



Association of  
**PROFESSIONAL ENGINEERS & GEOSCIENTISTS**  
of British Columbia

## **Council Agenda – Open Session**

Friday, September 9, 2016

Ballroom 1-2, 2<sup>nd</sup> Floor

Delta Burnaby Hotel, 4331 Dominion Street, Burnaby, BC

11:25 – 15:45

### **11:25 4. OPEN SESSION CALL TO ORDER**

**(5 min)**

*Chair: Dr. Mike Wrinch, P.Eng., FEC, FGC (Hon.) President*

#### **4.1. Declaration of Conflict of Interest**

### **11:30 5. OPEN CONSENT AGENDA**

**(15 min)**

**MOTION: That Council approve all items (5.1 to 5.13) on the Open Consent Agenda.**

#### **5.1. June 17, 2016 Open Minutes**

Open Minutes  
Jun 17, 2016

**MOTION: That Council approve the June 17, 2016 Open Meeting minutes as circulated.**

#### **5.2. Appointments Approval**

**MOTION: That Council approves the recommended appointments and re-appointments to APEGBC Volunteer Groups and to outside Organizations, as applicable.**

#### **5.3. AGM Rules**

AGM Rules

**MOTION: That Council approves the proposed 2016 AGM Rules.**

*Governance Committee*

#### **5.4. Building Engineering as a Discipline of Evaluation for Registration**

Add Discipline for  
Reg

**MOTION: That Council approves that Building Engineering be added as a discipline of evaluation for registration and that competency assessors and a member of the Board of Examiners be recruited for this discipline.**

*David Harvey, P.Eng., Struct.Eng., FEC, Chair of the Registration Committee*

**5.5. Expansion of Election Information**Expansion of  
Elec Info

**MOTION: That Council ratifies the decision of the Executive Committee regarding the addition of a Question & Answer component for the 2016 Council Election and ratifies the Question and Answer template for the 2016 Council Election.**

*Dr. Mike Wrinch, P.Eng., FEC, FGC (Hon.), President, Chair of the Executive Committee*

**5.6. Increase Reduced Fee to 50% of Member Fee**Increase  
Reduced Fee

**MOTION 1: That Council approves that the reduced fee level for members whose annual active income is less than the threshold determined by Council be set to 50% of the full annual fee for each category of membership; and**

**MOTION 2: That Council approves that payment of the reduced fee be restricted to one billing year and not be allowed for the year immediately following that year. If a member requires fee relief for a second consecutive year, the member may avail themselves of other means provided by APEGBC.**

**\*\* In accordance with Section 21 of the Engineers and Geoscientists Act, the first part of the motion must be approved by 2/3rds of the Council members.**

*Gillian Pichler, P.Eng., FEC, FGC (Hon.), Director of Registration*

*Jennifer Cho, CPA, CGA, Director of Finance & Administration*

**5.7. Extend Refugee Application Fee Waiver to November 2017**Extend Refugee  
App Fee

**MOTION: That Council approves that the waiver of the application (examination of credentials) fee for refugees and persons in a refugee-like situation be extended until November 2017.**

*David Harvey, P.Eng., Struct.Eng., FEC, Chair of the Registration Committee*

**5.8.** Update on Eng.L. to P.Eng., Bridging PilotUpdate on  
Bridging Pilot

**MOTION:** That Council approves that the pilot project to evaluate the Policy ‘Providing Eng.L. a Method to Bridge the Academic Requirements to Full Professional Status’ be extended for up to three years (to September, 2019); and that Council approves that an annual report be brought to the Registration Committee and Council to review progress and findings and to make recommendations on the pilot and bridging program.

*Mark Rigolo, P.Eng., Associate Director of Engineering Admissions*

**5.9.** Updated ACEC-BC/APEGBC Professional Practice Guidelines – Budget Guidelines for Consulting Engineering Services Infrastructure and Transportation

Budget Guide

**MOTION:** That Council approves the updated ACEC-BC/APEGBC Professional Practice Guidelines – Budget Guidelines for Consulting Engineering Services Infrastructure and Transportation for final editorial and legal review prior to publication.

*Peter Mitchell, P.Eng., Director of Professional Practice, Standard & Development*

**5.10.** ABCFP (Association of BC Forest Professionals)/APEGBC/CAB (College of Applied Biologists) Professional Practice Guidelines – Legislated Riparian Assessments in BCRiparian Guide  
BC

**MOTION:** That Council approves the ABCFP (Association of BC Forest Professionals)/APEGBC/CAB (College of Applied Biologists) Professional Practice Guidelines – Legislated Riparian Assessments in BC for final editorial and legal review prior to publication.

*Peter Mitchell, P.Eng., Director of Professional Practice, Standard & Development*

**5.11.** APEGBC Professional Practice Guidelines – APEGBC Professional Practice Guidelines – Developing Climate Change Resilient Designs for Highway Infrastructure in British Columbia (Interim)Climate  
Change  
Resilient Guide

**MOTION:** That Council approves the APEGBC Professional Practice Guidelines – Developing Climate Change Resilient Designs for Highway Infrastructure in British Columbia (Interim) for final editorial and legal review prior to publication.

*Peter Mitchell, P.Eng., Director of Professional Practice, Standard & Development*

**5.12. Resource Support for Corporate Practice Initiative**Corp Prac  
Initiative

**MOTION: That Council approves an unbudgeted expenditure of \$75K in fiscal 2016/2017 to support assessment of corporate practice and the regulation of organizations.**

*Executive Committee*

**5.13. Information Reports**

**MOTION: That Council receives the following informational reports.**

**5.13.1. CEO & Registrar Report**CEO & Registrar  
Rpt

*Janet Sinclair, Chief Operating Officer*

**5.13.2. Update on Canadian Environment Experience Pilot**Update on Enviro  
Experience Pilot

*Michelle Cheng, Registration Project Manager*

**5.13.3. Registration Admissions Report to Council for Fiscal 2016**Reg Admission  
Rpt

*Gillian Pichler, P.Eng., FEC, FGC(Hon.), Director of Registration*

**5.13.4. Annual Membership Information Renewal**Annual  
Membership Info  
Renewal

*Tony Chong, Chief Regulatory Officer*

**5.13.5. Strategic Plan, KPI and Dashboard Update**Strat Plan  
Update

*Janet Sinclair, Chief Operating Officer*

**5.13.6. Engineers Canada Director's Report**Eng Can  
Director's Report

*Russ Kinghorn, P.Eng., FEC, FGC (Hon.), APEGBC Director to Engineers Canada*

*Jeff Holm, P.Eng., FEC, FGC (Hon.), APEGBC Director to Engineers Canada*

**5.13.7. APEGBC Road Map for 2015-2016 - Update**

Road Map

*Janet Sinclair, Chief Operating Officer*

**5.13.8. Committee Summary**

Comm Summary

*Janet Sinclair, Chief Operating Officer*

**11:45 6. OPEN REGULAR AGENDA**

**MOTION: That Council approve the Open Regular Agenda (with any additions from the Consent Agenda).**



- |   |  |                                 |
|---|--|---------------------------------|
| <p><b>11:45</b><br/><b>(40 min)</b></p> | <p><b>6.1.</b> Audited Financial Statements/Year End Review</p> <p><b>MOTION 1: That Council accept the report of the Audit Committee.</b></p> <p><b>MOTION 2: That Council approve the audited APEGBC Financial Statements for the fiscal year ended June 30, 2016.</b></p> <p><b>MOTION 3: That the President and the Chief Executive Officer and Registrar be authorized to sign the fiscal 2016 Financial Statements on behalf of Council.</b></p> <p><b>MOTION 4: That the appointment of PricewaterhouseCoopers LLP, Chartered Accountants as the Association's external auditors for the fiscal year ending June 30, 2017 be recommended for final approval at the Annual General Meeting in October 2016.</b></p> <p><i>Ken Laloge, CPA, CA, TEP, Chair of the Audit Committee</i></p> | <p>Financials</p>               |
| <p><b>12:25</b><br/><b>(45 min)</b></p> | <p><b>Break for Lunch</b></p>  |                                 |
| <p><b>13:10</b><br/><b>(20 min)</b></p> | <p><b>6.2.</b> Visiting Dean (UVIC)</p> <p><i>Dr. Tom Tiedje, P.Eng., Dean of the Faculty of Engineering at the University of Victoria</i></p>   | <p>Presentation</p>             |
| <p><b>13:30</b><br/><b>(15 min)</b></p> | <p><b>6.3.</b> Renewal of Memorandum of Agreement with the Society of International Trained Engineers of BC (SITEBC)</p> <p><b>MOTION: That Council approves the renewal of the Memorandum of Agreement with SITEBC (the MOA) and that the President be authorized to execute the MOA on behalf of APEGBC.</b></p> <p><i>Gillian Pichler, P.Eng., FEC, FGC (Hon.), Director of Registration</i></p>  | <p>Renew MOA with SITEBC</p>    |
| <p><b>13:45</b><br/><b>(40 min)</b></p> | <p><b>6.4.</b> Branding Development Update</p> <p><b>MOTION: That Council approve the name Professional Engineers and Geoscientists of BC, and the [crest/diamond] logo for development and implementation.</b></p> <p>or</p> <p><b>MOTION: That Council directs staff to provide further options for design concepts for Council decision.</b></p> <p>or</p> <p><b>MOTION: That Council defer a decision on the Branding Initiative indefinitely.</b></p> <p><i>Melinda Lau, Acting Director of Communications &amp; Stakeholder Engagement</i></p>   | <p>Brand Development Update</p> |

*Maria-Carmen Kelly, Marketing Specialist*

**14:25  
(15 min)**

- 6.5.** Approval of the Strategic Plan 2017-2020 Framework  
 MOTION: That Council approves the 2017-2020 Strategic Plan Framework  
 Janet Sinclair, Chief Operating Officer

Approval of Strat  
Plan Framework

**14:50  
(30 min)**

- 6.6.** Policy and Procedure for Registration Hearings  
**MOTION 1: That Council delegate its authority to hold Registration hearings to the Registrar under s. 13(8) of the Act on an interim basis until a bylaw is approved by Council to delegate this function to a Registration Hearings Committee.**  
**MOTION 2: That Council approve, in principle, the Policy and Procedure for holding Registration Hearings; and**  
**MOTION 3: That Council approve that a draft bylaw creating a committee to hold registration hearings be reviewed by legal counsel and brought to the November 2016 meeting with Terms of Reference for approval to conduct a bylaw consultation.**  
*Gillian Pichler, P.Eng., FEC, FGC (Hon.), Director of Registration*

Reg Hearings

**6.7.** Governance Committee

**15:20  
(10 min)**

- 6.7.1.** APEGBC Volunteer Group Reporting Structure Review  
**MOTION: That Council approves the following recommendations:**

Covering Memo  
 Volunteer Group  
 Rev

- 1. That the Statutory (mandated by the Engineers and Geoscientists Act and Bylaws), the Standing, and Advisory Committees except the Mentoring Committee and the Professional Practice related voluntary groups remain intact and continue to report to Council.**
- 2. That the Mentoring Committee operate as an advisory committee reporting to the CEO.**
- 3. That all of the Professional Practice related voluntary groups report to the Professional Practice Committee which will report to the CEO.**
- 4. That all Professional Practice Related Guidelines will continue to be forwarded to Council for approval.**

**15:30**  
**(5 min)**

**6.7.2** Approval of Revised Audit Committee Terms of Reference

Rev Audit TOR

**MOTION: That Council approves the amended terms of reference as presented.**

**15:35**  
**(10 min)**

**6.8.** Legislative Implementation Task Force

LITF

**MOTION: That Council stands down the Legislative Implementation Task Force and thanks the members for their contribution.**

*Efrem Swartz, LL.B., Director of Legislation, Ethics & Compliance*

**15:45**  
**(10 min)**

**End of Open Session and Break Before In-Camera Session**

**MINUTES OF THE OPEN SESSION OF THE FIFTH MEETING OF THE 2015/2016 COUNCIL of  
the Association of Professional Engineers and Geoscientists of British Columbia,  
held on JUNE 17, 2016 in the RIVERS ROOM, HOTEL 540, KAMLOOPS, BC**

**Present**

**Council**

Dr. Mike Wrinch, P.Eng., FEC	President (Chair)
Bob Stewart, P.Eng.	Vice President
Dr. John Clague, P.Geo., FGC, FEC (Hon.)	Past President
Kathy Tarnai-Lokhorst P.Eng., FEC	Councillor (via teleconference)
David Harvey, P.Eng., Struct.Eng., FEC	Councillor
Tajdin Mitha, LLB	Councillor
Richard Farbridge, P.Eng.	Councillor
Dr. Lyn Anglin, P.Geo.	Councillor (via teleconference)
Dan Campbell, P.Eng.	Councillor
Ken Laloge, CPA, CA, TEP	Councillor
Chris Moser, P.Eng.	Councillor (via teleconference)
Scott Martin, P.Eng.	Councillor
John Turner, P.Ag.	Councillor

**Staff**

Ann English, P.Eng.	Chief Executive Officer & Registrar
Janet Sinclair	Chief Operating Officer
Tony Chong, P.Eng.	Chief Regulatory Officer & Deputy Registrar
Jennifer Cho, CGA, CPA	Director - Finance & Administration
Sarah Wray	Executive Assistant to Council and to the Chief Executive Officer & Registrar
Deesh Olychick	Director – Member Services
Melinda Lau	Acting Director – Communication & Stakeholder Engagement
Peter Mitchell, P.Eng.	Director – Professional Practice, Standards & Development
Don Gamble	Director – Information Services
Gillian Pichler, P.Eng.	Director – Registration
Efrem Swartz, LLB	Director – Legislation, Ethics & Compliance

**Guests**

Russ Kinghorn, P.Eng., FEC, FGC (Hon.)	APEGBC Director to Engineers Canada
Jeff Holm, P.Eng., FEC, FGC (Hon.)	APEGBC Director to Engineers Canada
Garth Kirkham, P.Geo., FGC	APEGBC Director to Geoscientists Canada

**Regrets**

Carol Park, P.Eng.	Councillor
Cassandra Hall, P.Geo., P.Eng.	Councillor
Caroline Andrewes, P.Eng.	Councillor
Ana Fernandes, CIM, FCSI	Councillor

## OPEN SESSION – CALL TO ORDER

Dr. Mike Wrinch, President and Chair, called the meeting to order at 10:30 am. Bob Stewart acted as the Parliamentarian and Richard Farbridge acted as the Membership Engagement Champion. Councillors Dr. Lyn Anglin, Chris Moser, and Kathy Tarnai-Lokhorst joined the meeting via teleconference. Councillors Caroline Andrewes, Cassandra Hall, Ana Fernandes, and Carol Park send their regrets.

Guests: The Chair advised the following guests would be welcomed over the course of the meeting: Russ Kinghorn and Jeff Holm of Engineers Canada, Garth Kirkham of Geoscientists Canada, Mark Porter – Chair of the Climate Change Advisory Group, Rob Newall and James Batemen from Karacters Design Group, and Dr. Tom Dickenson and Sadie Hunter from Thompson Rivers University. One member of the South Central Branch also joined the session.

### CO-16-58 OPEN CONSENT AGENDA

**MOTION:** It was moved and seconded that items 5.1 to 5.9 of the Open Consent Agenda be approved.  
**CARRIED**

Motions carried by approval of the Consent Agenda:

- 5.1 **MOTION** that the April 15, 2016 Open Meeting minutes be approved as circulated.
- 5.2 **MOTION** that Council approves the recommended appointments and reappointments to APEGBC Volunteer Groups and to outside Organizations, as applicable.

Individual, Designation	Position	APEGBC Volunteer Group/Outside Organization	Staff Contact	Start Date	Expiry Date	New/Returning * Over 6 Years
<b>Re-appointments (under six years)</b>						
Thomas Vanman Leung, P. Eng., Struct.Eng., FEC	Member	Discipline Committee	Efrem Swartz	June 20, 2016	June 20, 2018	Returning
Nadine King, P.Eng.	Member	Standing Awards Committee	Melinda Lau	June 17, 2016	June 17, 2018	Returning
M.F. Sophie Mercier, P.Eng.	Member	Building Enclosure Committee	Peter Mitchell	June 20, 2016	June 20, 2018	Returning
Christa E. Wilcock, P.Eng.	Member	Building Enclosure Committee	Peter Mitchell	June 20, 2016	June 20, 2018	Returning
Michael J. Wilson, P.Eng.	Member	Building Enclosure Committee	Peter Mitchell	October 31, 2016	October 31, 2018	Returning
Roz C. Nielsen, P.Eng.	Member	Building Codes Committee	Peter Mitchell	May 20, 2016	May 20, 2018	Returning
<b>New Appointments and Re-Appointments (over six years)</b>						
Robyn Edgar, P.Eng.	Member	Building Enclosure Committee	Peter Mitchell	June 17, 2016	June 17, 2018	New

Paul Blanchard, P.Eng., FEC, FGC (Hon.)	Scrutineer	2016/17 Council Election & Bylaw Vote	Deesh Olychick	June 17, 2016	October 22, 2016	New
Kathleen Kompauer, P.Eng., FEC, FGC (Hon.)	Scrutineer	2016/17 Council Election & Bylaw Vote	Deesh Olychick	June 17, 2016	October 22, 2016	New
Dennis McJunkin, P.Eng., FEC, FGC (Hon.)	Scrutineer	2016/17 Council Election & Bylaw Vote	Deesh Olychick	June 17, 2016	October 22, 2016	New
Oliver John Hans Bonham, P.Geo., FGC	Member	Discipline Committee	Efrem Swartz	June 26, 2016	June 26, 2018	Returning
Kevin Riederer, P.Eng.	Member	Standing Awards Committee	Melinda Lau	June 17, 2016	June 17, 2018	New
Ben Whiting, P.Geo.	Member	Standing Awards Committee	Melinda Lau	June 17, 2016	June 17, 2018	New
Gloria Gill, P.Eng.	Member	APEGBC Editorial Board	Melinda Lau	June 17, 2016	June 17, 2018	New
Emilia Mazzonna, P.Eng.	Member	Building Codes Committee	Peter Mitchell	May 4, 2016	May 4, 2018	Returning
Dr. Donald Gillespie, P.Eng.	Member	Practice Review Committee	Peter Mitchell	June 17, 2016	June 17, 2018	New
William R. Hughes, P.Eng.	Member	Organizational Quality Management Committee	Peter Mitchell	June 17, 2016	June 17, 2018	New

- 5.3 **MOTION** that Council approve the Volunteer Guidelines subject to legal and editorial review.
- 5.4 **MOTION** that APEGBC cease to be the national provider of assessments for the Canada International Professional Engineers and APEC Engineer Register; and that subject to final edits, the CEO be authorized to sign on behalf of APEGBC, the Memorandum of Agreement setting out the terms of the transition.
- 5.5 **MOTION** that the changes to the Policy on applicants whose Discipline of Practice/Experience is Different from their Discipline of Academic Qualification be approved.
- 5.6 **MOTION** that the revised Policy for the Publication of Disciplinary Decisions be approved.
- 5.7 **MOTION** that the proposed revisions to the Terms of Reference for the Advisory Task Force on Corporate Practice be approved.
- 5.8 **MOTION** that the proposed Delegation of Signing Authority Policy be approved.
- 5.9 **MOTION** that Council receives the following information report:
- CEO & Registrar Report

- Engineers Canada Directors Report
- Geoscientists Canada Directors Report
- Branch Engagement Report
- Annual Survey on Council Performance
- APEGBC Road Map for 2015/2016 – Update
- Committee Attendance Summary

CO-16-59 OPEN REGULAR AGENDA

**MOTION** It was moved and seconded to approve the Open Regular Agenda.  
**CARRIED**

CO-16-60 APPOINTMENT OF COUNCILLOR TO AUDIT COMMITTEE

**MOTION** It was moved and seconded that Councillor Kathy Tarnai-Lokhorst be appointed to the Audit Committee until the end of the 2015/2016 Council year.  
**CARRIED**

CO-16-61 POSITION PAPER ON HUMAN-INDUCED CLIMATE CHANGE

**MOTION** It was moved and seconded that the APEGBC Council approves APEGBC's Position on Human-Induced Climate Change, for final editorial and legal review before publication.  
**CARRIED**

CO-16-62 BRAND DEVELOPMENT UPDATE

**MOTION 1** It was moved and seconded that Council approve the following visual identity for full development and implementation: (Direction 1).  
**DEFERRED**

**MOTION 2** It was moved and seconded that Council approve the following business name for APEGBC: Engineers and Geoscientists British Columbia.  
**DEFERRED**

CO-16-63 TRU ENGINEERING INITIATIVE

Dr. Tom Dickinson, Dean of the Faculty of Science at the Thompson Rivers University presented the TRU Engineering Initiative to Council. Dr. Dickinson spoke on the Electrical, Computer and Software Engineering programs at the TRU and also addressed the following:

- Why Computer, Software & Electrical Engineering at TRU?
- Demand for Professional Engineers & Digital Talent in Canada
- Information & Communications Technology Council 2016 report
- WorkBC labour market projections for technology & science
- Venture Kamloops Study of Demand for Engineers & Training
- TRU's successful Engineering Transfer program
- Academic Pathways Engineering & Applied Sciences at TRU
- Resources Required to Develop Engineering Degrees at TRU

**MOTION** It was moved and seconded that APEGBC offer its support to Thompson Rivers University in relation to the development of an Engineering Program and direct staff to prepare a letter of support to be submitted to the Minister of Advanced Education.

CARRIED

CO-16-64 UPDATE ON EIT ACCREDITED EMPLOYER PILOT

Gillian Pichler, Director of Registration, gave an update on the EIT Accredited Employer Pilot.

**END OF OPEN SESSION**

The Open Session ended at 1:30 pm.



Date: August 23, 2016

Report to: **Council for Decision**

From: Governance Committee

Subject: 2016 AGM Meeting Rules for Approval

Linkage to Strategic Plan: Continue to implement best practices in governance.

**Purpose:** To approve recommended changes to the 2016 AGM Meeting Rules.

**Motion:** That Council approves the proposed 2016 AGM Rules.

### Background

Each year, the AGM meeting rules are reviewed by the Governance Committee, and changes are recommended to Council for approval.

### Discussion

The Governance Committee met on August 3, 2016 and discussed proposed changes to the AGM Rules as recommended by Eli Mina, APEGBC's designated Registered Parliamentarian, and informed by legal advice provided by Michael Blatchford of Bull Housser.

The Governance Committee recommends the following changes:

1. Simplify the language in rule 2.3 to negate ambiguity and align with practice that motions must be framed in advisory language.
2. In rule 4.1, remove "*Those who leave the meeting must turn in their voting cards to staff*" to align with current practice.
3. Remove the "*Use of Preamble*" section in the Motion References to align with rule 2.5.

In addition to the recommendations above, a number of minor editorial changes have been made. A marked-up document with the changes is attached.

As in previous years, members will be encouraged to develop and submit motions in advance of the AGM.

### Recommendation

**That Council approves the proposed 2016 AGM Rules.**

**Appendix A – 2016 AGM Rules (Black-Lined)**

**Appendix B – 2016 AGM Rules (Track Changes)**

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Date: August 23, 2016

Report to: **Council for Decision**

From: David Harvey, P.Eng., Struct.Eng., FEC  
Chair of Registration Committee

Issue: Add Building Engineering as a Discipline of Registration

Linkage to the Strategic Plan: Members and Future Members

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<b>Purpose:</b>	To add Building Engineering as a discipline of registration
<b>Motion:</b>	That Council approves that Building Engineering be added as a discipline of evaluation for registration and that competency assessors and a member of the Board of Examiners be recruited for this discipline.

## Background

The definition of the practice of professional engineering in the Engineers and Geoscientists Act includes, “...other disciplines of engineering that may be designated by the council and for which university engineering programs have been accredited by the Canadian Engineering Accreditation Board or by a body which, in the opinion of the council, is its equivalent...”<sup>1</sup>

It is proposed that Building Engineering<sup>2</sup> be added as a choice of application discipline of evaluation for the following reasons:

- Building Engineering is a well-established area of practice
- Engineers Canada has established a syllabus for this discipline
- There are CEAB-accredited programs in Building Engineering at Concordia University and in Architectural Conservation and Sustainability at Carleton University, Masters of Engineering/Applied Science programs in Building Engineering at BCIT; and courses offered in building engineering in other CEAB-accredited programs such as University of Toronto’s B.A.Sc. in Civil Engineering. There are also Building Engineering programs accredited by Washington Accord accrediting organizations and therefore also recognized by APEGBC.
- APEGBC has experienced increasing volumes of applications from applicants practicing in this field due to the growth of BC’s already significant building

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<sup>1</sup> Engineers and Geoscientists Act 1(1) Definitions and Interpretation: practice of professional engineering

<sup>2</sup> Building engineering (also referred to as architectural engineering) includes the design of building systems including heating, ventilation and air conditioning, plumbing, fire protection, electrical, lighting, and structures.

engineering practice and industry. Several of these applicants have been referred to the Interdisciplinary Review Panel whose feedback is that they should be evaluated through this discipline, instead of being forced to choose a discipline of evaluation that doesn't quite match their area of practice (electrical, integrated, mechanical)

- The competency based assessment system allows all applicants to demonstrate their competency to practice, regardless of area of practice; and
- APEGBC has members practicing in building engineering who are available to act as competency assessors and an examiner if needed.

### Discussion

APEGBC is experiencing a significant increase in volumes of applications from graduates practicing in the building engineering area. These applicants are forced to choose a discipline of evaluation for registration (electrical, integrated, mechanical) that doesn't quite match their proposed area of practice. APEGBC has been hearing concerns from new graduates and employers in this area of practice that these graduates are not being properly recognized and their applications are being delayed unnecessarily while APEGBC tries to determine how to process them.

### Recommendation

It is therefore recommended that building engineering be added to the engineering disciplines for evaluation of professional engineer applicants and that competency assessors and an examiner be recruited for this discipline of registration.

**MOTION: That Council approves that Building Engineering be added as a discipline of evaluation for registration and that competency assessors and a member of the Board of Examiners be recruited for this discipline.**

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Date: August 8, 2016

Report to: **Council for Decision**

From: Executive Committee

Subject: Expansion of Election Information

Linkage to Strategic Plan: Continue to implement best practices in governance.

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<b>Purpose:</b>	To approve the Candidate Question & Answer template for the 2016 Council Election.
<b>Motion:</b>	That Council ratifies the decision of the Executive Committee regarding the addition of a Question & Answer component for the 2016 Council Election and ratifies the Question and Answer template for the 2016 Council Election.

### Background

In the 2012 and 2015 Member Satisfaction surveys, members expressed that they do not vote in Council elections because they feel they do not have enough information to make an informed decision. Council has expressed on many occasions, most recently at the April Council meeting, that they would like to see voter turnout improved and therefore directed staff to explore ways that additional information about the candidates could be made available. It was determined that in addition to the standard candidate statement, each candidate could be offered the opportunity to answer an optional Question and Answer (Q&A) section and that both documents could be published as part of the election materials.

At its May 30 meeting, the Executive Committee approved the concept of an optional Question and Answer section in the election materials. Council was informed about the addition of the Question and Answer template via an email from the President after the Executive Committee meeting and no objections were received. This email also advised that a follow up report to Council on this matter would be presented at the September Council meeting. This is that report.

### Discussion

The Registrar is responsible for preparing the election ballot as per the bylaws, and for preparing the election material as per the Council approved Election Policy. Following Council's direction to explore options to provide more information about the candidates for the members, the Executive Committee gave approval for an optional Q&A section in the election materials. The Registrar subsequently developed the specific Q&A template for implementation. As per the Terms of Reference for the Executive Committee, decisions made by this committee between Council meetings are to be brought forward to Council for information and/ or ratification. As this matter pertains to the election, it is recommended that those members of Council who are currently running for re-election declare a conflict of interest and refrain from participating in the discussion and vote on this matter.

## Recommendation

That those members of Council who are currently running for re-election declare a conflict of interest and refrain from participating in the discussion and vote on this matter.

## MOTIONS:

That Council ratifies the decision of the Executive Committee regarding the addition of a Question & Answer component for the 2016 Council Election and ratifies the Question and Answer template for the 2016 Council Election.

## QUESTION AND ANSWER TEMPLATE

- 1. APEGBC is the regulatory authority charged with protecting the public interest with respect to the practice of engineering and geoscience in the province of BC. What is the key challenge facing APEGBC?**
- 2. What are the key issues facing the engineering and/ or geoscience professions?**
- 3. Looking five years ahead, what is your vision for APEGBC as a professional regulatory body in BC?**

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Date: August 28, 2016

Report to: **Council for Decision**

From: Gillian Pichler, P.Eng., Director, Registration  
Jennifer Cho, CPA, CGA, Director, Finance & Administration

Subject: Revise Reduced Annual Fee to 50% for All Categories of Membership and  
Remove Consecutive Year Access

Linkage to Strategic Plan: 4. Enabling Goal

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<b>Purpose:</b>	To adjust the reduced fee and limit the time period for which it can be used.
<b>Motion:</b>	<p>That Council approves that the reduced fee level for members whose annual active income is less than the threshold determined by Council be set to 50% of the full annual fee for each category of membership; and</p> <p>That Council approves that payment of the reduced fee be restricted to one billing year and not be allowed for the year immediately following that year. If a member requires fee relief for a second consecutive year, the member may avail themselves of other means provided by APEGBC.</p>

### Background

In April 2010, in preparation for the establishment of the new non-practising member bylaw, Council approved a reduced fee policy that allowed access to reduced annual fees for all grades of membership and licence – practising and non-practising, based on an Active Income threshold or a medical condition that renders the member of licensee unfit for work.

This resulted in a tiered fee relief structure of:

- Reduced Fee - members with an annual active income less than a set Low Income threshold (currently \$31,000)
- Fees Waived – members who have medical issues that render them unable to work
- Fees Deferred – with a limit of one year upon formal application to the Director, Registration, after which members who require further fee deferral must apply to the Benevolent Fund or resign.
- Life Membership for Members who are age 70 with 35 years in the profession; at least 20 of which are with APEGBC.

The current reduced fee is \$120, or 32% of the registered member annual fee and 54% of the member-in-training annual fee.

Members apply for the reduced fee online, making a declaration as to their annual active income.

### Discussion

During the preparation for the 2017 budget, staff examined trends in the above categories.

Key findings were:

- i. In 2016, 1,845 members paid reduced fees of \$120. This represents 6% of the membership excluding Life and Student Members.
- ii. 65% of these members had paid reduced fees in 2014 and/or 2015. Many of these may be retired and bridging to Life Membership, unemployed or on parental leave.
- iii. from 2014 to 2016, there was a 12% increase in reduced fee requests. This increase was in the P.Geo. and Member-in-Training categories;
- iv. Most members paying reduced fees have maintained practice rights; and
- v. During the same period from 2014 to 2016, fee deferral requests increased from 28 to 68 or 142%; and resignations by 18%.

**Table1: Reduced Fee Payments**

	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>Average 3 Year % change</b>	<b>Paid reduced fees in 2014 and/or 2015</b>	<b>%</b>
P.Eng.	1359	1405	1312	-1.6%	960	73%
P.Geo.	109	150	188	31.5%	113	60%
EIT	162	229	301	36.4%	99	33%
GIT	15	45	44	98.9%	24	55%
<b>TOTAL</b>	<b>1645</b>	<b>1829</b>	<b>1845</b>	<b>6.0%</b>	<b>1196</b>	<b>65%</b>

Staff examined reduced fee policies of several other regulatory bodies in B.C. and engineering and geoscience regulators in Canada. A variety of policy conditions applied, notably:

- Restriction on the number of years a member can be on reduced fees (1 to 4 years)
- Reduced fees are typically 30% of the annual member fee; however members on reduced fees are typically linked to 'inactive' or non-practising membership.
- Life Membership among regulators in B.C. seems to be a device of the past – most have replaced it with retired non-practising membership for a nominal fee with or without voting rights.

The implementation of the reduced fee category seems to be overly-permissive by comparison, indicating that APEGBC's fee policy may need refinement.

#### Setting Reduced Fees to a Percentage of the Member Fee

Setting reduced fees to a percentage the member fee (e.g. 50%) could gain additional fee income. Fee sensitivity might cause some members not intending to practice engineering or geoscience in the future to resign their memberships. If the reduced fee were set at 50% of the current fee, it would increase for professional members and be somewhat reduced for members-in-training, i.e.

Select Major Member Categories Before GST:	Full Annual Fee	Current Reduced Fee	50% of Annual Fee
P.Eng. and P.Geo.	\$380	\$120	\$190
EIT and GIT	\$221	\$120	\$110.50

Assuming no change in the number of members accessing reduced fees, the change from \$120 to 50% of the member fee would result in a net increase in revenue of approximately \$102,000.

#### Limiting Time Access to Reduced Fees

It is recommended that APEGBC limit the number of consecutive years that a member can be on reduced fees. Members who wish to practice full time, are not on parental leave and have an annual active income of less than \$31,000 are likely also in need of additional financial assistance.

It is suggested that the time limit be set at 1 year, following which members in hardship may avail themselves of other reduced fee options if needed, including fee deferral and application to the Benevolent Fund. Members may apply for a reduced fee again in the future for a one year period.

It is anticipated that members who are on extended parental leave or are long-term members who are no longer practising and wish to bridge to Life Membership may raise an objection to the one year time restriction.

#### **Recommendation(s)**

That Council approves that the reduced fee level for members whose annual active income is less than the threshold determined by Council be set to 50% of the full annual fee for each category of membership; and

That Council approves that payment of the reduced fee be restricted to one billing year and not be allowed for the year immediately following that year. If a member requires fee relief for a second consecutive year, the member may avail themselves of other means provided by APEGBC.

*In accordance with Section 21 of the Engineers and Geoscientists Act<sup>1</sup>, the first part of the motion must be approved by 2/3 of the council members.*

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<sup>1</sup> 21 (1) The council, by resolution passed by at least 2/3 of the council members, may

- (a) set an annual fee to be paid by members, licensees and certificate holders, and
- (b) set the date on or before which the annual fee must be paid.



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Date: November 16, 2015

Report to: **Council for Decision**

From: David Harvey, P.Eng., Struct.Eng., FEC  
Chair, Registration Committee

Subject: Refugee Admissions Policy: Application Fee

Linkage to Strategic Plan: Goal 1 – Members and Future Members

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<b>Purpose:</b>	To extend the time period for waiver of the application (examination of credentials) fee for refugees, displaced persons and persons in a refugee-like status.
<b>Motion:</b>	That Council approve that the waiver of the application (examination of credentials) fee for refugees and persons in a refugee-like situation be extended until November 2017.

### Background

In November 2015, deciding that it would be appropriate to waive the application fee for those who are classified as refugees, with respect not only to affordability, but also as their ability to prove qualification is likely to follow an onerous and uncertain path. Council approved the following motion:

*that the Designated Refugees who apply for enrollment, registration, or licence be exempt from payment of the application (examination of credential) fee and that this practice be revisited in November 2016.*

In February 2016, Council also approved a Policy on Refugees (Applicants) who Cannot Provide Traditional Documentation and included in the category of Designated Refugees: applicants who are designated refugees or in a refugee-like situation.

### Discussion

Since the implementation of the application fee waiver for refugees in November 2015, APEGBC has have received applications from four Syrian refugees. We also agreed to or evaluate or assist in the evaluation of applicants for two other regulators: APEGA and Engineers PEI.

Due to the extended period of time it takes for refugees to be settled and to come forward for registration, the Registration Committee is suggesting now that the fee waiver be extended through November 2017. We estimate that we will receive a maximum of 30 applications from refugees during this period, including those referred by APEGA.

In waiving the fee, APEGBC is taking a reasonable and altruistic position that directly meets its objective of supporting potential members in acquiring the competencies required for professional registration and indirectly meets several others. After Council waived the fee in November 2016, one member wrote, *"I just wanted to comment on the decision to exempt*

*refugees from the P.Eng and P.Geo application cost for the next year. This is a fantastic idea, and I would love to see it extended indefinitely. This decision made me proud to be an APEGBC member.”*

### **Recommendation**

That Council approve that the waiver of the application (examination of credentials) fee for refugees and persons in a refugee-like situation be extended until November 2017.

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Date: August 23, 2016  
Report to: **Council for Information and Decision**  
From: D.I. (David) Harvey, P.Eng., Struct.Eng., FEC Member of Council  
Chair, Registration Committee  
Issue: Status of the Limited Licence to Professional Registration Pilot Bridging Program  
Linkage to the Strategic Plan: Members and Future Members

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**Purpose:**

To provide Council with a status report on the Limited Licence to Professional Registration Pilot Bridging Program and to extend this program for up to three years to September 2019.

**Motion:**

That Council approves that the pilot project to evaluate the Policy Providing Eng. L a Method to Bridge the Academic Requirements to Full Professional Status be extended for up to three years (to September 2019) and that an annual report be brought to the Registration Committee and Council to review progress and findings and to make recommendations on the pilot and bridging program.

**Background**

At its June 2015 meeting, the Registration Committee passed a motion that a process of research, consultation and development be carried out in order to develop a bridging process for Engineering Licensees to full Professional Engineer status.

Staff developed a pilot program with a bridging policy (see Appendix 1) that consists of the following:

An Eng.L. holder shall be considered as having met the academic requirements for full professional status if the applicant:

- a) is an active Eng.L licensee in good standing; and
- b) has obtained a minimum of a 2-year diploma in science or technology and is not academically qualified for P. Eng. registration; and
- c) has a low-risk reference profile, ie:
  - All references positive;
  - At least two in-discipline P.Eng. references; and
  - At least one supervisor P.Eng. reference; and
- d) has more than 10 years of well-documented progressive work experience, including at least 4 years as an Eng.L, at least one year in a Canadian Environment and has attained a job position that demonstrates the competencies of a P.Eng. that have been assessed through a competency report and validated by acceptable professional referees; and

- e) has passed the FE and PE Exams or other suitable exam protocol determined and set by a Board of Examiners; and
- f) has passed an LTE-style interview based on a technical report. The report is to be 5000 to 10000 words long, and based on a design study or a report of original authorship. The topic will be assigned by a technical panel and must be suitable to the applicant's experience and provide opportunity for the applicant to demonstrate technical competence to the standard of an exemplifying qualification. To ensure that the project undertaken is of a sufficient scope and challenge, the topic will be assigned from a project undertaken approximately 18 months after the candidate began practicing as an Eng.L.

The technical report is then provided to an interview panel for an LTE-Style interview. At least one of the interview panel members cannot have been a member of the technical panel that assigned the report. The interview will proceed in the style of a thesis-defense. Interviewers will use the report as a basis to probe the applicant's technical competence.

The report and defense will be judged on the extent to which the applicant can demonstrate a clear understanding of engineering principles and the key technical aspects relating to the topic assigned that one would normally expect from someone who is graduating with an exemplifying qualification (4-year bachelor's degree in engineering or applied science). If the interview meets the requirements set out by the interview panel, the applicant is considered to have the requirements for professional registration.

At the September 11, 2015 meeting, Council carried the following motions:

- That the proposed Policy on Providing Eng.L. a Method to Bridge the Academic Requirements to Full Professional Status be approved.
- That a pilot project to evaluate the Policy Providing Eng.L. a Method to Bridge the Academic Requirements to Full Professional Status be run until June 2016 and that a report be brought to the Registration Committee in August 2016 to review progress and findings.

## Discussion

The program was launched in Q1 2016 and, as of the writing of this report, 13 Eng L holders have applied to the Pilot Bridging Program. Most are highly experienced practitioners.

Each was sent a letter explaining that they would need to complete the following next steps:

1. Provide updates with respect to education and formal learning completed since the Eng.L. application
2. Complete a Competency-Based Assessment of experience Using APEGBC's Competency Experience Reporting System.
3. Provide Three Project Abstracts
4. Review of the results of your Competency Assessment
  - a. If the Competency Assessment is successful, the recommended next step will be to write and pass the Fundamentals of Engineering and Principles and Practice of Engineering Examinations.

- b. If the Competency Report is not successful, they will be given feedback on where it is lacking and, if applicable, given instructions on how to update it. They may be told that their competency level is not at the required level and that the application is rejected at this time, whereupon the application fee will be refunded.
5. Write the Fundamentals of Engineering and Principles and Practice of Engineering Examinations
6. Results of exams
  - a. If they are successful in completing both the FE and PE exams, they will be given the topic for a technical report and presentation selected from the three project proposals in Section 3 above.
  - b. If they are not successful in completing both the FE and PE exams, they may rewrite one or both in accordance with the regulations of these exams.
7. Complete the technical project report and present the results to a panel of P. Eng.

Each is now in the process of completing the Competency Experience Reporting System (step 2 above). Once these are complete, staff will provide feedback to each applicant as to whether the competency reports they prepared are sufficient. If they are, they can proceed to the rest of the steps outlined above.

All members for the Engineering Licence to Professional Engineer Bridging Program Advisory Panel have been recruited.

At present none of the applicants is close to completing the bridge program. It would appear that applicants will need 1-3 more years' time to have a realistic chance of completing the process. It is not possible to evaluate the effectiveness of the program until several applicants have completed all of the steps above and it is recommended that this pilot program be extended for a reasonable length of time to allow for more data to be collected on its effectiveness.

### Recommendation

It is therefore recommended that the pilot project to evaluate the Policy Providing Eng. L a Method to Bridge the Academic Requirements to Full Professional Status be extended for up to three years (to September 2019). Staff should prepare an annual report to be brought to the Registration Committee and Council to review progress and findings and to make recommendations on the pilot and bridging program.

**MOTION:** That Council approves that the pilot project to evaluate the Policy Providing Eng. L a Method to Bridge the Academic Requirements to Full Professional Status be extended for up to three years (to September 2019) and that an annual report be brought to the Registration Committee and Council to review progress and findings and to make recommendations on the pilot and bridging program.

### Appendix A – Policy Providing Engineering Licensees a Method to Bridge the Academic Requirements to Full Professional Status

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Date: August 26, 2016

Report to: **Council for Decision**

From: Peter R. Mitchell, P.Eng.  
Director, Professional Practice, Standards & Development

Subject: Updated *ACEC-BC/APEGBC Professional Practice Guidelines – Budget Guidelines for Consulting Engineering Services Infrastructure and Transportation*

Linkage to Strategic Plan: Improve resources and education as well as awareness and access to resources that help members practice to high professional and ethical standards.

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**Purpose:** For Decision and Action

**Motion:** That Council approve the updated *ACEC-BC/APEGBC Professional Practice Guidelines – Budget Guidelines for Consulting Engineering Services Infrastructure and Transportation* for final editorial and legal review prior to publication.

## Background

APEGBC's Professional Practice, Standards and Development (PPSD) Department focuses on the proactive regulation of professional engineering and professional geoscience. One of the important ways in which PPSP delivers on the proactive regulation of the professions is through the development of APEGBC professional practice guidelines. These particular professional practice guidelines provide guidance in establishing the appropriate budget for consulting engineering services allocated for infrastructure and transportation projects in BC.

The updating of these guidelines which were last published in 2009 is very timely due to the announcement of the new federal infrastructure funding program which will provide an additional 60 billion dollars in new funding over the next 10 years for public transit, green infrastructure and social infrastructure. It is important that appropriate budgets are allocated for the engineering of these projects. These guidelines provide guidance for establishing an adequate budget for engineering fees which will support providing an appropriate standard of engineering practice for all infrastructure and transportation projects in BC.

## Discussion

ACEC-BC and APEGBC issued the latest version of the *ACEC-BC/APEGBC Budget Guidelines for Consulting Engineering Services* in 2009. In 2015/16 the ACEC-BC Business Practices Group prepared a revised draft of the budget guidelines for consulting engineering services for review and consideration of the APEGBC Consulting Practice Committee. The APEGBC Consulting Practice Committee met to review the revised guidelines and approved them for final editorial and legal review based on the following three items being appropriately addressed:

1. The term "fee guidelines" cannot be used in an APEGBC endorsed document, as this is contrary to the federal government's *Competition Act*. The *Competition Act* prohibits APEGBC from setting practice standards and then also establishing the fees associated with meeting those practice standards. APEGBC recommends that the title be changed back to "budget guidelines".

Response by ACEC-BC was that the name of the guidelines was revised to “budget guidelines”.

2. The new version of the guidelines only covers Infrastructure and Transportation, while the previous version of the *ACEC-BC/APEGBC Budget Guidelines for Consulting Engineering Services* published in 2009 also included budget guidelines for consulting engineering services provided on buildings. APEGBC has been notified that the intention is to have a second issue of the guidelines that would cover buildings.

Response by ACEC-BC was that they will work with APEGBC to develop budget guidelines for consulting engineering services for building projects.

3. The new version of the guideline has omitted any mention to the APEGBC practice guidelines and how they aide professionals in explaining to clients what their due diligence is as a professional and how this relates to fees. It was recommended that page 1 of Section A, Basis for Remuneration from the 2009 version of the guidelines be included. It was noted that the new version also includes information regarding the OQM Program, APEGBC commends this.

Response by ACEC-BC was that they added new text in the Executive Summary of the attached guidelines referencing the APEGBC practice guidelines and the guidance provided for establishing budgets for engineering fees in the guidelines is consistent with the standard of care identified in APEGBC’s practice guidelines. ACEC-BC also added additional text to “Section 2. Range of Services” of the guidelines reinforcing this.

The revisions made by ACEC-BC to the budget guidelines in response to the comments provided by the APEGBC Consulting Practice Committee (see the three items identified above) were reviewed and it was recommended that the manner in which ACEC-BC responded to the comments appropriately addressed the issues raised.

The APEGBC Professional Practice Committee is responsible for overseeing the development of APEGBC professional practice guidelines and the Committee approved the following motion:

*“The APEGBC Professional Practice Committee recommends that the APEGBC Council approve the draft updated ACEC-BC/APEGBC Professional Practice Guidelines – Budget Guidelines for Consulting Engineering Services Infrastructure and Transportation for final editorial and legal review.”*

## **Recommendation**

MOTION: That Council approves the *ACEC-BC/APEGBC Professional Practice Guidelines – Budget Guidelines for Consulting Engineering Services Infrastructure and Transportation* for final editorial and legal review prior to publication.

## **Appendix A – ACEC-BC/APEGBC Professional Practice Guidelines – Budget Guidelines for Consulting Engineering Services Infrastructure and Transportation**



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Date: August 26, 2016

Report to: **Council for Decision**

From: Peter R. Mitchell, P.Eng.  
Director, Professional Practice, Standards & Development

Subject: ABCPF (Association of BC Forest Professionals)/APEGBC/CAB (College of Applied Biologists) Professional Practice Guidelines - Legislated Riparian Assessments in BC

Linkage to Strategic Plan: Improve resources and education as well as awareness and access to resources that help members practice to high professional and ethical standards.

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**Purpose:** For Decision and Action

**Motion:** That Council approves the *ABCPF (Association of BC Forest Professionals)/APEGBC/CAB (College of Applied Biologists) Professional Practice Guidelines - Legislated Riparian Assessments in BC* for final editorial and legal review prior to publication.

## Background

APEGBC's Professional Practice, Standards and Development (PPSD) Department focuses on the proactive regulation of professional engineering and professional geoscience. One of the important ways in which PPSD delivers on the proactive regulation of the professions is through the development of APEGBC professional practice guidelines. These guidelines identify the standard of care APEGBC professionals are expected to provide in meeting the duty of care APEGBC professionals have in law when carrying out professional activities involving the practice of professional engineering and professional geoscience.

These professional practice guidelines establish a common level of expectation, for a variety of stakeholders on what constitutes good professional practice when carrying out a particular professional activity. These stakeholders include APEGBC professionals, statutory decision makers, clients, APEGBC, other professional associations, the public and a variety of other groups. In 2008 APEGBC Council approved the Council Policy on the Development of APEGBC Professional Practice Guidelines.

In addition it is increasingly the case that multi-disciplinary teams are used for carrying out professional activities involving complex matters. Because they focus on public protection and not turf protection, professional practice guidelines are an effective tool for establishing the standard of practice to be followed for members of a variety of professional associations when carrying out professional activities where there is practice overlap between various professions. This is the case with these guidelines. The riparian area is that zone adjacent to a stream or lake that provides essential functions for natural hydrologic processes, channel stability, slope stability and erosion resistance of adjacent banks, supply of large woody debris, and vegetation contributing to fish life processes. Registered professionals permitted to carry out riparian area assessments in BC (mostly for development permitting purposes) under the *Riparian Area*



Regulation include members of the CAB, APEGBC and the ABCFP as well as a few from some other professional associations.

## Discussion

Concerns were raised by the public and a variety of stakeholders regarding the quality of riparian area assessments being carried out in BC under the *Riparian Area Regulation*.

As a result in 2014 the Office of the Ombudsperson, Province of British Columbia, issued a report entitled *Striking a Balance: The Challenges of using a professional reliance model in environmental protection – British Columbia's Riparian Areas Regulation*.

Recommendation 7 in the Ombudsperson's report states the following:

*"I recommended that the Ministry of Forests, Lands and Natural Resource Operations work with professional associations to draft professional guidelines for use by individuals who conduct assessments under the Riparian Areas Regulation that are designed to constitute an enforceable standard of professional conduct."*

The Ministry of Forests, Lands and Natural Resource Operations accepted this recommendation and in 2015 contracted with the CAB and APEGBC to develop a professional practice guideline establishing the standard of practice to be followed by self-regulated professionals in BC carrying out such assessments. By far the majority of such assessments are carried out by members of the CAB but there are also members of APEGBC, ABCFP, BC Institute of Agrologists and one member of ASTTBC who carry out these types of assessments. The CAB and APEGBC followed the APEGBC Council approved Policy for the development of Professional Practice Guidelines in preparing the contract signed with government which directed the development of these guidelines and also provided funding of \$12,000 towards their development.

The APEGBC Professional Practice Committee has been receiving regular updates on the development of this guideline and the consultation process followed for this guideline since February 2015. In addition the Professional Practice Committee approved the consultation process put in place and followed. Finally the APEGBC Professional Practice Committee approved the following motion *"The APEGBC Professional Practice Committee recommends that the APEGBC Council approves the ABCPF (Association of BC Forest Professionals), APEGBC, College of Applied Biologists (CAB) Professional Practice Guidelines - Legislated Riparian Assessments in BC for final editorial and legal review"*.

These guidelines have been recommended for approval by the members of the primary authors. Also senior staff from the BC Ministry of Forests Lands and Natural Resource Operations have recommend that these guidelines be approved for final editorial and legal review.

Following is the list of the primary authors and the review groups:

<b>Primary Authors:</b> Pierre Iachetti, P.Ag., CEO of the CAB Glynnis Horel, P. Eng. Michele Jones, R.P. Bio. Peter Mitchell, P. Eng	<b>CAB Review Group:</b> Gerry Leering, R.P. Bio. Linda Stordeur, R.P. Bio. Warren Warttig, R.P. Bio. Brian Wilkes, R.P. Bio.	<b>MFLNRO Review Group:</b> Andrew Appleton Stacey Wilkerson, R.P. Bio.
<b>APEGBC Review Group:</b> Kim Green, P.Geo. and David Melville, P.Geo. (through the APEGBC Division of Professional Engineers and Geoscientists in the Resource Sector) Brian Lacas, P. Eng.	<b>BCIA (BC Institute of Agrologists):</b> Blair Irwin, P. Ag. Randy Morris, P. Ag. Blair Irwin, P. Ag.	<b>ABCFP Review Group:</b> Members of the ABCFP Practice Committee
<b>ASTTBC Review Group:</b> Jason Jung, ASCT Carolyn Rutledge, ASCT		

Extensive meetings were then held between the primary authors and government in order to respond to all the comments provided by the various members of the review group. The attached document represents the draft which the primary authors and government recommend be approved for final editorial and legal review before publication. A preliminary legal review has been carried out to assure these guidelines are consistent with the relevant legislation.

This is an excellent example of where APEGBC has been able to share with other professional associations our methodology for preparing professional practice guidelines for a wide variety of professional activities. This collaborative approach is allowing the association to develop joint professional practice guidelines which are helping to create a critical mass of documents across various professional associations and for a variety of government ministries which guide the appropriate use of and reliance on qualified registered professionals.

### **Recommendation**

That Council approves the *ABCPF (Association of BC Forest Professionals)/APEGBC/CAB (College of Applied Biologists) Professional Practice Guidelines - Legislated Riparian Assessments in BC* for final editorial and legal review prior to publication.

### **Appendix A – ABCPF (Association of BC Forest Professionals)/APEGBC/CAB (College of Applied Biologists) Professional Practice Guidelines - Legislated Riparian Assessments in BC**

Date: August 26, 2016

Report to: **Council for Decision**

From: Peter R. Mitchell, P.Eng.  
Director, Professional Practice, Standards & Development

Harshan Radhakrishnan, P.Eng.  
Practice Advisor

Subject: APEGBC Professional Practice Guidelines - Developing Climate Change Resilient Designs for Highway Infrastructure in British Columbia (Interim)

Linkage to Strategic Plan: Improve resources and education as well as awareness and access to resources that help members practice to high professional and ethical standards.

**Purpose:** For Decision and Action

**Motion:** That Council approves the *APEGBC Professional Practice Guidelines – Developing Climate Change Resilient Designs for Highway Infrastructure in British Columbia (Interim)* for final editorial and legal review prior to publication.

## Background

APEGBC's Professional Practice, Standards and Development (PPSD) Department focuses on the proactive regulation of professional engineering and professional geoscience. One of the important ways in which PPCSD delivers on the proactive regulation of the professions is through the development of APEGBC professional practice guidelines. These guidelines identify the standard of care APEGBC professionals are expected to provide in meeting the duty of care APEGBC professionals have in law when carrying out professional activities involving the practice of professional engineering and professional geoscience.

These professional practice guidelines establish a common level of expectation, for a variety of stakeholders on what constitutes good professional practice when carrying out a particular professional activity. These stakeholders include APEGBC professionals, statutory decision makers, clients, APEGBC, the public and a variety of other groups. In 2008 APEGBC Council approved the Council Policy on the Development of APEGBC Professional Practice Guidelines.

## Discussion

These APEGBC professional practice guidelines were developed in response to the Ministry of Transportation and Infrastructure (MOTI) Technical Circular: (T-06/15) titled *Climate Change and Extreme Weather Preparedness and Resilience in Engineering Infrastructure Design* (June 22, 2015). The circular can be viewed at the following web address:

<http://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/technical-circulars/2015/t06-15.pdf>

These guidelines will complement the existing *APEGBC Professional Practice Guidelines – Legislated Flood Assessment Guidelines in a Changing Climate in BC*. The context for these guidelines was informed by a National-level guidance document by Engineers Canada titled *Principles of Climate Change Adaptation for Engineers* consisting of nine principles and establishing the scope of professional engineering practice in carrying out climate change adaptation work.

The guidance offered by these APEGBC documents is consistent with one of the primary objectives of APEGBC which is to establish, maintain and enforce standards for the professional practice of engineers and geoscientists in BC. As a result of the above referenced Technical Circular being issued in 2015 the BC Ministry of Transportation contracted with APEGBC to develop these guidelines. APEGBC followed the APEGBC Council approved Policy for the development of Professional Practice Guidelines in preparing the contract signed with government which directed the development of these guidelines and also provided \$5,000 in funding for their development.

A Steering Committee consisting of registered professionals and experts which included the following people was formed to develop these guidelines:

- Climate Scientists (Trevor Murdock and Raj Shrestha from the Pacific Climate Impacts Consortium),
- BC Ministry of Transportation and Infrastructure Staff (Dirk Nyland, P.Eng., Chief Engineer, Jim Barnes, Khalid Khan, and Daniel Cosette)
- Fraser Basin Council Staff (Jim Vanderwal)
- Climate Change Advisory Group Internal Review Team Members (Mark Porter, P.Eng., Struct.Eng., Glen Parker, P.Eng., Glen Shkurhan, P.Eng., Brent Burton, P.Eng., Johanna Wolf (MoE CAS))
- Contributing Reviewers (Des Goold, Eric Morris, P.Eng., Elise Paré, P.Eng.)
- Industry Representative and liaison with the Association of Engineering Companies – BC (Zane Sloan, P.Eng.)

The primary authors of these guidelines, as approved by the Steering Committee, are practicing members Glen Zachary, P.Eng., M.A.Sc. ( Urban Systems) and Michael MacLatchy, P.Eng., PhD (Associated Engineering ).

The detailed affiliations for each of these individuals is identified in Appendix F of the attached draft guideline. A review group then provided input and commented on drafts of the guidelines as they were being prepared. Members of the review group are also identified in Appendix F of the attached guidelines.

The steering committee met with members of the review group on three separate times for full day meetings. Significant revisions were made to subsequent drafts of these guidelines following these meetings. The steering committee then passed a motion recommending that the APEGBC Council approve these guidelines for final editorial and legal review prior to publication.

Jim Barnes at the MOTI has also confirmed through an e-mail that others at the Director level at MOTI identified that as designing for climate resilience is a new field and with new expectations these APEGBC professional practice guidelines provide the necessary detail in terms of how to approach the subject matter.

David Lapp, P.Eng. (Practice Lead, Globalization and Sustainable Development at Engineers Canada) commented that these guidelines "...will set a precedent for our engineering regulators across Canada."

The Association of Engineering Companies of BC (ACEC-BC) took a real interest in the development of these guidelines and Zane Sloan, P.Eng. was their liaison. As a result Zane coordinated having APEGBC staff present the guidelines to the ACEC-BC Board. As a result of the presentation the following matters were addressed;

- The ACEC-BC Board identified that it must be clearly and unequivocally communicated that these guidelines are unique to MOTI infrastructure. ACEC-BC's concern being that as a result of these guidelines there will be an expectation created on the part of all owners of infrastructure in BC that climate change adaptation will be automatically incorporated in all future infrastructure designs in BC for all projects. The Title, the Forward and the opening paragraph in the Preface were revised to address this concern. The BC MOTI approved this approach.
- The guidelines need to be interim. The ACEC-BC Board identified the concern that their member firms are still learning about how to design highway infrastructure owned by the BC MOTI that is resilient to climate change. As a result the guidelines are identified as being interim so they can be revised after a couple of years of use to reflect lessons learned. The BC MOTI approved this approach.

In terms of engagement and consultation, some of the active committees at APEGBC such as the Climate Change Advisory Group, the Building Codes Committee, the Sustainability Committee, and the Building Enclosures Committee have been appraised of the framework for these guidelines. In terms of external stakeholders presentations have been made at the National 2016 Adaptation Canada Conference, Professional Association Adaptation Working Group (Secretariat for which is provided by MoE-CAS), SFU's Disaster Change Due to Climate Change Workshop, Meeting of the Environmental Officers from other Constituent Associations (moderated by Engineers Canada), Canadian Waterworks and Wastewater Association's National Conference and to ACEC-BC board members.

It is understood that with respect to designing for climate change APEGBC professionals have a steep learning curve ahead of them, and have to contend with knowledge gaps and tools that are currently evolving. But with the release of the Technical Circular by MOTI over a year ago, and these guidelines good guidance on the appropriate standard of professional practice to be followed when carrying out climate resilient designs for public highway infrastructure in BC has been provided. In addition in order to help assist practitioners, the APEGBC Climate Change Information Portal with ~60 resources and tools has been established which is currently live and is accessible at: [www.apeg.bc.ca/climateportal](http://www.apeg.bc.ca/climateportal) and once these guidelines are published, up to three continuing professional development seminars have been planned to assist APEGBC members.

The APEGBC Professional Practice Committee is responsible for overseeing the development of APEGBC professional practice guidelines and the Committee approved the following motion:

*"The APEGBC Professional Practice Committee recommends that the APEGBC Council approve the draft APEGBC Professional Practice Guidelines – Developing Climate Change Resilient Designs for Highway Infrastructure in British Columbia (Interim) for final editorial and legal review."*

### **Recommendation**

That Council approves the *APEGBC Professional Practice Guidelines – Developing Climate Change Resilient Designs for Highway Infrastructure in British Columbia (Interim)* for final editorial and legal review prior to publication.

## **Appendix A – APEGBC Professional Practice Guidelines – Developing Climate Change Resilient Designs for Highway Infrastructure in British Columbia (Interim)**

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Date: August 26, 2016

Report to: **Council for Decision**

From: APEGBC Executive Committee

Subject: Resource Support for Corporate Practice Initiative

Linkage to Strategic Plan: Members' Employers and Clients; Gov't, Public and Other Stakeholders.

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<b>Purpose:</b>	To adequately resource the continued work of the Advisory Task Force on Corporate Practice towards a recommendation to Council on the regulation of companies.
<b>Motion:</b>	That Council approves an unbudgeted expenditure of \$75K in fiscal 2016/2017 to support assessment of corporate practice and the regulation of organizations.

### Background

In April 2015, Council discussed the concept of regulating engineering and geoscience organizations in light of the impact that this could have in enhancing APEGBC's ability to protect the public interest.

Council passed a motion to establish an advisory task force to *"make recommendations to Council on the regulation of engineering/geoscience organizations by following a phased program as outlined below:*

*Phase 1: Strategic consultation and coordination*

*Phase 2: Address legislated authority to make mandatory if consensus obtained to proceed*

*Phase 3: Develop business plan to move forward and pursue Act revisions if required.*

The Advisory Task Force on Corporate Practice was convened for its first meeting in February 2016. In April, external consultant Compass Resource Management was engaged to provide support for the task force's evaluation of corporate regulation. While this work was not anticipated or budgeted within the initial 2014-2017 budget initiatives, staff were able to reallocate resources for the first stage of this work taking place during FY2015/2016, totalling \$36k.

### Discussion

Exploration of the concept of corporate regulation for engineering and geoscience in BC is a complex matter with high stakes for APEGBC, its members and industry. Use of an external consultant to support the work of the advisory task force had not previously been contemplated when this issue was previously brought to Council in September 2015. Initially APEGBC staff from the Professional Practice, Standards and Development (PPSD) and Communications Departments supported the work of the task force. However after the initial meetings the task force became sensitive to the level of influence staff had in coordinating the work of the task force and in the preparation of materials. In early 2016 (after the 2016/17 budget process was

complete) APEGBC Communications and PPSD staff met to discuss the best way forward. It was determined that the use of a consultant having specific expertise in strategic analysis and decision making so the task force felt fully engaged and in control of a consensus based and objective decision making process was the way to proceed. In consideration of the task force's tight timeline discussions were held with the Chair of the task force (Mike Currie, P.Eng.) and a recommendation was made to engage Compass Resource Management to support the efforts of the task force. The members of the Task Force and APEGBC staff fully supported the engagement of Compass Resource Management for a number of key reasons:

1. The consultant, Compass Resource Management, has expertise and past experience in strategic analysis, decision making and consultation for complex matters. APEGBC staff did not have this particular skill set. Due to the level of expertise provided by Compass the task force has been engaged in a decision-making process guided by a rigorous assessment of options, consideration of all values (costs, benefits and other concerns with regulation) reflected in a specific assessment criteria.
2. Having the process facilitated by a third-party, rather than exclusively by staff, helps to alleviate task force member and stakeholder concerns of bias in support of a particular agenda or outcome.

The Advisory Task Force is currently completing the first stage of its work for this initiative, during which it has approved a consultation plan, developed Round 1 options for assessment, and launched initial consultation. Due to the results achieved to date and the relationship and level of trust developed between Compass and the task force the consultant was asked to submit a proposal in order to continue the level of support provided in 2016 throughout fiscal 2016/17. Mike Currie, P.Eng., Chair of the task force, provided the following comment:

*"Given the relatively tight timeframe and the complex nature of the issue, the task of carefully evaluating the many corporate practice models and options had the potential to be overwhelming for the Task Force. We have found it extremely beneficial to have access to the expertise and objectivity delivered by Compass under the direction of Michael Harstone, P.Eng. in assessing a wide variety of regulatory and non-regulatory options for developing a consensus-based shortlist."*

To support the advisory task force's continued work, \$75K is required in fiscal 2016/2017 to resource the development and assessment of shortlisted options and a discussion paper for consultation, meaningful and accessible consultation opportunities for members (including a webinar, and in-person consultation events at APEGBC branches), a final review of options, and the task force's final report and recommendation to Council. The \$75K would come from the current contingency budget included in the 2016/17 Council approved budget.

At their meeting on August 25, 2016 the APEGBC Executive Committee passed the following motion in support of this initiative; "That the Executive Committee approves an unbudgeted expenditure of \$75K in fiscal 2016/17 to support assessment of corporate practice and regulation of organizations."

### **Recommendation**

Motion: That Council approves an unbudgeted expenditure of \$75K in fiscal 2016/2017 to support assessment of corporate practice and the regulation of organizations.



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Date: July 21, 2016

Report to: **Council for Information**

From: Ann English, P.Eng.  
CEO & Registrar

Subject: CEO and Registrar Report to Council

Linkage to the Strategic Plan: Continue to implement best practices in governance.

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This report summarizes activities of the Leadership Team related to the policy agenda and work implementation of the Strategic Plan and ongoing Regulatory duties of the Association since the June 17, 2016 meeting of Council.

## **1. Regulatory Matters**

### **1.1 Update on the Professional Engineering and Geoscience Practice in BC Online Program**

The development of the Professional Engineering and Geoscience Practice in BC online seminar is now complete. The online seminar has been launched as is available on the APEGBC website. The online seminar has replaced the live two day Law and Ethics seminar and DVD option and will allow users to fulfill the law and ethics requirement for registration at any time and any location, increasing accessibility to applicants within the province and abroad. The online seminar can be accessed via desktop, laptop, tablet or mobile and is compatible with any browser. The total amount of time to complete the online seminar will vary with each individual, given their learning style; however, it is estimated that it should take approximately eight hours to complete. The online seminar is composed of ten modules with a combination of video interviews, concise reading, case studies, knowledge tests and interactive activities which provide an engaging learning platform.

## **2. Association Matters**

### **2.1. Engineers Canada**

APEGBC remains very involved and active with Engineers Canada (EC). At the May AGM, APEGBC signed a multi-party agreement with Engineers Nova Scotia, Engineers Prince Edward Island and Engineers Yukon that supports a simpler and more expeditious multi province application process, facilitating inter-provincial mobility. It is hoped that this kind of leadership will spread to include other provinces over time.

In August, EC hosted a national workshop on Engineering Accreditation. The workshop was attended by about 120 representatives including deans from many universities, student societies, staff and councillors from constituent associations, members of the Canadian Engineering Accreditation Board (CEAB) and members of the Canadian Engineering Qualifications Board (CEQB). The purpose of the workshop was to explore perspectives on how the process and content of engineering education accreditation can be improved in Canada. The Deans have expressed concerns with



both the current process and the details of how accreditation is measured. Several concepts and areas of improvement resulted from the workshop. The APEGBC CEO was asked to lead a task group investigating a risk based approach to accreditation as opposed to the time based approach used currently. As well, consideration is being given to shifting the focus of accreditation more towards competency and outcomes assessment as opposed to input metrics. The Canadian accreditation system is well respected internationally and any changes considered will take into account the international reputation of our programs.

This upcoming year APEGBC is demonstrating significant leadership at EC with our past president Russ Kinghorn as the President Elect (and member of the Engineers Canada Executive Committee), past president Paul Blanchard as the past chair of the CEQB, CEO Ann English as the Chair of the CEO group (and member of the Executive committee) and Efreem Swartz (Director of LEC) as Chair of the National Officials Group for Discipline and Enforcement.

APEGBC is also working with Engineers Canada to investigate ways to nationalize aspects of the APEGBC home grown programs of Competency Based Assessment and Organizational Quality Management. Nationalization of programs helps mobility and quality assurance of engineering services across the country.

## **2.2. Applied Science Technologists and Technicians of BC (ASTTBC)**

The ASTTBC/APEGBC Joint Board did not meet over the summer months. However, renewed efforts will be made to find a suitable time for the appointed members of the Joint Board to meet in September.

In the meantime, APEGA and ASET have written to ASTTBC with copies to Alberta Government Officials and APEGBC regarding their position on ASTTBC's proposed "PTech" designation. The following is an excerpt from their letter to ASTTBC dated Aug 22, 2016:

- *"The ASTTBC P.Tech. designation is deemed not equivalent to the ASET designation of P.Tech., and as such, will not be considered a mobile designation until such time that these designations are right to independent practice of professional engineering are deemed equivalent to the Engineering and Geoscience Professions Act.*
- *By ASTTBC continuing to render professional designations while waiting for legislative change to give those professionals access to a scope of independent practice, it creates a significant risk to the public and will lead to considerable confusion in both provinces on what the designation actually means.*
- *The licensing of P.Techs needs to be done through direct involvement of APEGBC through its existing legislation."*

The position taken by ASET and APEGA is supportive of APEGBC's messaging to date regarding ASTTBC's proposed P.Tech. Designation.

## **2.4. Pacific NorthWest Economic Region (PNWER)**

APEGBC delegates attended the PNWER Summit in Calgary in July. This conference provides an excellent opportunity for APEGBC to discuss issues such as professional mobility and emergency preparedness with government, businesses and other regulators.

### **3. Internal Operations**

#### **3.1. Compliance Statement**

APEGBC has met all of its legal obligations. There are no outstanding lawsuits or other liabilities that would materially modify our financial position.

#### **3.2. Space Update**

The building renovations are well underway. Phase 1 work has been completed. This includes completion of the vacant suite renovations and installation of the first floor workstations. Phase 2 work has started which would involve installation of the second floor workstations and completion of meeting room spaces on the second floor. Progression of the project is moving along as scheduled and Phase 3 (the final phase) will start September 9<sup>th</sup>. Phase 3 of the project will be completion of the renovation of the upstairs boardrooms and the café on the first floor. The project is expected to be completed by the end of October-early November. To date, it is expected that the cost of the project will meet the Council approved budget of \$1.5M.

### **4. Member and Public Affairs**

#### **4.1. Media Interactions**

On July 20, the BC government held a press conference to announce changes to the *Mining Code*, and the implementation of 20 of 26 recommendations from the Independent Expert Engineering Investigation and review panel, and the Chief Inspector of Mines. The announcement and accompanying press release referred to APEGBC's development of the Guidelines for Dam Site Characterization, and included a quote from CEO, Ann English, P.Eng. APEGBC was also invited to have an official present for the press event. APEGBC was cited in subsequent coverage in the *Vancouver Sun* (July 20), *Canadian Consulting Engineer* (July 26), and *Mining Technology.com* (July 21). APEGBC had also previously been mentioned in an article related to the aftermath of Mt. Polley in the *Canadian Consulting Engineer* on June 22.

On August 11, publication of the Guidelines for Dam Site Characterization was publicized through a press release to media throughout the province and to relevant stakeholders.

In late July, APEGBC fielded a media inquiry from the *Engineering News Record* regarding the association's reaction to OIQ's loss of self-regulation.

An article in the *Canadian Consulting Engineer* on August 9, featured APEGBC's initiative exploring Corporate Practice and the issue of regulation of companies. Another article on Canadian Filipino Net discussed registration and the Eng.L. Bridging Program.

#### **4.2 Professional Member Induction Ceremony**

The next Professional Member Induction Ceremony is scheduled for Thursday, October 6, 2016 from 5:00 pm to 7:30 pm. The event will take place at the Marriott Vancouver Pinnacle located on 1128 W Hastings St., Vancouver, BC. Councillors are encouraged to attend this event to meet the Association's newest members.

#### **4.3 Annual Conference and AGM Update**

The 2016 APEGBC Annual Conference and AGM will be held from October 20 to 22, 2016 at the Victoria Conference Centre. Councillors are encouraged to participate wherever possible, and complimentary tickets to all events are available to you. Invitations for the conference were emailed to Councillors including a schedule of

events. If you have not completed your registration, please return your form to Gurjeet Phungura at [gphungura@apeg.bc.ca](mailto:gphungura@apeg.bc.ca) at your earliest convenience.

APEGBC conference delegate rates have been arranged at the Fairmont Empress Hotel. Reservations can be made by phone at 1-800-441-1414 (quote the group name:

Association of Professional Engineers and Geoscientists of BC) or you may book accommodations online (link to: <https://resweb.passkey.com/go/apegbc2016>). Be sure to review the hotel's cancellation policy and please note that the rates are guaranteed only until Monday, October 3, 2016 and based on availability. **It is recommended that you please book your accommodation prior to September 19<sup>th</sup> as space is limited.**

#### **4.4 Annual Report Progress Update**

The annual report content has been drafted, and reports reviewed by their respective authors. It is currently at the editorial layout and design stage of publication and is on schedule for delivery in time to meet APEGBC's obligations under the Bylaws. The report highlights how APEGBC has delivered on its Strategic Plan goals, and includes the audited financial statements, reports from the President, CEO, and additionally this year, a report from APEGBC's government appointees to Council.

#### **4.5 Member Engagement Strategy Update**

Delivery of Stage 1 of the member engagement strategy is underway. Communications staff are developing key messages with a clear regulatory focus for use throughout the organization, and these are already being brought to bear in a number of key documents, such as the annual report. Meetings are currently being scheduled with APEGBC branch executives to engage them in better understanding members' questions, concerns and awareness of APEGBC's role under the *Engineers and Geoscientists Act*.

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Date: August 29, 2016

Report to: **Council for Information**

From: Michelle Cheng  
Registration Project Manager

Subject: Canadian Environment Experience Project Update

Linkage to Strategic Plan: Goal 1: Members and Prospective Members  
Goal 2: Members' Employers and Clients  
Goal 3: Government, Public and Other Stakeholders  
Goal 4: Enabling Goal

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<b>Purpose:</b>	To update Council regarding the progress of the Canadian Environment Experience Project.
<b>Motion:</b>	No motion required.

### Background

With funding from the Ministry of Jobs, Tourism and Skills Training (JTST), the Canadian Environment Experience Project explores potential alternative methods to meet the current requirement of a minimum of 12 months of Canadian environment experience for professional licensure. The ability for internationally trained workers (ITWs) to demonstrate their readiness for licensure in Canada was identified as a barrier to entry in a Foreign Qualifications Recognition (FQR) Review conducted by the ministry in 2012.

The purpose of the project is to:

- 1) Clearly define the Canadian environment experience competencies required for current and prospective P.Eng. applicants.
- 2) Address human rights concerns that the time-based requirement creates a barrier of entry for internationally trained engineers (ITEs), as identified by the Ontario Human Rights Commission.
- 3) Explore alternative methods and processes that are defensible and robust to meet the Canadian environment experience requirement.
- 4) Protect the intent of the Canadian environment experience requirement.

The Canadian Environment Experience Project is separated into two phases: Phase I and Phase II. Phase I activities (completed in May 2014) defined and articulated the Canadian environment competencies and identified possible alternative methods to licensure. The purpose of Phase II, which began in May 2015, is to pilot the alternatives identified in Phase I, and to determine whether the proposed alternatives serve the purpose intended. Phase II also includes the development of the Working in Canada Seminar – a bridging program that is intended to be used as a method to fully or partially meet the Canadian environment experience requirement.

## Update

In October 2015, Michelle Cheng was hired as the Registration Project Manager to oversee the foreign qualifications recognition projects.

A website for the pilot project (<http://experienceincanada.ca>) was launched, allowing interested participants to evaluate their eligibility for the pilot, and to complete the pilot application form online. It is also a valuable resource for assessors, participating Constituent Associations (CAs), and the project's National Steering Committee to monitor the pilot and its outcomes.

The APEGBC Project Team has been actively recruiting pilot applicants and assessors. An assessor training session was held in March 2016. In reviewing the initial pilot applicants, the assessment team and the National Admissions Officials Group (NAOG) strongly recommended a major revision to the pilot application form in order to make clear of the expectations to the pilot applicant. The Ministry of JTST approved to extend the pilot to May 2017 in order to allow for more time for revisions and to obtain robust data. In a presentation to the Canadian Engineering Qualifications Board (CEQB) in April 2016, the Canadian environment experience requirement issue was identified as a high priority issue.

To support the Canadian Environment Experience Project, the APEGBC Project Team completed the development of the Working in Canada Seminar within a 6-month timeline; the intention is to be able to offer an approved bridging program during Phase II of the project. Professional engineering members acting as subject matter experts, employers, and other volunteers have been crucial to its success.

The Working in Canada Seminar curriculum corresponds to each of the four Canadian environment experience competencies that address Canadian-specific practices in the engineering workplace. The course is also unique in that it offers a "*Codes, Standards and Regulations*" unit, which provides a primer on the regulatory requirement for professional engineers to design engineering solutions according to the codes, standards, and regulations of Canada and its provinces and territories. The entire seminar is 56 to 64 hours to complete, and will be offered online allowing the ability for the course to be completed prior to arrival in Canada. The course curriculum is also designed to allow instructor-led training should it be required in the future, the APEGBC Project Team is exploring longer-term strategies for marketing and distributing the course.

## Appendix A – Canadian Environment Experience Project Updates

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Date: August 27, 2016

Report to: **Council for Information**

From: Gillian Pichler, P.Eng.  
Director, Registration

Subject: Registration Report – Admissions & Membership for Fiscal 2016

Linkage to Strategic Plan: Goal 1: Members and Prospective Members  
Goal 2: Members' Employers and Clients  
Goal 3: Government, Public and Other Stakeholders  
Goal 4: Enabling Goal

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**Purpose:** The Registration Report (Admissions & Membership) is provided to Council on a semi-annual basis. Reports are provided to Council at its September meeting to provide fiscal year end results; and at its first meeting of each calendar year to report on the prior calendar year for budget planning purposes. Members of Council are invited to provide feedback on any aspect of the attached report and are welcome to ask for additional analysis.

**Motion:** No motion required.

## Discussion

### Changes of Note from the February 2016 Registration Report

- a. 41% of new professional engineer applications (vs 50% in the last report) were from Internationally-educated applicants; resulting in a net decline in applications from Internationally Trained engineers of 174 applicants or 28%. This may be due to a significant decrease in the number of applicants from Iran in the last 6 months;
- b. One EIT from each of 4 accredited employer engineer-in-training programs has been approved for P.Eng. registration; subsequent program graduates will be approved automatically on the recommendation of the company assessors;
- c. The content of the APEGBC-led Working in Canada Seminar has been completed and it has entered its testing phase with P.Eng.'s, subject matter experts and employers and applicants from across Canada;
- d. Engineers Canada's Qualifications Board has made the APEGBC-led Canadian Environment Experience Alternatives Pilot one of its priorities for the coming year;
- e. A tool, adapted from APEGA, has been implemented which will expedite the process of scope development for Engineering and Geoscience Licensee applicants

- f. The first two applications under the multiple application agreement signed in May by APEGBC, Engineers Nova Scotia, Engineers PEI and Engineers Yukon have been received; and
- g. Online training tutorials for most registration volunteers are complete. This includes Registration Coaches who support Members-in-Training in fulfilling the competencies for registration, the Board of Examiners, Competency Assessors, Referees and Validators and Registration Interviewers.
- h. The Enhanced Engineer-in-Training Program is expected to be launched this fall supported by assigned Registration Mentors who have received Registration Coach Training in Competency Assessment.

## **Appendix A – Registration Report**



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Date: August 24, 2016

Report to: **Council for Information**

From: Tony Chong, P.Eng.  
Chief Regulatory Officer/Deputy Registrar

Subject: Annual Membership Information Renewal

Linkage to Strategic Plan: Improve Resources and Education as well as awareness and access to resources that help members practice to high professional and ethical standards

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<b>Purpose:</b>	To inform Council of the plan to request members to update membership information to comply with the Engineers and Geoscientists Act and the Freedom of Information and Protection of Privacy Act.
<b>Motion:</b>	No motion required.

### Background

During the past couple of years there have been concerns/comments from the membership regarding the information appearing on APEGBC's website; specifically, the information contained in the Member Directory and other pages such as the Discrete Scope Projects Directory.

The nature of the concerns/comments varied substantially. Some members felt that there was too much personal information published than they would have liked while others felt that there was insufficient information provided for the purpose of marketing themselves. Staff has responded to these concerns/comments on an ad hoc basis such as removing the year of graduation to conceal the age of members. We have also removed some information that is extraneous to the requirements of the Engineers and Geoscientists Act (the "Act") in terms of what should be included in the APEGBC Register of members. By removing some of the information to protect the privacy of members, we incurred negative feedback from some members expressing concerns that APEGBC has removed personal information that they wish to be published in the Member Directory. There have also been concerns expressed about non-compliance with the requirements of the Freedom of Information and Protection of Privacy Act (the "FIPPA") in that APEGBC did not seek the prior permission of individual members to publish personal information beyond the requirements of the Act. In light of this dilemma, a Staff Committee consisting of senior departmental managers was formed to review the relevant provisions of the Act and FIPPA, and to develop a plan to update the membership information such that it is in full compliance with legislation.

### Discussion

Section 19 of the Act requires the Registrar to maintain a register of APEGBC members and licensees. Additionally, the information for each member/licensee recorded in the register is to include the full name, address and the date of issue of each licence. In several cases,



specifically those related to Life Members, there has been no way in the past to ensure that members' addresses and vital status (alive or deceased) is updated as it is directly linked to the Annual Billing requirements and these members are not billed.

Section 33.1 (1) of the Act requires our members or licensees to inform Council of any discipline action taken against the member or licensee by a professional engineering or geoscience regulator in another jurisdiction in or outside Canada.

Section 30 (9) (a) of the Act empowers the Investigation Committee to recommend to the Discipline Committee that an inquiry be held to consider any member or licensee who has been convicted in Canada or elsewhere of an offence that, if committed in BC, would be an offence under an enactment of the Province, and that the nature or circumstances of the offence render the person unsuitable for registration or licensing.

Bylaw 14 (a) (6) Code of Ethics of the Association requires our members or licensees to keep themselves informed in order to maintain their competence in their fields of practice. There are a number of Council approved Professional Practice Guidelines that are applicable to specific fields of practice. Members and Licensees are expected to comply or exceed these guidelines in their professional practice.

Bylaw 14 (b) of the Association requires our members or licensees to establish and maintain documented quality management processes for their professional practice.

As part of the online Annual Membership Information Renewal Process for 2016 (which will commence at the beginning of October), the plan is to ask our members and licensees to provide or update any missing or out of date information (e.g. their addresses) for the Association's register. Furthermore, members and licensees will be asked to provide additional information such as criminal conviction, disciplinary action, Struct.Eng CPD, non-practising and quality management and practice guideline compliance declarations. This is new for this year. Failure to provide this information will not result in members or licensees not being able to renew their membership. However, the non-responsive members or licensees will be placed on a list for possible follow up by staff.

An article explaining the new Membership Information Renewal Process will be placed in the Sept/Oct issue of Innovation. Staff is considering other options to notify, remind and encourage our members and licensees to update their information under the new process.

By implementing the new process, APEGBC will be compliant with the intent of the Act and FIPPA.

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Date: August 26, 2016

Report to: **Council for Information**

From: Janet Sinclair  
Chief Operating Officer

Subject: Strategic Plan and Key Performance Indicator Results at the end of Year 2.

Linkage to Strategic Plan: Continue to implement best practices in governance.

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<b>Purpose:</b>	To provide Council with an update on strategic plan progress and the results of the key performance indicators for Year 2.
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<b>Motion:</b>	No motion required.
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### Background

In order to track progress on the implementation of the strategic plan, Council receives semi-annual reports on the initiatives being undertaken to achieve the goals and objectives. Council also receives a summary report on the Key Performance Indicators (KPIs) that are used to measure whether the objectives are being achieved.

This year Council received a strategic plan update report in June, just before year end. There are no significant updates to that report to bring to Council's attention at this time. The APEGBC Annual Report which details progress made on the strategic plan over the fiscal year (July 1 – June 30) is currently under development and will be published on the APEGBC website on September 22.

The final results of the KPIs are attached in table form and a summary of the results is below.

### Discussion

Nineteen objectives are measured with a number of metrics tracked within each. Of the 19 objective targets eight have been fully achieved, five have been partially achieved, and 6 have not been achieved.

Metrics that have been achieved include those associated with the mentoring program and career awareness as well as those related to consultation on corporate practice support and time for investigation files to be processed. Media interactions and stakeholder engagement targets have been fully achieved as have targets for recognition of professional reliance. With respect to financial targets, no fee increase was required this year and the 2015/16 audit required no material adjustments.

Partially achieved metrics include awareness and satisfaction with professional practice guidelines where member satisfaction targets were reached but the number of hits on the guideline web pages was slightly lower than targeted. Targets for increasing employer participation in APEGBC programs was also only partially met as the number of sponsors at the Annual conference was below target and the number of employers who participated in the

Enhanced MIT program was four instead of five. Registration targets were also partially achieved as average time from documents complete to first decision were met, but 85 percentile targets were not. Metrics which measure awareness and use of APEGBC's risk management tools and programs were only partially achieved as compliance with the voluntary CPD guideline and attendance at CPD seminars were lower than target. Diversity targets for volunteers were also only partially met.

Targets not met include lower membership growth, higher than budgeted surplus, failure of the CPD bylaw and diversity targets related to the number of female members.

### **Recommendation**

That Council receives the report on strategic plan progress and the results of the key performance indicators for Year 2.

APEGBC KEY PERFORMANCE INDICATORS		On Track		Achieved					
FOR THE REPORTING PERIOD JULY 1 2015 - JUNE 30 2016		Monitoring Closely		Partially Achieved					
Metrics		Unlikely to achieve		Not achieved					
	Key Performance Indicator Measure	As of June 30, 2014 Base Measure	2014/15 Target (YR1)	2015/16 Target (YR2)	Results at June 30, 2016 (end of Year 2)	Status at June 30, 2016	Comments on Status	3 Year Target Set September 2014	
Our goal is to make BC professional engineers and geoscientists synonymous with the highest standards of professional and ethical behavior.									
1	Increase awareness of, access to, and compliance with professional practice and ethics guidelines and resources.	Member survey on awareness and use of guidelines; number of APEGBC website hits on guidelines webpage.	2013 Level of satisfaction with practice guidelines Satisfied 69%; 6,574 guidelines webpage hits.	73% Satisfied as per survey; 7,000 or more guidelines webpage hits.	Satisfaction baseline established via survey. 15,000 hits on Guidelines web page.	78% satisfied or somewhat satisfied with current available guidelines. 13,535 hits on Guidelines webpage this year, cumulative total since June 2014 = 26,500.		Total of 78% satisfied is combined of 54% satisfied and 24% somewhat satisfied; guideline web page views just short of target	75% Satisfied as per survey; 8,000 or more guidelines webpage hits.
2	Increase participation in APEGBC's mentoring program.	Number of participants in the program measured by the number of mentors and mentees applying for the program, and the number of new and retained matches.	# of Mentor applications - 169 # of Mentee applications - 57 # of New Matches - 55 # of Retained Matches - 188	# of Mentor applications - 10% increase (186) # of Mentee applications - 10% increase (63) # of New Matches - 10% increase (61) # of Retained Matches - Maintain (188)	# of Mentor applications - 20% more than targeted mentee applications (82) # of Mentee applications - 20% increase (88) # of New Matches - 20% increase (86) # of Retained Matches - Maintain - 283	61 Mentor applications 158 Mentee applications 154 New Matches 368 Retained Matches		*Mentors were not actively pursued as we currently have twice the number of mentors in our system than mentees. Have surpassed all other year end targets.	Total increase over 3 yrs # of Mentor applications - 30% # of Mentee applications - 30% increase # of New Matches - 30% increase # of Retained Matches - Maintain
3	Increase in the percent growth of membership	Percent of overall membership growth with breakdown analysis by membership category.	A. 5 Year Average Membership Growth. (FY2009 through FY 2013): 4.1% B. 2013/14 Member Growth. Total Membership: 4.7% - P.Eng.: 3.8% - P.Geo.: 4.1% - MIT & Provisional: 9.4% - Limited Licence: 16%	Increase of 10% over previous year's increase (e.g. 3.8% membership increase in 2014 = 4.18% increase in membership the following year).	Fiscal 2016 vs Fiscal 2015: 5% membership growth, not including student members.	4.30%			Increase of 16% over 2014 membership numbers.
4	Increase in awareness of the engineering and geoscience professions.	Level of public respect & familiarity with what engineers and geoscientists do in their jobs as measured by a public opinion survey; number of requests from educators.	2011 Level of familiarity for what engineers do 81%; geoscientists do 52%. 2011 Level of respect engineers 90%; geoscientists 77%. 20 requests from educators for classroom/career awareness presentations	Familiarity for what engineers do (85%) ; what geoscientists do (56%). Respect for engineers (90%). Respect for geoscientists (80%). 20 requests from educators for classroom/career awareness presentations.	30 requests from educators for classroom/career awareness presentations.	43 requests from educators for classroom/career awareness presentations. Public opinion not measured this year.		Achieved.	Familiarity for what engineers do (90%) ; what geoscientists do (65%). Respect for engineers (92%). Respect for geoscientists (83%). 40 requests from educators for classroom/career awareness presentations.
Member's Employers and Clients									
Our goal is to be regarded as a valued partner by clients and employers in all sectors, supporting the delivery of engineering and geoscience services in the public interest.									
5	Increase year over year employer awareness and participation in key APEGBC programs.	Level of industry participation as measured by attendance at APEGBC events such as student industry nights, response for company representatives on APEGBC committees, number of firms who have registered to participate in OQM, number of companies in Employer Accredited MIT program.	2013/2014: # of AC sponsors - 14, # of AC exhibitors - 38, Science Games sponsorship \$4k; OQM participation - total 250; MIT program new - 0	# of Exhibitors - 45 # of Sponsors - 16 #OQM firms registered to participate in OQM - 50/yr # Employers in MIT Pilot: 5 Science Games sponsorship maintained at \$4K	# of Exhibitors - 37 (max space allows) # of Sponsors - 18 New OQM Firms registered to participate: 75 Employers in MIT program = 6 Science games sponsorship \$5500	# of Exhibitors = 37 # of Sponsors = 14 # New OQM Firms registered to participate: 88 # Employers in MIT program = 5 \$10,300 Science Games		Exhibitor target met, sponsorship short by 4, exceeded new firm participation in OQM, short 1 employer for MIT program participation.	# of Exhibitors - 45 # of Sponsors - 20 #OQM firms registered to participate in OQM - 50/yr # Employers in MIT Program: 28; Science Games sponsorship increased to \$6500.
6	Decrease processing time for applicants who participate in accredited employer and enhanced EIT/GIT training programs.	Processing time for applicants who participate in Accredited Employer MIT program as compared to other applicants.	FY 2014 All Canadian Trained P.Eng. Applicants: 85% within 80 days; average of 40 days All Internationally Trained new P.Eng. Applicants: 85% within 78 Days; average of 40 days All EIT to P.Eng. Applicants: 85% within 77 days; average of 38 Days.	FY 2015 - Maintain 2014 Levels All Canadian Trained P.Eng. Applicants: 85% within 80 days; average of 40 days All Internationally Trained new P.Eng. Applicants: 85% within 78 Days; average of 40 days All EIT to P.Eng. Applicants: 85% within 77 days; average of 38 Days.	All Canadian Trained P.Eng. Applicants: 85% within 80 Days; Average 50 days All Internationally Trained new P.Eng. Applicants: 85% within 100 days; average 65 days; All EIT to P.Eng. Applicants: 85% within 80 Days; Average 50 Days.	Processing time for P.Eng. applicants in accredited programs: 1 applicant processed in FY 16 - 30 days as required review by Registration Committee as required audit. Anticipated processing time for remaining applicant is less than 10 business days. For Other Categories, Estimated Processing times: All Canadian Trained P.Eng. Applicants: Estimate 85% within 92 days, Average 46 days. All Internationally Trained new P.Eng. Applicants: estimate 85% within 96 days, Average 48 days. All EIT to P.Eng. Applicants: estimate, 85% within 85 days; Average 42 days.		Results for other categories are estimates as data set analysis report generation still under development.	All Canadian Trained P.Eng. Applicants: 85% within 70 Days; Average 35 days All Internationally Trained new P.Eng. Applicants: 85% within 75 days; average 40 days; All EIT to P.Eng. Applicants: 85% within 50 days; Average 30 Days.
7	Increase the awareness and use of APEGBC risk management tools and programs.	Increased use of risk management tools and programs as measured by the number of practice reviews, number of certified OQM companies, number of participants in APEGBC seminars, reported compliance with CPD guideline.	100 Practice Reviews completed/year; 73 firms OQM Certified; 3035 participants in seminars ; 46% CPD compliance	100 Practice Reviews completed/year; 150 firms OQM certified; 100% CPD Compliance 3,340 Seminar attendance	100 Practice Reviews completed/year; 200 firms OQM certified; 100% CPD Compliance 3,400 Seminar attendance	113 Practice Review Completed and 201 firms OQM Certified. 53.3% CPD Compliance 2916 seminar attendance		Number of practice reviews exceeded target as did total number of OQM firms now certified. CPD Compliance is higher than ever before but still well short of 100% compliance by practicing members. Seminar attendance goal was not achieved.	100 Practice Reviews completed/year; 200 firms OQM certified; 100% CPD Compliance 3,600 Seminar attendance
8	Increase the number of practice guidelines developed for emerging fields of practice.	Number of new professional practice guidelines published for emerging fields of practice.	0	Draft of 1st one	Metric no longer being assessed to allow refocusing of effort to regulation of companies consultation.	Activity discontinued	N/A	N/A	One guideline completed - second in draft format
8	NEW 2015/16 - Decision made on the course of action for the Regulation of Companies.	Phase 1 complete	n/a	n/a	Consultation with stakeholders underway.	Phase 1 Consultation launched June 2016. Survey issued with backgrounder to consult with membership.		On track for recommendation to Council in March 2017.	Decision to proceed or not and if so the types of companies to be regulated (e.g. consulting firms, others).
9	Improved resolution of complaints against members through better education on appropriate resolution processes.	Target to close or send to the Investigation Committee 85% of complaint files within 5 months.	2012: 7.8 months 2013: 6.3 months 2014: 3.7 months	Target to close or send to the Investigation Committee 85% of complaint files within 5 months	Target to close or send to the Investigation Committee 85% of complaint files within 5 months.	For files opened in 2016, 85% in 4.4 months.			Target to close or send to the Investigation Committee 85% of complaint files within 4 months.
10	Increase outreach to individuals and organizations in various sectors on the value of engaging APEGBC professionals.	Number of new corporate engagement initiatives and resources undertaken/produced.	n/a	3 new corporate engagement initiatives/ year	Efforts to be refocused to the regulation of companies.	N/A	N/A	N/A	N/A

APEGBC KEY PERFORMANCE INDICATORS		On Track		Achieved					
FOR THE REPORTING PERIOD		Monitoring Closely		Partially Achieved					
JULY 1, 2015 - JUNE 30, 2016		Unlikely to achieve		Not achieved					
Metrics	Key Performance Indicator Measure	As of June 30, 2014 Base Measure	2014/15 Target (YR1)	2015/16 Target (YR2)	Results at June 30, 2016 (end of Year 2)	Status at June 30, 2016	Comments on Status	3 Year Target Set September 2014	
Government, Public and Other Stakeholders									
Our goal is to enhance public confidence in our members through leadership in regulatory, engineering and geoscience best practices.									
11	Increase in earned media and stakeholder interactions that provide positive exposure for APEGBC.	Increase in number of actual earned media and stakeholder interactions.	12 instances of successful media engagement; 9 instances of APEGBC supplied experts cited; 5 information release topics targeted; 5 documented forms of recognition/interaction with various stakeholders that provide positive exposure for APEGBC	15 instances of successful media engagement; 12 instances of APEGBC supplied experts cited; 12 media resource materials released; 6 documented forms of recognition/interaction with various stakeholders that provide positive exposure for APEGBC	15 instances of successful media engagement; 12 instances of APEGBC supplied experts cited; 10 media resource materials released; 7 documented forms of recognition/interaction with various stakeholders that provide positive exposure for APEGBC.	19 Media inquiries fielded; 35 instances of APEGBC or APEGBC experts referenced in media; 12 media resource materials released (includes media/public-facing key messages plus news releases). Completed 7 documented forms of recognition/interaction with various stakeholders that provide positive exposure for APEGBC.		20 instances of successful media engagement; 15 instances of APEGBC supplied experts cited; 15 media resource materials released; 7 documented forms of recognition/interaction with various stakeholders that provide positive exposure for APEGBC.	
12	Growth of collaborative interactions and formalized partnerships with private and public sectors, and with other professional associations in areas of common interest to build on existing successes.	Growth in number of collaborative interactions such as partnerships to produced PD seminars, joint submissions to authorities having jurisdiction, joint guidelines, joint initiatives	5 documented collaborative submissions/guidelines/initiatives; 3 PD partnerships	5 or more documented collaborative submissions/guidelines/initiatives; 5 PD partnerships	2 or more documented collaborative submissions/guidelines/initiatives; 2 PD partnerships	7 collaborative submissions 3 PD partnerships		7 or more documented collaborative submissions/guidelines/initiatives 7 PD partnerships	
13	Demonstrated confidence of government through continued or increased usage of the professional reliance model and/or requirements that specify the expertise of APEGBC members in support of the public interest.	Maintain existing legislation utilizing APEGBC members and licensees as qualified professionals. Attempt to achieve new pieces of legislation.	Two efforts in 2014 to maintain or increase the appropriate use of APEGBC professionals in legislation.	Two efforts to maintain or increase the appropriate use of APEGBC Professionals in government legislation.	2 additional documented efforts to maintain or increase the appropriate use of APEGBC professionals in govt legislation	2 completed		Three efforts to maintain or increase the appropriate use of APEGBC Professionals in government legislation.	
Enabling Goal									
Our goal is to provide a solid foundation for the sustainable delivery of the association's mission.									
14a	Demonstrate financial prudence on a consistent basis.	Budgeted surplus/deficit vs. actual surplus/deficit to be less than 3%	Actuals 4x greater than budgeted deficit	Budgeted surplus/deficit vs. actual surplus/deficit to be less than 3%	Budgeted surplus/deficit vs. actual surplus/deficit to be less than 3%	Budgeted deficit (\$50K) vs. Actual surplus \$540K = 10,796% variance.		Higher than expected membership revenues, unused contingency, and savings in staff vacancies.	Budgeted surplus/deficit vs. actual surplus/deficit to be less than 3%
14b		Produce a clean audit i.e. An unqualified opinion.	No material annual audit adjustments.	One or less material annual audit adjustments.	One or less material annual audit adjustments.	Clean audit report received with no adjustments.			One or less material annual audit adjustments.
14c		No additional annual membership fee increase outside of what is budgeted for 2015-2017	Established in budget \$35 fee increase in 2015, \$0 fee increase in 2016, \$0 fee increase in 2017.	Established in budget \$35 fee increase in 2015, \$0 fee increase in 2016, \$0 fee increase in 2017.	Established in budget \$35 fee increase in 2015, \$0 fee increase in 2016, \$0 fee increase in 2017.	No fee increase in 2016/17.		Achieved.	Established in budget \$35 fee increase in 2015, \$0 fee increase in 2016, \$0 fee increase in 2017.
14d		Budgeted surplus/deficit vs. actual surplus/deficit to be less than 3% of gross budgeted revenue.	n/a added as metric in November 2015	n/a	\$456,501	\$539,806 surplus which is 3.5% of gross budgeted revenue.		Additional 0.5% surplus	≤3% of budgeted gross revenue
15	Gain membership approval for bylaw amendments which advance the work of the organization and the profession.	Members ratify bylaws.	Achieve member ratification.	Achieve member ratification.	Approval of CPD Bylaw.	CPD Bylaw failed.		Not achieved.	Achieve member ratification.
16	Increase diversity and new volunteer participation in the volunteer program.	Enhanced diversity as measured by the number of new volunteers to APEGBC, the number of women, and the number of young professionals participating.	Ratio Male/Female = 7.5:1 Ratio of Volunteers >40 yrs to < 40 years = 4:1 ; 33% female speakers and participants at student program events.	5% of total volunteers are new; maintain existing ratio of 7.5:1 Male:Female and 4:1 >40 to < 40; 10% increase of female speakers and participants at Student Program events. 30% of available openings are new volunteers.	10% increase of female speakers and participants at Student Program events. Maintain 26% volunteer workforce as new volunteers Decrease M:F ratio of volunteers to 4.5:1 Decrease # of volunteers >age 40 vs <age 40 to: 2:1	Increase in New Volunteers: 27.2%. Active Male:Female Volunteers: 5:1. Active >Age 40 vs <Age 40: 3:1. 80, out of a total of 316 (19%) female industry participants at Student Program events to date.		Exceeded target for number of new volunteers, did not reach target for age or gender diversity.	20% of total volunteers are new; maintain existing ratio of 7.5:1 Male:Female and 4:1 >40 to < 40; 10% increase of female speakers and participants at Student Program events. 50% of available openings are new volunteers.
17a	Increase the number of women in the professions.	The percentage of women in the professions.	Total Female Membership: 3,257 (11.4%) - Engineering P.Eng. & Licensees: 2,015 (9%) - Geoscience P.Geo. & Licensees: 316 (17.6%) - EIT & Provisional Member (Eng): 806 (19.3%) - GIT & Provisional Member (Geo): 120 (43.6%)	Total Female Membership: (12.6%) - Engineering P.Eng. & Licensees: (9.9%) - Geoscience P.Geo. & Licensees: (19.4%) - EIT & Provisional Member (Eng): (21.2%) - GIT & Provisional Member (Geo): (48.2%)	Total Female Membership (12.5%) - P.Eng and Eng.L: (10.8%) - P.Geo and Geo.L: (21.2%) - EIT & Provisional Member (Eng): (23.1%) - GIT & Provision Member (Geo): (49.1%)	No longer tracking this statistic as Active Membership provides a more accurate reflection.	No longer tracking this statistic as Active Membership provides a more accurate reflection.		Total Female Membership: (15%) - Engineering P.Eng. & Licensees: (11.7%) - Geoscience P.Geo. & Licensees: (23%) - EIT & Provisional Member (Eng): (25%) - GIT & Provisional Member (Geo): (50.0%)
17b		Percentage of Active Members (in training & provisional) or with Practice Rights that is female.	At November 5, 2015 = 13.2%		Total Active Female membership 13.8% - P.Eng. and Eng.L: (11.0%) - P.Geo. And Geo.L: (20.4%) - EIT & Provisional Member (Eng) (19.4%) - GIT & Provisional Member (Geo) (40.4%)			Target missed by 0.3%	14.8%
17c		Percentage of New Registrants excluding NRLs that is female.	Registered between November 1, 2014 to October 30, 2015, excluding NRLs = 19.3%		20.0% Registered in FY 16: 15.6% - P.Eng. (14.8%) - P.Geo.(23.9%) - EIT (18.2%) - GIT (36.6%) - Eng.L. (10.5%)			Target missed by 4.2%	20.70%

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Date: August 26, 2016

Report to: **Council for Information**

From: Russ Kinghorn, P. Eng., FEC  
Jeff Holm, P. Eng., FEC  
APEGBC Directors to the Board of Engineers Canada

Subject: Engineers Canada Update

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### Canadian Engineering Accreditation Board (CEAB)

A workshop was held in Toronto on August 17 & 18. The goal was to identify key accreditation issues and potential solutions to all parties. There were approximately 120 participants from all stakeholder groups including;

- Deans and programmers of engineering schools
- Engineers Canada board members
- Provincial regulators (CEO's & registrar's)
- Engineering Students
- CEAB members (including some faculty)

APEGBC was represented by Ann English, Tony Chong & Gill Pichler. Russ Kinghorn, Paul Blanchard (QB) & Jeff Holm also attended.

The facilitated workshop intensively determined and ranked the key issues and discussed the path forward. The facilitator has produced 126 pages of minutes and the Accreditation Board will be discussing and recommending solutions to Engineers Canada. This will likely be performed by a task force representing the stakeholder groups.

Key discussion items ranged from the rationale behind a national accreditation system to the accounting mechanics of specific program requirements.

An outcome is to have a new national framework for accreditation drafted in the next 12 months for further discussion. The next meeting of the CEAB is September 17 in Halifax. The next meeting of Engineers Canada is September 26 in Ottawa.

### Board Workshop – June 20-21, 2016

This year's Board workshop focussed on developing a strategic plan for Engineers Canada. The bases for discussion were:

- Results of the consultation survey of the Regulators (formerly known as the Constituency Associations who are the owners of Engineers Canada) as requested by the Linkages Task Force. The questions asked in the consultation were:
  - What are the major challenges facing the profession in the next five years? What is needed to overcome them?

- What is the one need that, if met, would immediately assist your association?
- What is the greatest opportunity to provide the engineering community with value that we're missing as Engineers Canada?
- Are there particular needs/issues you would like Engineers Canada to address?
- What are the most critical outcomes that Engineers Canada should seek to achieve?
- What are the strengths (and weaknesses) of the current Ends? What's missing?
- Major themes from the past Big Picture Thinking sessions at Board meetings going back to the Spring meeting in 2013
- An Environmental Scan
- Aspirations for the Engineering Profession from a survey of members of the profession.

All of the above items (There were just over 600 in total) were ranked on a 1-5 scale for impact on one of the Engineers Canada initial themes listed below and on a 1-5 scale for the ability for Engineers Canada to achieve the desired outcome. The product of these two ratings gave an overall rating for the item presented. It was a comprehensive process even though there was overlap for many items.

The Board narrowed its focus to 6 themes plus some sub-themes. This will be compiled into a draft strategic plan that should be available for the September Board meeting.

Engineers Canada Initial Themes:

- Diversity & Inclusion
- Enabling Engineers Canada
- Excellence & Integrity
- Globalization
- Harmonization
- High Standard in Education
- Innovation
- Issues & Trends
- Labour Market
- Multi-Disciplinary
- National Voice
- Outreach
- Proactive Regulation
- Promising Practices
- Societal Leadership
- Supporting Regulators
- Valued Profession

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Date: August 25, 2016

Report to: **Council for Information**

From: Ann English, P.Eng.  
Chief Executive Officer & Registrar

Subject: APEGBC Road Map for 2015-2016 - Completed

Linkage to Strategic Plan: Effective governance and resources that enable and guide  
APEGBC's operations

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<b>Purpose:</b>	To update Council on the current status of the actionable items listed on the Council Road Map for 2015-2016.
<b>Motion:</b>	No motion required.

### **Background**

The attached document summarized expected agenda items that were planned to be brought forward to Council during the 2015/2016 Council year. The items were aligned with the Strategic Plan and assisted in Council seeing the progress on elements of the Plan. This road map was not exclusive and additional items were added as required throughout the year. The September Council meeting is the last Council meeting of the 2015/2016 year and, as such, the Work Plan has been completed. A new Work Plan will be brought forward for the 2016/2017 Council year and it will be based on the new Strategic Plan.



APEGBC Road Map for 2015-2016 - as at the September 9, 2016 Council Meeting

	HIGHLIGHTS	27 Nov Council mtg	11 Feb Planning Session	12 Feb Council mtg	15 April Council mtg	June 15, 16 Planning session	17 Jun Council mtg	9 Sept Council mtg	20 -22 Oct Annual Conference and AGM
Members & Future Members	BRANCHES, DIVISIONS & SOCIETIES REPORTS	Report of the October 2015 Branch Rep Meeting		Branch Engagement Report DEP Presentation			Branch Engagement Report	APEG Foundation AGM and Benevolent Fund AGM DAWEG Presentation	
	IMPROVING MEMBER SUPPORT & BRAND		Member Engagement Report	Change to Limited Licence Title	Member Satisfaction Survey Results Brand Development Update		Brand Development Update		
	ENHANCING REGISTRATION PROCESSES	Update on Geoscience Comptencies for Registration		1. Update on Canadian Environment Experience Pilot 2. Registration Admissions Report to Council for Calendar 2015	Update on Law & Ethics Online Program  Fairness Panel Annual Report			1. Update on Canadian Environment Experience Pilot 2. Update on Eng.L. to P.Eng. Bridging Pilot 3. Registration Admissions Report to Council for Fiscal 2016	
Members, Employers, etc.	EMPLOYER ENGAGEMENT	Labour Market Study Report		Corporate Engagement Report Visit from VP of BC Hydro Update on OQM Program	Update on OQM Program		Update on EIT Accredited Employer Pilot	Update on OQM Program	
Government, Public & Other Stakeholders	INCREASING PUBLIC CONFIDENCE		Discussion on Offshoring		Human Rights and Diversity Guideline		Approval of Award Nominations	Year End Reports on (1) Investigation and Discipline and (2) Enforcement	
	ACADEMIC OUTREACH	Visiting Dean					Visiting Dean	Visiting Dean	
	ENGINEERS CANADA AND GEOSCIENTISTS CANADA	Directors Report Joint Executive Committee Dinner with Engineers Canada (December 10)		Directors Report	Directors Report		Directors Report	Update on Engineers Canada Bylaws	
Enabling Goal	STRATEGIC PLAN CYCLE AND MONITORING ACTIVITIES	New KPI Metrics	Strategic plan tweak and future visioning, semi-annual progress update on plan		Revised 2016/17 Strategic Plan for Approval	Build the 2017 - 2020 Strategic Plan		AGM Rules Strategic Plan and KPI Update	
	LEGISLATION CHANGES AND BYLAW CYCLE	CPD Bylaw Review			Update on Legislative Amendment Progress Approval in principle of housekeeping bylaws				
	IMPROVING DIVERSITY		Update on WIEG Activities Update on Volunteer Diversity	First Nations Greeting Decision				Update on Volunteer Management Activities	
	EFFECTIVE GOVERNANCE	Council Governance Training; Council Team Building Workshop; Risk Management Assessment; Approval of Nominating Committee Appointees; AGM Motion Referral		Agenda Publication Decision Salary Publication Decision				Council Evaluation	
	FINANCIAL OVERSIGHT	Quarterly financial report/ Budget Guideline approval		Quarterly Financial Report AGM Special Guest Policy	Quarterly Financial Report/ Budget approval			Audited Financial statements/Year End Review	Approval of Auditors
	Activities Completed								
	Activities Behind Schedule (by end of September)								
	New Item	Item has been brought forward from a previous meeting	Items Advanced						

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Date: August 25, 2016

Report to: **Council for Information**

From: Ann English, P.Eng.  
Chief Executive Officer & Registrar

Subject: Committee Attendance Summary - Completed

Linkage to Strategic Plan: Effective governance and resources that enable and guide  
APEGBC's operations

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<b>Purpose:</b>	To update Council on the year end Committee Attendance Summary.
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<b>Motion:</b>	No motion required.
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### Background

The Committee Attendance Summary was created to track individual Councillor attendance at the Council meetings and the other related Committee meetings that Councillors are a part of (e.g. the Executive Committee, the Governance Committee, the Registration Committee). Each Councillor was assigned a column which was regularly updated and has been tallied and a percentage applied. The intent in curating this summary is to provide information that will assist with future correspondence relating to things such as the election; this will enable us to display the high level of dedication that is required of candidates. The Committee Attendance Summary has also provided a clear visual of the amount of meetings that the average Councillor is required to attend and how many meetings each Committee holds – in knowing this, the appointing of Councillors to the mandated Committee positions will be less intensive going forward.

		Dr. Mike Wrinch, P. Eng., FEC, FGC (Hon.)	Bob Stewart, P. Eng.	Dr. John Clague, P. Eng.	Ana Fernandes, CIM, FCSI	David Harvey, P. Eng., FGC, FEC (Hon.)	Ken Lalage, CPA, CA, TEP	Kathy Tarnai-Lokhorst, P. Eng., FEC	Tai Mitha, LLB	Caroline Andrewes, P. Eng., FEC	Dr. Lyn Anglin, P. Geo.	Dan Campbell, P. Geo.	Carol Park, P. Eng.	Cassandra Hall, P. Geo., P. Eng.	Richard Farbridge, P. Eng.	Scott Martin, P. Eng.	Chris Moser, P. Eng.	John Turner, P. Ag.	
	Oct 17, 2015 (Council)	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓		
	Oct 28, 2015 (Orientation)	✓	✓		✓								✓	✓	✓	✓	✓		
	Nov 10, 2015 (Exec Comm)	✗	✓	✓	✓				✓										
	Nov 10, 2015 (Reg Comm)				✓		✓						✗	✗					
	Nov 26, 2015 (Orientation)	✓	✓										✓	✓	✓	✗	✗		
	Nov 26, 2015 (Eli Mina and Team-Building)	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓	✗	✓	✓	✓	✗	✗		
	Nov 27, 2015 (Council)	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓		
	Dec 7, 2015 (Gov Comm)																		Meeting cancelled.
	Dec 8, 2015 (Exec Comm)	✓	✓	✓	✓				✓										
	Dec 16, 2015 (Reg Comm)				✓		✓						✓	✓					
	Jan 11, 2016 (Prof Prac Comm)													✗	✓				
	Jan 13, 2016 (Nom Comm)			✓															
	Jan 21, 2016 (CCAG)															✓			
	Jan 21, 2016 (Geo Comm)																		Meeting cancelled.
	Jan 25, 2016 (Gov Comm)																		Meeting cancelled.
	Jan 27, 2016 (Reg Comm)				✓		✓						✗	✓					
	Feb 2, 2016 (ASTTBC/APEGBC JB)						✓												
	Feb 9, 2016 (Nom Comm)			✓															
	Feb 10, 2016 (Gov Comm)			✓				✓								✓	✓	✓	
	Feb 11, 2016 (Planning Session)	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✗	✗	
	Feb 12, 2016 (Council)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Feb 26, 2016 (Foundation Nom Comm)				✓	✓		✓											
	Feb 29 - Mar 1, 2016 (Govt Receptions)	✓	✓	✓	✓	✓	✗	✗	✓	✓	✗	✗	✗	✓	✗	✗	✗	✗	Victoria
	Mar 2, 2016 (Nom Comm)			✓															
	Mar 3, 2016 (Geo Comm)									✓	✗		✗						
	Mar 9, 2016 (Reg Comm)				✓		✓						✗	✓					
	Mar 17, 2016 (Exec Comm)																		Meeting cancelled.
	Mar 17, 2016 (Foundation Nom Com)				✓	✓		✓											
	Mar 22, 2016 (Gov Comm)			✓				✓								✗	✗	✓	
	Mar 30, 2016 (Exec Comm)	✓	✓	✓	✓				✓										
	Apr 15, 2016 (Council)	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	
	Apr 20, 2016 (Nom Comm)			✓															
	Apr 21, 2016 (Geo Comm)									✓	✓		✓						
	Apr 27, 2016 (Reg Comm)				✓		✗						✓	✓					
	May 12, 2016 (Industry Breakfast)	✓	✓	✗	✗	✓	✗	✗	✓	✗	✗	✗	✓	✓	✗	✗	✗	✗	
	May 25, 2016 (Geo Comm)									✗	✓		✓						
	May 30, 2016 (Exec Comm)	✓	✓	✓	✓				✓										
	May 30, 2016 (Gov Comm)			✓				✓								✗	✓	✓	
	June 13, 2016 (Reg Comm)				✓		✓						✗	✓					
	* June 15-16, 2016 (Planning Session)	✓	✓	✓	✗	✓	✓	✓	✗	✓	✓	✗	✗	✓	✓	✗	✓		Kamloops (allow for travel time)
	June 17, 2016 (Council)	✓	✓	✓	✗	✓	✓	✓	✗	✓	✓	✗	✗	✓	✓	✓	✓		Kamloops (allow for travel time)
	June 21, 2016 (Audit Comm)					✗	✓	✓			✓	✓							
	June 28, 2016 (PP Forum & Induction)	✓	✓	✗	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	
	July 14, 2016 (Geo Comm)																		Meeting cancelled.
	Aug 3, 2016 (Exec Comm)																		Meeting cancelled.
	Aug 3, 2016 (Gov Comm)			✓				✗								✗	✓	✓	
	Aug 17, 2016 (Reg Comm)				✓		✓						✓	✓					
	Aug 18, 2016 (Geo Comm)									✗	✗		✓						
	Aug 22, 2016 (Audit Comm)					✓	✓	✓			✓	✓							
	Aug 25, 2016 (Exec Comm)	✓	✓	✓	✗				✓										
	Sept 9, 2016 (Council)	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Sept 15, 2016 (Geo Comm)									✓	✓		✓						
	Sept 28, 2016 (Reg Comm)				✓		✓						✓	✓					
	Percentage of Attendance	94%	100%	100%	64%	100%	76%	95%	94%	85%	64%	81%	63%	70%	85%	81%	62%	80%	

The following Committees have not set their schedule as of yet:

- Advisory Task Force on Corporate Practice (number of meetings required has not been determined)
- Professional Practice Committee (will meet at least four times)
- ASTTBC/APEGBC Joint Board (will meet four to six times)
- Climate Change Advisory Group (will meet at least two times)
- Foundation Nominating Committee (will meet at least three times)

☐ Attendance Required

■ Attendance Not Required

/// Meeting Cancelled

**THE ASSOCIATION OF PROFESSIONAL ENGINEERS AND  
GEOSCIENTISTS OF THE PROVINCE OF BRITISH COLUMBIA**

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**FINANCIAL RESULTS INDEX  
FOR THE YEAR ENDED JUNE 30, 2016**

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Date: August 23, 2016

Report to: **Council for Decision**

From: Ken laloge, CPA, CA, TEP

Subject: PricewaterhouseCoopers LLP (PwC) Auditor's Report FY2016

Linkage to Strategic Plan: Continue to implement best practices in governance

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### **A. Audit Committee Purpose**

The purpose of the Audit Committee is to assist Council in fulfilling its oversight responsibilities by reviewing: the financial information which will be provided to the public and others; reviewing the systems of corporate controls which management and Council have established; and reviewing the external audit process.

### **B. Background**

On August 22, 2016, the Audit Committee met with the Engagement Leader of Audit & Assurance of PricewaterhouseCoopers LLP (PwC) to review the Auditor's Report to Audit Committee of Council and the draft audited Financial Statements of the Association, the Foundation, and the Benevolent Society. The review focused on the unqualified audited financial results, notes, and supporting schedules for the fiscal periods ended June 30, 2016 for the Association, the Foundation and the Benevolent Fund Society. The Committee recommends to the Council, The Foundation Directors, and the Benevolent Society Directors approval of the entities' financial statements.

### **C. Review of Financial Statements and Disclosures**

The Audit Committee reviewed the disclosures of the statements presented by the Director of Finance and her staff and requested modification to various presentation points for member clarity or resolved items that did not aid in the understanding of the statements. These discussions included consideration of items subsequent to year end and matters related to the General Funds balance and its explanation in the notes. Explanations of the results from the Director were accepted and discussed related to individual financial statement items with follow up on certain matters to come to assist in the review with Council.

### **D. External Audit Discussion**

The review with the Auditor included the private discussion on the accounting and other staff of the Association and their co-operation in the external audit of the financial statements. It also included discussion on consolidation of the branches and other entities and the reporting of disclosures related to those parties. That discussion on the requirements for disclosures and

the election by the Association not to consolidate those smaller entities is consistent with past practice and PwC is totally comfortable with the practice. The Audit committee confirmed to PwC it had no knowledge of fraud or internal control problems in the Association.

The Audit Committee has reviewed and discussed the relevant issues with both the PwC auditors and the APEGBC staff. PwC reviewed the following key areas, and found that the financial statements present fairly in accordance with Canadian audit standards and under Canadian accounting standards the results and positions of the entities. Below is the summary of audit findings as reported to the Audit Committee for Council by PwC:

## Significant accounting, auditing and reporting matters

<p><b>Matter 1 – Risk of material misstatement due to management override (Significant risk)</b></p>	<p><b>Significant risk</b></p> <p>Accounting regulatory authorities require that the risk of material misstatement due to management override of controls be considered a significant risk on every audit engagement.</p> <p><b>Audit work performed</b></p> <p>PwC have understood management processes and internal controls in place, including application, authorization and monitoring controls.</p> <p>PwC have reviewed significant manual journal entries and accounting estimates, taking into account management bias, and tested a sample of all posted journal entries.</p> <p>PwC ensured the general ledger is reconciled to the financial statements.</p> <p>Consistent with Canadian generally accepted auditing standards, PwC also implemented a level of unpredictability into audit procedures.</p> <p>There were no exceptions noted from our testing.</p>
<p><b>Matter 2 – Risk of fraud in revenue recognition (Significant risk)</b></p>	<p><b>Significant risk</b></p> <p>Accounting regulatory authorities require that the risk of fraud in revenue recognition be considered as a significant risk on every audit engagement.</p> <p><b>Audit work performed</b></p> <p>PwC have understood management processes and internal controls in place, including application, authorization and monitoring controls.</p> <p>PwC have performed substantive audit procedures to address the risk that revenue could be misstated due to fraud.</p> <p>There were no exceptions noted from our testing.</p>
<p><b>Matter 3 - Response to Audit Committee request - Chief Executive Officer Expenses (area of focus)</b></p>	<p><b>Area of focus</b></p> <p>At the request of the Audit Committee, PwC have reviewed a sample of Executive Director expenses to ensure that they are in-line with the Association's reimbursement policy and have been appropriately approved.</p> <p><b>Audit work performed</b></p> <p>Using professional judgment, PwC selected a sample of fifteen transactions to test. PwC agreed these expenses to supporting documentation without exception. All expenses were considered to be consistent with the Association's reimbursement policy and were properly authorized.</p> <p>As a result of our work performed, PwC did not note any exceptions.</p>

<b>Fraud and illegal acts</b>
No fraud or illegal acts involving senior management or employees with a significant role in internal control came to PwC's attention as a result of their audit procedures.  As part of their completion procedures, PwC asked management to reconfirm that they are not aware of any known, suspected or alleged incidents of fraud or illegal acts not previously discussed with PwC. This reconfirmation is included as part of management's representation letter to PwC.  In addition, PwC wishes to reconfirm that the Audit Committee is not aware of any known, suspected or alleged incidents of fraud or illegal acts not previously discussed with PwC.

<b>Summary of unadjusted and adjusted items</b>
As a result of audits, PwC identified no unadjusted or adjusted items.

<b>Internal control recommendations</b>
Canadian Auditing Standards requires PwC to communicate in writing to the Audit Committee internal control weaknesses identified as part of audit that are considered to be significant deficiencies.  PwC have no significant internal control recommendations to report.

<b>Independence</b>
PwC confirmed their independence with respect to the Association.

<b>Subsequent events</b>
No subsequent events which would impact the financial statements other than those disclosed have come to PwC's attention.

## **E. Chief Executive Officer's Expenses**

The Audit engagement provides that the audit include an audit of the CEO's expenses. PwC reviewed and verified a sample of expenses to supporting documentation and found no discrepancies. All expenses verified met the Association policy and were properly authorized with no issues noted.



## **F. Internal Control Review**

The review of current internal controls of the Association was undertaken by enquiry and discussion by the Audit Committee Chair that included enquiries of Don Gamble, Jennifer Cho, and Ken Legg with a focus on events, reconciliations, errors, and the external report findings of the last year including those of Deloitte (on IT but overlapping financial reporting) and MNP (on the accounting department). The discussions indicated normal limitations in a smaller staff environment and the need to return to the subject on the annual cycle.

## **G. Auditor Tendering Process**

It is best practice and due diligence to go through a tendering process for selection of an external auditor for the Association. The Audit Committee has conducted a tendering process as per the Procurement Policy in the month of July/August. Four firms were invited to submit their proposals for the external audit for a three year term. Each of the proposals were evaluated on the same criteria and the consultant that scored the highest overall has been selected. The Audit Committee has selected PriceWaterhouseCoopers (the incumbent) and recommends to Council to use PriceWaterhouseCoopers to complete the Association and Charities audits for a three year term.

## **H. Risk Management Planning**

The Audit committee did not discuss the role of risk management in the meeting of August 22, 2016 but has exchanged discussions and background information related to this. We believe further discussion related to the changes to the TOR on this point are needed particularly related to the anticipated level of formality and reporting this will place on senior management. The exchange of the "Orange Book" review of risk management concepts was a follow up to the November 16, 2015 CEOs Report to Council for Information on the Risk Management Review by PwC and the proposal of the Governance Committee to extend the Terms of Reference. Without confirming if the role is overview of reports or more a more involved role there is a need for more discussion. This will require additional consideration Management and then at the Council as the role of the Audit Committee at this time is restricted to being an advisory committee to Council only. Council is reminded in the last three years we have twice reviewed risk issues as part of strategic planning of the Council.

## **I. Recommendations**

The enclosed PwC Auditors' Report and Financial Statements package and this memo provide the reporting of the Audit Committee's review of the External Audit to Council. The Audit Committee recommends that Council receive and approve the following motions:

- 1. That Council accept the report of the Audit Committee.**
- 2. That Council approve the audited APEGBC Financial Statements for the fiscal year ended June 30, 2016.**
- 3. That the President and the Chief Executive Officer and Registrar be authorized to sign the fiscal 2016 Financial Statements on behalf of Council.**
- 4. That the appointment of PricewaterhouseCoopers LLP, Chartered Accountants as the Association's external auditors for the fiscal year ending June 30, 2017 be recommended for final approval at the Annual General Meeting in October 2016.**

## **Audit Committee Members**

Ken Laloge, CPA, CA, TEP Chair

Dan Campbell, P.Eng.

Kathy Tarnai-Lokhorst, P. Eng., FEC

Carol Park, P.Eng.

Tajdin Mitha, LLB



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Date: August 12, 2016

Report to: **Council for Information**

From: Jennifer Cho, CPA, CGA  
Director, Finance & Administration

Subject: Summary of Financial Results for the Fiscal Year ended June 30, 2016

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Over the past fiscal year ended June 30, 2016, APEGBC has an excess of revenue over expenses of \$540K. The following is an explanation of the financial results for the fiscal year.

#### **A. FY2016 Budget vs Actuals**

The FY2016 surplus is \$589K higher than the budgeted deficit of (\$50K) mainly due to savings in payroll and membership revenue growth.

##### **Revenue:**

Some unanticipated revenue increases such as membership revenue, affinity rebates, legal cost recovery, and stronger magazine and web ad revenue contributed to the \$231K revenue variance. The table below is a more detailed analysis of the difference between budget to actual revenues in (\$'000).

<b>Revenue</b>	<b>Variance (\$'000)</b>	<b>Explanation</b> (Amount may not sum up to the total variance listed, as items of lesser significant are not included)
Annual membership fees	183	Favorable budget variance due to strong volume growth in P.Eng \$125K and in EIT \$38K.
Affinity programs	40	Higher Park rebate and other affinity programs due to insurance claim changes
Miscellaneous	39	Variance due to higher discipline recovery
Innovation magazine and other advertising	29	Stronger than expected in both magazine and web advertisement. Web advertisement has transitioned to online order platform, which allows customers with easier access to orders
Professional and academic examinations	21	Increase due to fee increase and volume growth in professional practice exam
Grant and project administration	(66)	Variance due to external grants' project progress
Investment income	(26)	Mainly due to drop of interest rates as a result of drop in oil pricing leading to lower Bank of Canada interest rate and less invested cash due to renovations and other initiatives
Other revenue	11	
<b>Total revenue variance</b>	<b>231</b>	

Expenses:

There were substantial savings in salary and benefits. The savings were due to timing of hires and vacant positions. The table below is a more detailed analysis of the difference between budget to actual expenses in (\$'000).

<b>Expenses</b>	<b>Variance (\$'000)</b>	<b>Explanation</b> (Amount may not sum up to the total variance listed, as items of lesser significant are not included)
Contract and consulting services	106	Variance mainly due to new projects: online Law & Ethics and Working in Canada Seminars
Meetings, seminar room rentals and special events	52	Variance due to higher PD room rental volume driven by revenue attendees growth
Write-down of computer software	51	One time variance from writing off capitalized Law & Ethics consulting costs
Travel	47	Variance due to AGM and professional practice related travel
Examinations and examination books	35	Related to growth in exam revenues, the budget variance due to volume increase in cost of goods sold and marking fees
Salaries and employee benefits	(327)	Savings from 4 vacancies ie. timing/turnover to fill old and new positions. Offset by (\$56K) of IT capitalization
Legal	(115)	Savings in unused contingency
Printing, publication and distribution costs	(75)	Savings from lower PD distance education costs and material cost of CDs, resulting from switching to online delivery platform
Amortization	(71)	Savings due to timing of renovation
Premises and operating costs	(34)	Savings from pushed back repairs/maintenance to focus on renovation
Telecommunications	(24)	Savings in office telephone lines with renewed contracts
Other items	(3)	
<b>Total expense variance</b>	<b>(358)</b>	

## **B. FY2016 Actuals vs. FY2015 Actuals**

The FY2016 surplus is \$131K less than the last fiscal year surplus due to revenue growth of \$740K offset by an increase in expenses of \$871K.

### **Revenue:**

Most of the \$740K revenue increase is due to steady membership growth and membership fee increase. Other factors include growth in professional development seminars and volume increase in professional practice examinations offset with loss of rental income due to renovation and lower transfer and application revenue. The table below is an analysis of the major difference between prior year to current year revenues in (\$'000).

<b>Expenses</b>	<b>Variance (\$'000)</b>	<b>Explanation</b> (Amount may not sum up to the total variance listed, as items of lesser significant are not included)
Annual membership fees	873	\$590K increase from both fee and volume increase. \$214K from volume increase. Also, \$55K student membership revenue increase due to accounting policy change
Professional development	125	Increase due to growth in seminars and new grant revenue for law and ethics project
Professional and academic examinations	34	Professional practice exam revenue increased by \$44K due to fee increase and volume growth, offset by lower academic exam revenue
Premises	(91)	Last year of rental income as space taken back for office renovation
Annual conference	(71)	Reduction in attendees and exhibitors due to different AGM venues (Vancouver vs Kelowna)
Application, registration and certification fees	(68)	Lower transfer and application revenue partially due to economic factors, offset by stronger certification revenue
Grant and project administration	(60)	Variance due to external grants' project progress
Other items	(2)	
<b>Total revenue increase</b>	<b>740</b>	

Expenses:

There were cost increases comparative to prior year with increased use of contractors both internally and externally offset with savings in IT and delay of building maintenance expenses due to renovations. The table below is an analysis of the difference between prior year to current year expenses in (\$'000):

<b>Expenses</b>	<b>Variance (\$'000)</b>	<b>Explanation</b> (Amount may not sum up to the total variance listed, as items of lesser significant are not included)
Salaries and employee benefits	697	\$147K increase due to 4 new positions, \$402K increase from prior year due to refilling/transitions from turnover and maternity leaves and average 3% merit increase (\$148K) of existing staff
Contract and consulting services	342	Increase due to new projects for working in Canada, online law & ethics. And volume growth in CPD contract services
Examinations and examination books	79	Increase due to higher exam marking fee and volume increase
Travel	78	Higher travel for AGM due to venue difference. Also increased travel in Council and professional practice committee
Write-down	51	One time write-down of online law & ethics due to lack of recoverability beyond a year
Annual conference – facilities and meal	(40)	Variance due to venue changes
Office, general and miscellaneous	(134)	Reduction is mainly from savings in IT business continuity expenses
Premises and operating costs	(99)	Savings due to deferral repaving of parking lot to be completed in the fall and other minor scheduled repairs and maintenance
Amortization	(97)	Lower due to fully amortized assets (externally acquired intangible assets) at end of prior year
Other items	(6)	
<b>Total expenses increase</b>	<b>871</b>	

**The Association of  
Professional Engineers and  
Geoscientists of the  
Province of British  
Columbia**

Non-consolidated Financial Statements  
**June 30, 2016**

\_\_\_\_\_, 2016

## **Independent Auditor's Report**

### **To the Members of**

### **The Association of Professional Engineers and Geoscientists of the Province of British Columbia**

We have audited the accompanying non-consolidated financial statements of The Association of Professional Engineers and Geoscientists of the Province of British Columbia which comprise the non-consolidated balance sheet as at June 30, 2016 and the non-consolidated statements of revenue and expenses, changes in net assets and cash flows for the year then ended, and the related notes, which comprise a summary of significant accounting policies and other explanatory information.

#### **Management's responsibility for the non-consolidated financial statements**

Management is responsible for the preparation and fair presentation of these non-consolidated financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of non-consolidated financial statements that are free from material misstatement, whether due to fraud or error.

#### **Auditor's responsibility**

Our responsibility is to express an opinion on these non-consolidated financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the non-consolidated financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the non-consolidated financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the non-consolidated financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the non-consolidated financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the non-consolidated financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.



**Opinion**

In our opinion, the non-consolidated financial statements present fairly, in all material respects, the financial position of The Association of Professional Engineers and Geoscientists of the Province of British Columbia as at June 30, 2016 and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

**Chartered Professional Accountants**

# The Association of Professional Engineers and Geoscientists of the Province of British Columbia

Non-consolidated Balance Sheet

As at June 30, 2016

	2016 \$	2015 \$
<b>Assets</b>		
<b>Current assets</b>		
Cash and cash equivalents (note 3)	1,606,190	834,448
Short-term investments (note 4)	8,891,921	8,946,685
Interest receivable	16,044	31,525
Accounts receivable (note 5)	366,753	454,731
Prepaid expenses	350,791	200,399
Inventory	15,590	10,240
	<u>11,247,289</u>	<u>10,478,028</u>
<b>Intangible assets</b> (note 6)	305,816	293,276
<b>Property and equipment</b> (note 7)	2,474,914	2,539,715
<b>Investments</b> (note 4)	392,700	999,000
	<u>14,420,719</u>	<u>14,310,019</u>
<b>Liabilities and Net Assets</b>		
<b>Current liabilities</b>		
Accounts payable and accrued liabilities (note 8)	1,061,938	1,604,519
Deferred fees (note 9)	4,869,698	4,745,751
Deferred revenue	228,765	239,237
	<u>6,160,401</u>	<u>6,589,507</u>
<b>Net assets</b> (note 2)		
General fund		
Invested in property and equipment and intangible assets	2,831,402	2,832,991
Operating	3,414,933	2,873,538
Property, equipment and systems replacement fund	1,513,983	1,513,983
Legal and insurance fund	500,000	500,000
	<u>8,260,318</u>	<u>7,720,512</u>
	<u>14,420,719</u>	<u>14,310,019</u>

**Commitments** (note 10)

**Approved on behalf of the Council**

\_\_\_\_\_  
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The accompanying notes are an integral part of these non-consolidated financial statements.

# The Association of Professional Engineers and Geoscientists of the Province of British Columbia

## Non-consolidated Statement of Revenue and Expenses

For the year ended June 30, 2016

	2016 \$	2015 \$
<b>Revenue</b>		
Fees		
Annual membership fees	9,614,202	8,740,845
Application, registration and certification fees	1,313,834	1,381,836
Professional and academic examinations	476,998	443,435
	<u>11,405,034</u>	<u>10,566,116</u>
<b>Other revenue</b>		
Affinity programs	399,502	392,561
Annual conference	272,532	344,013
Grant and project administration	1,314,078	1,374,548
Innovation magazine and other advertising	509,417	491,242
Investment income	51,746	81,833
Miscellaneous (note 14)	223,105	240,821
Organization quality management	144,558	124,047
Premises	8,905	99,499
Professional development	1,119,444	994,008
	<u>4,043,287</u>	<u>4,142,572</u>
<b>Total revenue</b>	<u>15,448,321</u>	<u>14,708,688</u>
<b>Expenses</b>		
Advertising	51,938	42,441
Annual conference - facilities and meals	152,257	191,825
Contract and consulting services	2,084,198	1,741,956
Contract and consulting services on grants	1,039,663	1,060,684
Engineers Canada Assessment	278,289	264,505
Examinations and examination books	374,532	295,053
Geoscientists Canada Assessment	64,143	65,908
Grants and awards	108,614	124,093
Innovation magazine printing	97,264	90,897
Legal	337,801	370,624
Meetings, seminar room rentals and special events	571,478	508,150
Office, general and miscellaneous (note 15)	857,463	991,079
Premises and operating costs	332,087	430,825
Printing, publication and distribution costs	443,458	469,182
Salaries and employee benefits	6,928,431	6,231,780
Secondary professional liability insurance premiums	145,129	139,695
Telecommunications	77,250	85,231
Travel	453,970	376,050
<b>Total expenses before amortization</b>	<u>14,397,965</u>	<u>13,479,978</u>
<b>Excess of revenue over expenses before amortization</b>	<u>1,050,356</u>	<u>1,228,710</u>
<b>Amortization</b>		
Intangible assets	187,038	284,367
Property and equipment	272,840	272,992
<b>Total amortization</b>	<u>459,878</u>	<u>557,359</u>
<b>Writedown of computer software</b>	<u>50,672</u>	<u>-</u>
<b>Excess of revenue over expenses for the year</b>	<u>539,806</u>	<u>671,351</u>

The accompanying notes are an integral part of these non-consolidated financial statements.

**The Association of Professional Engineers and  
Geoscientists of the Province of British Columbia**

Non-consolidated Statement of Changes in Net Assets

For the year ended June 30, 2016

	2016				2015
	General Fund				
	Invested in property and equipment and intangible assets \$	Operating \$	Property, equipment and systems replacement fund \$	Legal and insurance fund \$	Total \$
<b>Net assets - Beginning of year</b>	2,832,991	2,873,538	1,513,983	500,000	7,720,512
Excess of revenue over expenses for the year	(459,878) (1)	999,684 (2)			539,806
Investment in intangible assets	199,579	(199,579) (3)			-
Investment in property and equipment	258,710	(258,710) (3)			-
<b>Net assets - End of year</b>	<b>2,831,402</b>	<b>3,414,933</b>	<b>1,513,983</b>	<b>500,000</b>	<b>8,260,318</b>

**Note:**

- (1) Amortization for the year
- (2) Excess of revenue over expenses before amortization
- (3) To fund intangible assets and property and equipment purchases

The accompanying notes are an integral part of these non-consolidated financial statements.

# The Association of Professional Engineers and Geoscientists of the Province of British Columbia

## Non-consolidated Statement of Cash Flows

For the year ended June 30, 2016

	2016 \$	2015 \$
<b>Cash flows from operating activities</b>		
Excess of revenue over expenses for the year	539,806	671,351
Item not affecting cash		
- amortization	459,878	557,359
- writddedown of computer software	50,672	-
	1,050,356	1,228,710
Change in working capital accounts	(481,389)	1,158,742
	568,967	2,387,452
<b>Cash flows from investing activities</b>		
Investment in intangible assets	(199,579)	(204,486)
Investment in property and equipment	(258,710)	(192,969)
Decrease (increase) in short-term investments and investments	661,064	(1,841,391)
	202,775	(2,238,846)
<b>Increase in cash and cash equivalents</b>	771,742	148,606
<b>Cash and cash equivalents - Beginning of year</b>	834,448	685,842
<b>Cash and cash equivalents - End of year</b>	1,606,190	834,448
<b>Supplementary information</b>		
Change in working capital accounts		
Accounts receivable	87,978	(102,153)
Interest receivable	15,481	(7,009)
Prepaid expenses	(150,392)	(22,490)
Inventory	(5,350)	12,644
Accounts payable and accrued liabilities	(542,581)	688,040
Deferred fees	123,947	603,613
Deferred revenue	(10,472)	(13,903)
	(481,389)	1,158,742

The accompanying notes are an integral part of these non-consolidated financial statements.

# **The Association of Professional Engineers and Geoscientists of the Province of British Columbia**

## **Notes to Financial Statements**

**June 30, 2016**

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### **1 Mandate**

The Association of Professional Engineers and Geoscientists of the Province of British Columbia (the Association or APEGBC) is incorporated under the provisions of the Engineers and Geoscientists Act. The Association's mandate is to protect public safety, health and well-being through the application of engineering and geoscience, as well as to ensure the responsible self-governance and vitality of the professions.

The Association is a tax exempt organization as described in the Income Tax Act and, as such is exempt from federal and provincial income taxes.

### **2 Significant accounting policies**

These non-consolidated financial statements include the financial activities of the Association exclusive of the net assets of the Association of Professional Engineers and Geoscientists Foundation, APEGBC Benevolent Fund Society and member-supported branches and divisions (note 12).

#### **Net assets**

The "General fund" comprises two components. "Operating" represents funds used in the general operating and business activities including any extraordinary circumstances that may arise and "Invested in property and equipment and intangible assets" represents the investment in property and equipment and intangible assets used in those activities.

The "Property, equipment and systems replacement fund" represents an appropriation by Council, which serves the long-term objective of setting aside funds to replace property, equipment and systems when required. Any repairs and maintenance associated with the building are deducted from this fund. Council reviews the method and the amount appropriated to ensure that the appropriation provides a reasonable basis for property, equipment and systems replacement. All repairs and maintenance deducted from the fund and property, equipment and systems acquisitions are approved by Council as part of the annual budgeting process.

The "Legal and insurance fund" relates to an appropriation by Council to set up a legal and insurance reserve to allow for extraordinary cases and situations over and above annual expectations. This allows the Association to be prepared for future contingencies. The amount appropriated for legal and insurance is reviewed by Council annually.

#### **Managing capital**

The Association defines its capital as the amount included in its net asset balances. The Association's objective when managing its capital is to safeguard its ability to continue as a going concern so that it can continue to fulfill its mandate as described in note 1. While there are no external restrictions on any of the net assets, Council has appropriated certain of the funds for specific purposes as described in net assets.

# **The Association of Professional Engineers and Geoscientists of the Province of British Columbia**

## **Notes to Financial Statements**

**June 30, 2016**

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### **General fund**

As at June 30, 2016, the General fund comprises \$ 2,831,402 (2015 - 2,832,991) that is invested in the property and equipment and intangible assets and is not available for other future operating activities and \$ 3,414,933 (2015 - 2,873,538) that is available for future operating activities including any extraordinary circumstances that may arise. Council has set a target of a minimum of 1.5 months operating expenses or \$1,750,000 to be held in the "Operating" net asset fund as a general reserve given the stability of annual membership fee revenues and the Association's ability to access a pre-approved line of credit.

### **Appropriated funds**

As at June 30, 2016, the property, equipment and systems replacement fund balance is \$1,513,983 (2015 - \$1,513,983).

As at June 30, 2016, the legal and insurance fund balance is \$500,000 (2015 - \$500,000). Council estimates this amount to cover two consecutive years of extraordinary legal and/or insurance costs.

### **Revenue recognition and deferred fees**

The Association follows the deferral method of accounting for annual fees and other revenues which are received, but for which services have not yet been performed. Membership and other fees are billed and received in advance on a calendar-year basis. Accordingly, a portion of these fees received prior to June 30, 2016, have been deferred for financial reporting purposes and will be recognized as revenue over the remainder of the current calendar year.

The Association enters into certain engineering contracts for which it subcontracts the required services. These contracts are accounted for using the deferral method of accounting.

All other revenues are recognized when earned if the amount to be received can be reasonably estimated and collectability is reasonably assured.

### **Amortization**

Amortization is recorded by using the following annual rates calculated on a straight-line basis:

Building	3.3%
Intangible assets (software and development)	33.3%
Computer	10% - 33.3%
Electronic equipment	20%
Furniture and fixtures	10%

# **The Association of Professional Engineers and Geoscientists of the Province of British Columbia**

## **Notes to Financial Statements**

**June 30, 2016**

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### **Donated services**

The Association and its members benefit from donated services in the form of volunteer time for various committees. Donated services are not recognized in these non-consolidated financial statements.

### **Cash and cash equivalents**

Cash and cash equivalents consist of cash on deposit and high interest savings accounts with banks.

### **Investments**

Investments may consist of federal and provincial government bonds, T-bills and guaranteed investment certificates consistent with the Association's investment policy. The investments are designated as held-to-maturity and are recorded at amortized cost. Interest income is recognized over the lives of the instruments using the effective interest rate method. As at June 30, 2016, short-term investments consist of treasury bills, and guaranteed investment certificates maturing within one year. Long-term investments consist of guaranteed investment certificates maturing between one to two years.

### **Inventory**

Inventory relates principally to exam books and professional development CD-ROMs. Inventories are recorded at the lower of cost and net realizable value. Cost is determined on a specific item, actual cost basis.

### **Controlled funds**

*The Association of Professional Engineers and Geoscientists Foundation (the Foundation)*

The Foundation provides financial support to fund, facilitate and promote activities and programs related to education in engineering and geoscience. The Foundation was incorporated on May 11, 1993 under the British Columbia Society Act and is a registered charity under the Income Tax Act.

The Association controls the operations of the Foundation through its ability to appoint the Directors, who direct all activities of the Foundation. The Association does not consolidate the financial results of the Foundation.

In 2007, a restricted contribution fund was donated to the Foundation under arrangements specified by the contributor. These funds are restricted and to be held as enduring property for no less than 10 years. The income from the property will be used to fund the operations of the Foundation. These funds are invested in financial institution guaranteed securities.



# The Association of Professional Engineers and Geoscientists of the Province of British Columbia

## Notes to Financial Statements

June 30, 2016

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### *APEGBC Benevolent Fund Society (the Society)*

The Society provides financial assistance to members of the Association and their dependants who qualify for the assistance. The Society was incorporated on November 1, 2010 under the British Columbia Society Act and is a registered charity under the Income Tax Act.

The Association controls the operations of the Society through its ability to appoint the Directors, who direct all activities of the Society. The Association does not consolidate the financial results of the Society.

### *Member-supported branches and divisions*

The member-supported branches and divisions provide local support to the members of the Association throughout the region of British Columbia. The member-supported branches and divisions are unincorporated entities.

The Association controls the operations of the member-supported branches and divisions as it holds a significant economic interest and shares complementary objectives with the member-supported branches and divisions. The Association does not consolidate the financial results of the member-supported branches and divisions. Bank accounts are managed and recorded by the Association's Finance department.

Financial information for the controlled funds is provided in note 12.

### **Use of estimates**

The preparation of financial statements in accordance with Canadian generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and revenues and expenses during the year. Significant areas requiring the use of estimates relate to determining the useful lives of property and equipment and the amount of membership fees received in advance to be deferred. Financial results, as determined by actual events, may differ materially from those estimates.

### **Financial instruments**

The Association applies Chartered Professional Accountants of Canada (CPA Canada) Handbook Section 3861, *Financial Instruments - Disclosure and Presentation*.

## **3 Cash and cash equivalents**

	2016 \$	2015 \$
Cash on hand	1,200,812	331,090
High interest savings accounts	405,378	503,358
	<u>1,606,190</u>	<u>834,448</u>

# The Association of Professional Engineers and Geoscientists of the Province of British Columbia

## Notes to Financial Statements

June 30, 2016

The Association has access to a pre-approved line of credit with a limit of \$500,000 of which \$nil was drawn on at year-end (2015 - \$nil).

### 4 Investments

	2016 \$	2015 \$
Guaranteed investment certificates	1,490,200	1,405,725
Government of Canada treasury bills	7,794,421	8,539,960
	<u>9,284,621</u>	<u>9,945,685</u>
Short term	8,891,921	8,946,685
Long term	392,700	999,000
	<u>9,284,621</u>	<u>9,945,685</u>

### 5 Accounts receivable

	2016 \$	2015 \$
Government grants	193,870	255,328
Innovation Magazine	41,146	58,471
GST	35,138	38,477
Other	96,600	102,455
	<u>366,753</u>	<u>454,731</u>

### 6 Intangible assets

	2016		2015	
	Cost \$	Accumulated amortization \$	Net \$	Net \$
Internally generated software	714,753	419,223	295,530	276,134
Externally acquired software	849,664	839,378	10,286	17,142
	1,564,417	1,258,601	305,816	293,276

# The Association of Professional Engineers and Geoscientists of the Province of British Columbia

## Notes to Financial Statements

June 30, 2016

### 7 Property and equipment

	2016		2015	
	Cost \$	Accumulated amortization \$	Net \$	Net \$
Land	874,011	-	874,011	874,011
Building	3,251,166	2,275,947	975,219	1,083,647
Computer*	1,880,929	1,763,871	117,058	174,434
Electronic equipment	69,745	6,974	62,771	-
Furniture and fixtures	1,230,761	784,906	445,855	407,623
	7,306,612	4,831,698	2,474,914	2,539,715

\*Note: includes \$50,672 one time write-down of computer software to Online Law & Ethics due to lack of recoverability of the net carrying value

### 8 Government payables

Government payables include provincial sales and payroll taxes. The following government remittances were payable at year-end:

	2016 \$	2015 \$
PST payable	1,246	1,797
WCB payable	1,283	1,076
	2,529	2,873

### 9 Deferred fees

	2016 \$	2015 \$
Professional Engineers and Geoscientists members fees	3,952,630	3,814,533
Engineer and Geoscientist-in-training membership fees	571,626	529,597
Non-resident licence and limited licence	213,669	208,374
Member advantage program for student membership fees	37,600	98,537
Other	94,173	94,710
	4,869,698	4,745,751

# **The Association of Professional Engineers and Geoscientists of the Province of British Columbia**

Notes to Financial Statements

**June 30, 2016**

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## **10 Commitments**

The Association has operating lease commitments for office equipment for the next three years requiring the following minimum payments:

	\$
Year ending June 30	
2017	80,913
2018	80,913
2019	<u>64,581</u>
	<u>226,407</u>

The Association has started building renovations and plans on completion of the project by fall of 2016 at a budgeted cost of approximately of \$1.5M.

## **11 Defined contribution plan**

The Association has established a defined contribution plan for its employees, under which employees contribute 5% of their qualifying gross earnings and the Association contributes 7.85% of qualifying employees' gross earnings. Defined contribution plan expense for the year was \$411,607 (2015 - \$378,834).

# The Association of Professional Engineers and Geoscientists of the Province of British Columbia

## Notes to Financial Statements

June 30, 2016

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### 12 Controlled funds

The Association controls the operations of the Benevolent Fund Society, the Foundation and member-supported branches and divisions. The results and net assets of these operations are not consolidated in the financial statements of the Association.

Summary financial information on each of the controlled funds is as follows:

	2016 \$	2015 \$
<b>Benevolent Fund Society</b>		
Total assets	294,129	311,638
Total liabilities	-	1,610
Net assets	294,129	310,028
Revenue - contributions and investment income	34,179	32,871
Expenses and grants	50,078	24,127
Cash flows from operating activities	(17,628)	6,847
Cash flows from investing activities	(5,428)	(4,200)
<b>Foundation</b>		
Total assets	641,001	615,119
Total liabilities	367,536	349,962
Net assets	273,465	265,157
Revenue - contributions and investment income	92,266	96,090
Expenses and grants	83,958	88,175
Cash flows from operating activities	21,513	122,157
Cash flows from investing activities	106,509	(97,584)

### Member supported branches and divisions

The Association collects and manages funds on behalf of member-supported branches and divisions. The Association does not consolidate the financial results of the branches and divisions because there is a large number of them that are individually small and therefore the expense of preparing consolidated financial statements exceed the benefits.

# The Association of Professional Engineers and Geoscientists of the Province of British Columbia

Notes to Financial Statements

June 30, 2016

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## 13 Financial instruments and risk management

### Currency risk

Currency risk is the risk that the value of a financial instrument will fluctuate due to changes in foreign exchange rates. The Association is not exposed to significant currency risk.

### Interest rate risk

Interest rate risk is the risk that the value of a financial instrument will fluctuate due to changes in market interest rates. The Association is exposed to interest rate risk on short-term deposits and investments. Management frequently reviews the interest rates to mitigate risk and uses professional investment management services.

### Market risk and other price risk

Market risk and other price risk is the risk that the value of a financial instrument will fluctuate as a result of changes in market prices. The Association is not exposed to significant market risk and other price risk.

### Credit risk

Credit risk is the risk that one party to a financial instrument will fail to discharge an obligation and cause the other party to incur financial loss. The Association does not have a significant concentration of credit risk in any single party or group of parties. Accounts receivable are due primarily from government.

### Liquidity risk

Liquidity risk is the risk that an entity will encounter difficulty in raising funds to meet commitments associated with financial instruments. The Association is not exposed to significant liquidity risk.

There have not been any significant changes in risk exposure from prior years.

## 14 Miscellaneous revenue

	2016 \$	2015 \$
Discipline recoveries	52,660	98,852
Other	74,174	68,569
Return to Practice/Reinstatement	40,050	58,400
Certified Professional Program	56,221	15,000
	<hr/>	<hr/>
	223,105	240,821

# **The Association of Professional Engineers and Geoscientists of the Province of British Columbia**

## **Notes to Financial Statements**

**June 30, 2016**

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### **15 Office, general and miscellaneous**

	<b>2016</b>	<b>2015</b>
	<b>\$</b>	<b>\$</b>
Bank and credit card processing fees	395,990	413,577
Office and general (courier, copier, office supplies, storage, training and regalia)*	294,129	340,074
Information Technology Licensing	66,152	135,514
Member file management	38,098	41,839
Insurance	44,267	36,288
Dues and subscriptions	17,251	22,873
Other	1,576	914
	<hr/>	<hr/>
	<b>857,463</b>	<b>991,079</b>

\*Following a review of the classification of Office, general and miscellaneous expenses, \$39,886 (2015 - \$15,643) has been reclassified from Other to Office and General. The impact on total Office and General and Miscellaneous expenses is nil.

APEGBC			
Balance Sheet			
	June 30	June 30	
	2016	2015	
	\$	\$	
Assets			
Current assets			
Cash and cash equivalents	1,606,190	834,448	Cash and cash equivalents
Short-term investments	8,891,921	8,946,685	Short-term investments such as T-bills and GICs.
Interest receivable	16,044	31,525	Interest receivable from investments
Accounts receivable	366,753	454,731	Grants receivable, GST ITC receivable and CCPG receivable
Prepaid expenses	350,791	200,399	(1) Software licenses (2) AGM deposits/prepayments (3) Insurance (4) Property tax
Inventory	15,590	10,240	(1) Professional development CDROM inventory & (2) Exam text book inventory
	11,247,289	10,478,028	
Intangible assets	305,816	293,276	Externally acquired and internally developed IT software
Property and equipment	2,474,914	2,539,715	Building, land, furniture fixtures, electronics and computer items
Investments	392,700	999,000	Investments maturing between one or two years
	14,420,719	14,310,019	
Liabilities and Net Assets			
Current liabilities			
Accounts payable and accrued liabilities	1,061,938	1,604,519	(1) Trade accounts payable (2) Vacation payable (3) Accrued liabilities
Deferred fees	4,869,698	4,745,751	(1) Members (2) EIT/GIT (3) Reduced Fee (4) NRL & LL & (5) Student membership
Deferred revenue	228,765	239,237	(1) Conference sponsors (2) Exam unearned (3) CPD seminar unearned (4)Advertising unearned revenue
	6,160,401	6,589,507	
Net assets			
General fund			
Invested in property and equipment and intangible assets	2,831,402	2,832,991	
Operating	3,414,933	2,873,538	
Property, equipment and systems replacement fund	1,513,983	1,513,983	
Legal and insurance fund	500,000	500,000	
	8,260,318	7,720,512	
	14,420,719	14,310,019	



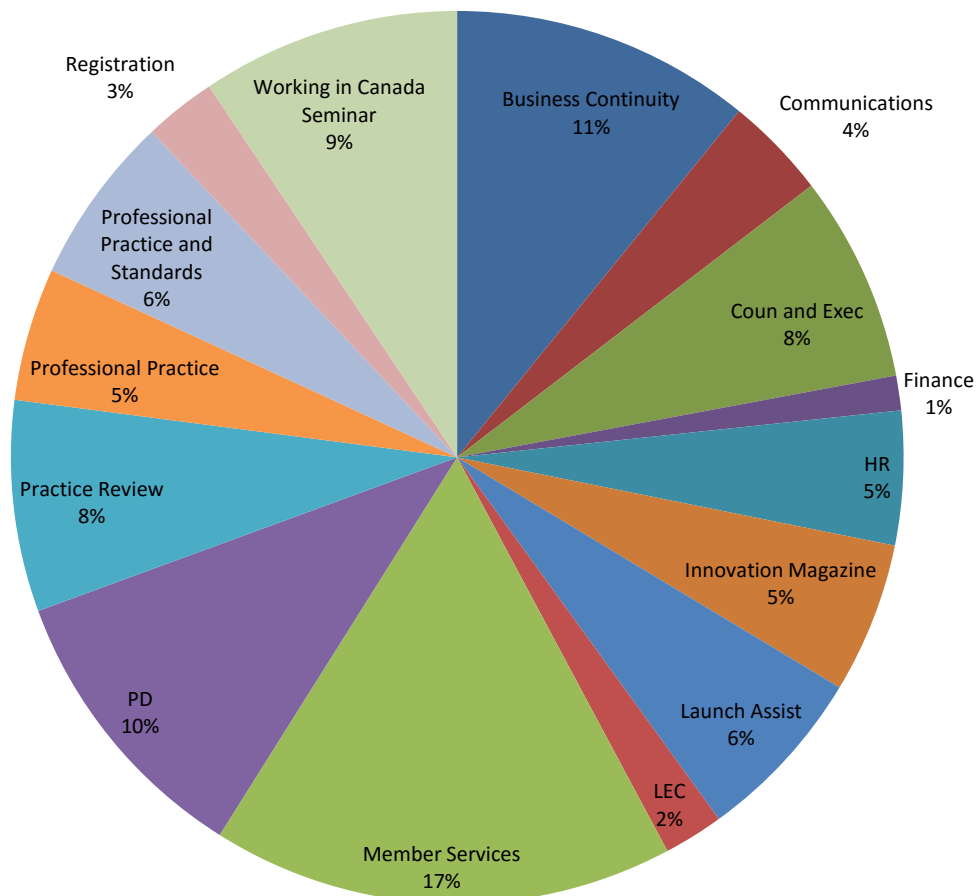
<b>APEGBC</b>				
<b>Balance Sheet</b>				
	<b>June 30</b>	<b>June 30</b>	<b>Year to Year</b>	
	<b>2016</b>	<b>2015</b>	<b>Variance</b>	
	<b>\$</b>	<b>\$</b>	<b>\$</b>	
<b>Assets</b>				
<b>Current assets</b>				
Cash and cash equivalents	1,606,190	834,448	771,742	Difference due to different investment timing and timing on renovation payment
Short-term investments	8,891,921	8,946,685	(54,764)	Difference due to investment timing
Interest receivable	16,044	31,525	(15,481)	No significant variance
Accounts receivable	366,753	454,731	(87,978)	Decrease due to lower grants receivable
Prepaid expenses	350,791	200,399	150,392	Increase due to deposit for new workstations and boardroom furniture for office renovation
Inventory	15,590	10,240	5,350	No significant variance
	11,247,289	10,478,028	769,261	
<b>Intangible assets</b>	305,816	293,276	12,540	No significant variance
<b>Property and equipment</b>	2,474,914	2,539,715	(64,801)	Amortization greater than asset additions
<b>Investments</b>	392,700	999,000	(606,300)	Difference due to investment timings
	14,420,719	14,310,019	110,700	
<b>Liabilities and Net Assets</b>				
<b>Current liabilities</b>				
Accounts payable and accrued liabilities	1,061,938	1,604,519	(542,581)	Decrease due to lower accounts payable balance
Deferred fees	4,869,698	4,745,751	123,947	Increase due to volume increase
Deferred revenue	228,765	239,237	(10,472)	No significant variance
	6,160,401	6,589,507	(429,106)	
<b>Net assets</b>				
General fund				
Invested in property and equipment and intangible assets	2,831,402	2,832,991	(1,589)	
Operating	3,414,933	2,873,538	541,395	
Property, equipment and systems replacement fund	1,513,983	1,513,983	0	
Legal and insurance fund	500,000	500,000	0	
	8,260,318	7,720,512	539,806	
	14,420,719	14,310,019	110,700	

<b>APEGBC</b>			
<b>Statement of Revenue and Expenses</b>			
	<b>2016</b>	<b>2015</b>	
	<b>\$</b>	<b>\$</b>	
<b>Revenue</b>			
<b>Fees</b>			
Annual membership fees	9,614,202	8,740,845	
Application, registration and certification fees	1,313,834	1,381,836	(1) Examination of credentials (2) Administration/certificate fee (3) Transfer fee (4) SER application fee (5) Limited license application fee/job interview (6) Stamp and seal and certificate revenue (7) Certified professional program (8) Structural qualifications (9) Reinstatement/Return to Practice
Professional and academic examinations	476,998	443,435	(1) Professional Practice Exam (2) Academic Exam (3) IStructE/SER Exams & (4) Professional Practice Exams Book Sales
	11,405,034	10,566,116	
<b>Other revenue</b>			
Affinity programs	399,502	392,561	Affinity program rebates (Manulife, Marsh, Lombard)
Annual conference	272,532	344,013	(1) Attendee (2) Sponsor & (3) Exhibitor Revenue
Grant and project administration	1,314,078	1,374,548	Seismic retrofit guidelines, external peer review and registration projects
Innovation magazine and other advertising	509,417	491,242	(1) Magazine advertising revenue (2) Web advertising revenue
Investment income	51,746	81,833	(1) Interest earned on investments & (2) Interest earned on bank balances
Miscellaneous	223,105	240,821	(1) Miscellaneous Revenues & (2) Student Sponsor Revenue (3) other one off revenues
Organization quality management	144,558	124,047	OQM membership and training revenue
Premises	8,905	99,499	Revenue from ground floor rental suites
Professional development	1,119,444	994,008	Revenue from professional development seminars and distance education product sales
	4,043,287	4,142,572	
<b>Total revenue</b>	<b>15,448,321</b>	<b>14,708,688</b>	
<b>Expenses</b>			
Advertising	51,938	42,441	(1) Communications dept. - public/government relations, student programs (2) Administration dept.- employment advertising & (3) PPE dept. - discipline and enforcement advertising
Annual conference - facilities and meals	152,257	191,825	Annual conference - facilities and meals
Contract and consulting services	2,084,198	1,741,956	(1) Professional practice review (2) Continuing professional development seminars & workshops (3) Information technology & (4) Other contract or consulting services
Contract and consulting services on grants	1,039,663	1,060,684	Seismic retrofit guidelines, external peer review and registration projects
Engineers Canada assessment	278,289	264,505	Engineers Canada assessment
Examinations and examination books	374,532	295,053	(1) Exam marking & (2) Exam invigilation
Geoscientists Canada assessment	64,143	65,908	Geoscientists Canada assessment
Grants and awards	108,614	124,093	(1) Branches grants (2) Career awareness (3) Student program
Innovation magazine printing	97,264	90,897	Innovation magazine printing
Legal	337,801	370,624	Legal
Meetings, seminar room rentals and special events	571,478	508,150	(1) CPD seminars & workshops & (2) Other program meeting expenses
Office, general and miscellaneous	857,463	991,079	(1) Bank fees (2) Computer hardware and software (3) Office supplies (3) Staff training (4) Property insurance (5) Copier and mail equipment lease
Premises and operating costs	332,087	430,825	Premises and operating costs
Printing, publication and distribution costs	443,458	469,182	(1) Postage (2) Photocopy (3) Mail house services (4) Printing (annual conference, program brochures, CPD, annual reports, annual invoicing, interim invoices, receipts and membership cards) (5) Letterheads, envelopes, business cards (6) Certificates & stamps & (7) others
Salaries and employee benefits	6,928,431	6,231,780	Salaries and employee benefits
Secondary professional liability insurance premiums	145,129	139,695	Secondary professional liability insurance premiums
Telecommunications	77,250	85,231	(1) Telephone (2) Long distance & (3) T1 Internet access
Travel	453,970	376,050	(1) Staff (2) President (3) Council committee (4) Practice reviewer (5) CPD speaker & branch reps travel
<b>Total expenses before amortization</b>	<b>14,397,965</b>	<b>13,479,978</b>	
<b>Excess of revenue over expenses before amortization</b>	<b>1,050,356</b>	<b>1,228,710</b>	
<b>Amortization</b>	<b>459,878</b>	<b>557,359</b>	Amortization expense of capital assets
<b>Writedown of computer software</b>	<b>50,672</b>	<b>-</b>	Software written off
<b>Excess of revenue over expenses for the year</b>	<b>539,806</b>	<b>671,351</b>	

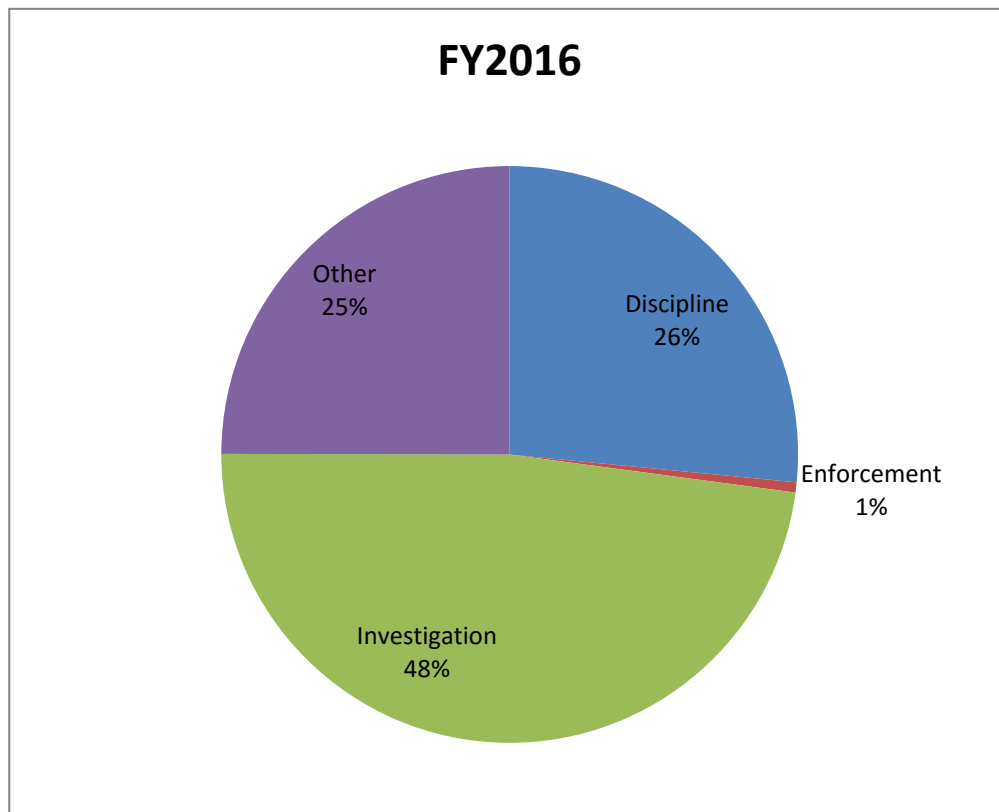
APEGBC									
Statement of Revenue and Expenses									
	2016	2015	Year to Year	Year to Year		2016 Budget	Budget	Budget	
	\$	\$	% variance	\$ variance		\$	% variance	\$ variance	
Revenue									
Fees									
Annual membership fees	9,614,202	8,740,845	10%	873,357	\$590K increase from both fee and volume increase. \$214K from volume increase. Also, \$55K student membership revenue increase due to accounting policy change	9,431,373	2%	182,829	Favorable budget variance due to strong volume growth in P.Eng \$125K and in EIT \$38K.
Application, registration and certification fees	1,313,834	1,381,836	-5%	(68,002)	Lower transfer and application revenue partially due to economic factors, offset by stronger certification revenue	1,313,748	0%	86	
Professional and academic examinations	476,998	443,435	8%	33,563	Professional practice exam revenue increased by \$44K due to fee increase and volume growth, offset by lower academic exam revenue	455,629	5%	21,369	Increase due to fee increase and volume growth in professional practice exam
	11,405,034	10,566,116	8%	838,918		11,200,750	2%	204,284	
Other revenue									
Affinity programs	399,502	392,561	2%	6,941		359,800	11%	39,702	Higher Park rebate and other affinity programs due to insurance claim changes
Annual conference	272,532	344,013	-21%	(71,481)	Reduction in attendees and exhibitors due to different AGM venue (Vancouver vs. Kelowna)	270,000	1%	2,532	
Grant and project administration	1,314,078	1,374,548	-4%	(60,470)	Variance due to external grants' project progress	1,380,000	-5%	(65,922)	Variance due to external grants' project progress
Innovation magazine and other advertising	509,417	491,242	4%	18,175	Stronger magazine advertisement revenue from prior year	480,000	6%	29,417	Stronger than expected in both magazine and web advertisement. Web advertisement has transitioned to online order platform, which allows customers with easier access to orders
Investment income	51,746	81,833	-37%	(30,087)	More funds were invested throughout the prior year, combined with lower Bank of Canada interest rate impacting interest rates in investments	77,445	-33%	(25,699)	Mainly due to drop of interest rates as a result of drop in oil pricing leading to lower bank of canada interest rate and less invested cash due to renovations and other initiatives
Miscellaneous	223,105	240,821	-7%	(17,716)	Lower reinstatement/return to practice revenues	183,700	21%	39,405	Variance due to higher discipline recovery
Organization quality management	144,558	124,047	17%	20,511	Increase due to volume growth	141,000	3%	3,558	
Premises	8,905	99,499	-91%	(90,594)	Last year of rental income as space taken back for office renovation	-	100%	8,905	
Professional development	1,119,444	994,008	13%	125,436	Increase due to growth in seminars and new grant revenue for law and ethics project	1,124,025	0%	(4,581)	
	4,043,287	4,142,572	-2%	(99,285)		4,015,970	1%	27,317	
Total revenue	15,448,321	14,708,688	5%	739,633		15,216,720	2%	231,601	
Expenses									
Advertising	51,938	42,441	22%	9,497		55,390	-6%	(3,452)	
Annual conference - facilities and meals	152,257	191,825	-21%	(39,568)	Variance due to venue changes	164,475	-7%	(12,218)	
Contract and consulting services	2,084,198	1,741,956	20%	342,242	Increase due to new projects for working in Canada, online law & ethics. And volume growth in CPD contract services	1,978,056	5%	106,142	Variance mainly due to new projects: online Law & Ethics and Working in Canada Seminars
Contract and consulting services on grants	1,039,663	1,060,684	-2%	(21,021)	Variance due to project progress	1,040,000	0%	(337)	
Engineers Canada Assessment	278,289	264,505	5%	13,784	Volume growth	277,327	0%	962	
Examinations and examination books	374,532	295,053	27%	79,479	Increase due to higher exam marking fee and volume increase	339,105	10%	35,427	Related to growth in exam revenues, the budget variance due to volume increase in cost of goods sold and marking fees
Geoscientists Canada Assessment	64,143	65,908	-3%	(1,765)		67,080	-4%	(2,937)	
Grants and awards	108,614	124,093	-12%	(15,479)	Less sponsorship grants issued	108,100	0%	514	
Innovation magazine printing	97,264	90,897	7%	6,367		100,000	-3%	(2,736)	
Legal	337,801	370,624	-9%	(32,823)	Savings due to lower discipline legal costs offset by higher investigation expenses	452,909	-25%	(115,108)	Savings in unused contingency
Meetings, seminar room rentals and special events	571,478	508,150	12%	63,328	Increase due to higher PD room rental related to higher PD revenue, and Council planning sessions	519,914	10%	51,564	Variance due to higher PD room rental volume driven by revenue attendees growth
Office, general and miscellaneous	857,463	991,079	-13%	(133,616)	Reduction is mainly from savings in IT business continuity expenses	835,612	3%	21,851	Higher banking fees by volume and due to fee increase
Premises and operating costs	332,087	430,825	-23%	(98,738)	Savings due to deferral of repaving of parking lot to be completed in the fall and other minor scheduled repairs and maintenance	365,930	-9%	(33,843)	Savings from pushed back repairs/maintenance to focus on renovation
Printing, publication and distribution costs	443,458	469,182	-5%	(25,724)	Lower PD distance education costs while transitioning to online delivery module	518,058	-14%	(74,600)	Savings from lower PD distance education costs and material cost of CDs, resulting from switching to online delivery platform
Salaries and employee benefits	6,928,431	6,231,780	11%	696,651	\$147K increase due to 4 new positions, \$402K increase from prior year due to refilling/transitions from turnover and maternity leaves and average 3% merit increase (\$148K) of existing staff	7,255,012	-5%	(326,581)	Savings from 4 vacancies ie. timing/turnover to fill old and new positions. Offset by (\$56K) of IT capitalization
Secondary professional liability insurance premiums	145,129	139,695	4%	5,434		151,605	-4%	(6,476)	
Telecommunications	77,250	85,231	-9%	(7,981)		101,024	-24%	(23,774)	Savings in office telephone lines with renewed contracts
Travel	453,970	376,050	21%	77,920	Higher travel for AGM due to venue difference. Also increase in travel for Council and professional practice committee	406,535	12%	47,435	Variance due to AGM and professional practice related travel
Total expenses before amortization	14,397,965	13,479,978	7%	917,987		14,736,132	-2%	(338,167)	
Excess of revenue over expenses before amortization	1,050,356	1,228,710	-15%	(178,354)		480,588	119%	569,768	
Amortization	459,878	557,359	-17%	(97,481)	Lower due to fully amortized assets (externally acquired intangible assets) at end of prior year	530,588	-13%	(70,710)	Savings due to timing of renovation
Writedown of computer software	50,672	-	100%	50,672	One time write-down of online law & ethics due to lack of recoverability beyond a year		100%	50,672	One time variance from writing off capitalized Law & Ethics consulting costs
Excess of revenue over expenses for the year	539,806	671,351	-20%	(131,545)		(50,000)	-1180%	589,806	

<b>Contract and consulting services (excluding external grants consulting costs)</b>	<b>FY2016</b>	<b>FY2015</b>	<b>\$ Change</b>	<b>% Change</b>
Business Continuity	226,645	192,668	33,977	18%
Communications	77,440	103,836	(26,396)	-25%
Coun and Exec	155,825	247,013	(91,188)	-37%
Finance	26,312	39,524	(13,212)	-33%
HR	100,978	79,006	21,972	28%
Innovation Magazine	113,665	126,853	(13,189)	-10%
Launch Assist	133,508	104,400	29,108	28%
LEC	45,244	82,574	(37,330)	-45%
Member Services	348,716	245,119	103,596	42%
PD	218,129	170,972	47,158	28%
Practice Review	159,441	150,387	9,054	6%
Professional Practice	100,364	97,383	2,982	3%
Professional Practice and Standards	127,903	83,599	44,304	53%
Registration	54,341	18,623	35,718	192%
Working in Canada Seminar	195,687	-	195,687	100%
	<b>2,084,198</b>	<b>1,741,956</b>	<b>342,243</b>	<b>20%</b>

## FY2016



Legal				
	FY2016	FY2015	\$ Change	% Change
Discipline	89,667	253,977	(164,310)	-65%
Enforcement	1,915	21,296	(19,381)	-91%
Investigation	161,877	31,978	129,898	406%
Other	84,342	63,373	20,969	33%
<b>Grand Total</b>	<b>337,801</b>	<b>370,624</b>	<b>(32,824)</b>	<b>-9%</b>



FY2016  
Statement of Revenue and Expenses

<b>Revenue</b>	
<b>Fees</b>	
Annual membership fees	9,614,202
Application, registration and certification Fees	1,313,834
Professional and academic examinations	476,998
	11,405,034
<b>Other revenue</b>	
Affinity programs	399,502
Annual conference	272,532
Grant and project administration	1,314,078
Innovation magazine and other advertising	509,417
Investment Income	51,746
Miscellaneous	223,105
Organization quality management	144,558
Premises	8,905
Professional development	1,119,444
	4,043,287
<b>Total revenue</b>	15,448,321
<b>Expenses</b>	
Advertising	51,938
Annual conference - facilities and meals	152,257
Contract and consulting services	2,084,198
Contract and consulting services on grants	1,039,663
Engineers Canada Assessment	278,289
Examinations and examination books	374,532
Geoscientists Canada Assessment	64,143
Grants and awards	108,614
Innovation magazine printing	97,264
Legal	337,801
Meetings, seminar room rentals and special events	571,478
Office, general and miscellaneous	857,463
Premises and operating costs	332,087
Printing, publication and distribution costs	443,458
Salaries and employee benefits	6,928,431
Secondary professional liability insurance premiums	145,129
Telecommunications	77,251
Travel	453,970
<b>Total expenses before amortization</b>	14,397,965
<b>Amortization</b>	
Intangible assets	187,038
Property and equipment	272,840
<b>Total amortization</b>	459,878
<b>Writedown of computer software</b>	50,672
<b>Excess of revenue over expenses for the year</b>	539,806

REGULATORY					OPERATIONS				FINANCE	GENERAL
Registration	Professional Practice, Standards & Development	Legislation, Ethics & Compliance	Council & Executive Office		Communications	Member Services	Information Systems	Human Resources	Finance & Administration	General
-	-	-			-	-			-	9,614,202
1,313,834	-	-			-	-			-	-
476,998	-	-			-	-			-	-
1,790,832	-	-	-		-	-	-	-	-	9,614,202
-	-	-			-	399,502			-	-
-	-	-			-	272,532			-	-
140,000	1,174,078	-			-	-			-	-
-	-	-			509,417	-			-	-
-	-	-			-	-			51,746	-
40,050	56,221	52,660			2,600	2,725			-	68,849
-	144,558	-			-	-			-	-
-	-	-			-	-			8,905	-
-	-	-			8,800	1,110,644			-	-
180,050	1,374,857	52,660	-		520,817	1,785,403	-	-	60,651	68,849
1,970,882	1,374,857	52,660	-		520,817	1,785,403	-	-	60,651	9,683,051
Registration	Professional Practice, Standards & Development	Legislation, Ethics & Compliance	Council & Executive Office		Communications	Member Services	Information Systems	Human Resources	Finance & Administration	General
-	-	-	-		51,938	-	-	-	-	-
-	-	-	-		-	152,257	-	-	-	-
250,028	521,216	45,244	155,825		191,105	566,845	226,645	100,978	26,312	-
-	1,039,663	-	-		-	-	-	-	-	-
-	-	-	-		-	-	-	-	-	278,289
374,532	-	-	-		-	-	-	-	-	-
-	-	-	-		-	-	-	-	-	64,143
-	-	-	-		74,519	34,095	-	-	-	-
-	-	-	-		97,264	-	-	-	-	-
-	-	337,801	-		-	-	-	-	-	-
41,083	38,931	10,388	85,167		52,288	292,274	760	35,057	15,529	-
9,926	26,175	2,723	2,786		33,320	16,561	66,152	126,859	164,998	407,963
-	-	-	-		-	-	-	-	332,087	-
90,630	6,968	4,486	8,460		126,511	42,325	-	-	164,078	-
1,396,448	856,038	528,958	836,535		730,141	749,629	783,984	226,808	819,890	-
-	-	-	-		-	-	-	-	-	145,129
-	-	-	-		-	-	77,251	-	-	-
23,423	99,037	4,402	143,776		12,673	168,122	1,920	57	560	-
2,186,070	2,588,028	934,002	1,232,549		1,369,759	2,022,106	1,156,712	489,760	1,523,455	895,524
-	-	-	-		-	-	187,038	-	-	272,840
(215,188)	(1,213,171)	(881,342)	(1,232,549)		(848,942)	(287,375)	(1,343,750)	(489,760)	(1,462,803)	8,514,687

Date: August 29, 2016

Report to: **Council for Decision**

From: Gillian Pichler, P.Eng., Director, Registration

Subject: Renewal of Memorandum of Agreement with the Society of Internationally Trained Engineers of BC (SITE BC)

Linkage to Strategic Plan: Goal 1: Members and Prospective Members  
Goal 2: Members' Employers and Clients  
Goal 3: Government, Public and Other Stakeholders  
Goal 4: Enabling Goal

<b>Purpose:</b>	To renew the Memorandum of Agreement with SITE BC.
<b>Motion:</b>	That Council approve the renewal of the Memorandum of Agreement with SITEBC (the MOA) and that the President be authorized to execute the MOA on behalf of APEGBC.

### Background

On March 8, 2013, APEGBC renewed its Memorandum of Agreement (MOA) with the Society of Internationally Trained Engineers of BC (SITE BC); that had originally been entered into in November 2004.

SITE BC, was the first of three engineering organisations to enter into an MOA with APEGBC; the others being the Bangladeshi Engineers and Applied Scientists of BC (BEASBC) in 2007 and the Iranian Engineers of BC Association (IEBCA) in 2009. At a corporate level, APEGBC supports [SITE BC's objectives](#) the MOA provides direct linkage between our organisations and the means to address any potential concerns about the group and its activities.

### Discussion

As the agreement is working well, it is proposed that it be renewed as attached, incorporating wording changes which are of a housekeeping nature, i.e. including the removal of a reference to Engineers Canada's now defunct EIEAP pre-arrival academic assessment program and extending the renewal term to five years from three. SITE BC President Fernando Borja, P.Eng. plans to attend the Council meeting to sign the agreement and provide an update on SITE BC activities.

### Recommendation(s)

That Council approve the renewal of the Memorandum of Agreement with SITEBC (the MOA) and that the President be authorized to execute the MOA on behalf of APEGBC.

### Appendix A – Memorandum of Agreement with SITE BC

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Date: August 25, 2016

Report to: **Council for Decision**

From: Deesh Olychick, Director, Member Services  
Melinda Lau, Acting Director, Communications and Stakeholder Engagement

Subject: Branding Initiative

Linkage to Strategic Plan: Members and Future Members, Gov't, Public and other stakeholders, Enabling Goal

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<b>Purpose:</b>	To provide direction to staff on the Branding Initiative to determine next steps.
<b>Motion:</b>	<div>That Council approve the name Professional Engineers and Geoscientists British Columbia, and the <i>[crest/diamond]</i> logo for development and implementation. Or That Council directs staff to provide further options for design concepts for Council decision. Or That Council defer a decision on the Branding Initiative indefinitely.</div>

## Background

Council's 2014-2017 Strategic Plan has a major focus to improve the brand recognition for APEGBC and the professions of engineering and geoscience. The plan sets out two objectives to *"Develop and implement an organizational brand strategy for APEGBC"* and *"Develop and implement a brand strategy for the BC engineering and geoscience professions,"* and an outcome *"The P.Eng. and P.Geo. designations are an internationally recognized brand of choice."*

Since its inception, the association has been impacted by significant changes such as the inclusion of geoscientists, increased participation of women in the workforce, a more ethnically diverse membership, and the blurring of protected areas of practice in the high-tech sector. While we have fundamentally and consciously changed how we do business to reflect these new norms, beyond a logo change in the 90s, this has never been done for how we represent the brand and the professions externally.

In April 2014, Council approved the Branding Initiative as a part of the 2014-2017 budget. Through this initiative, Council's intent was to make the association, the professions and their value more easily recognizable and understood by the public, and engage members as champions of the brand and brand ideas. This is being accomplished through a strategic marketing and communications approach founded on a clearly articulated brand identity,



supported by consistent messaging throughout the organization and a look and feel that reflects the brand identity and its core ideas of ethics, excellence and progress.

This three-year initiative has had significant funding allocated to it each year (\$223k in total). To provide guidance for the initiative, a well-known consultant with extensive experience in brand development was hired and a brand working group was established, including representatives from Council, engineering and geoscience members and senior staff. Work started in 2014, and Council has provided direction and received regular reports since. At the September 2015 meeting, Council approved “exploration and brand identity development of the name options as ‘Professional Engineers and Geoscientists of British Columbia’ and ‘Engineers and Geoscientists BC.’ ”

At the June 17, 2016 meeting, a recommendation was brought forward from the Working Group, and Council was asked to provide a decision for direction on a new name and visual identity concept. Council deferred a decision and requested that staff provide more information on the budget for the brand roll out and the implementation plan, the website domain name, and the legal process for a business name change.

## Discussion

Over the three years of the project, numerous stakeholder meetings, surveys and one-on-one interviews have taken place. To authentically articulate APEGBC’s brand, the work that is being done is data driven, and relies heavily on member input. This first phase of the project has involved a brand audit and comparison studies, survey data from members, staff and the public, one-on-one interviews with members representing different demographics and internal groups, as well as external stakeholders. To date, approximately \$197k has been spent, with a budgeted \$37.5k remaining to complete development and implementation (deferral from June to September resulted in unbudgeted costs for additional research and testing (~\$12k)).

### Additional information requested by Council

Business Name Change and website domain: APEGBC rarely uses its full legal name under the *Act* and has been operating under a business name for some time. Based on legal counsel received and a completed trademark search, we do not anticipate any impediment to change our business name to either of the two proposed options: “Professional Engineers and Geoscientists British Columbia” or “Engineers and Geoscientists British Columbia.”

A number of website domain names have also been secured in anticipation of a business name change. While a large number of possible domain name combinations exist, we have reserved those most relevant to the association’s intended use, including:

engineersgeoscientistsbc (.ca/.com/.org), engineersandgeoscientistsbc (.ca/.com/.org), engineersgeoscientists.bc.ca, professionalengineersandgeoscientistsbc (ca/.com/.org), professionalengineersandgeoscientists.bc.ca.

Implementation plan and budget: Seeking impact through a member focus, implementation will be staged, with the key elements of roll-out occurring in June 2017 aligned with the launch of the 2017-2020 APEGBC strategic plan. Much of the roll-out of the new visual identity will occur through regular renewal of collateral and will be covered by existing resource allocations in FY2017. Other elements of implementation with one-time costs will also be requested as budget

initiatives for 2017-2020, such as those with a range of options for Council consideration, e.g., branding identity advertising campaign.

A table summarizing timing and estimated costs is provided for reference.

### **Additional consultation and research**

To support a decision by Council, additional consultation was undertaken with both members and the public on the name and design options.

A poll was conducted by Insights West on behalf of APEGBC using a representative sample of 800 members of the BC public. Additionally, individual interviews were conducted with a demographically diverse group of APEGBC members. Results were informative, although it is essential to note that this kind of research is only able to gather surficial information within the limited context of testing and is intended to be applied with the overall evaluation criteria for rebranding in mind.

Consistent across the research with both groups, the diamond tested better in representing the concepts of progressiveness, innovativeness, and diversity, whereas the more traditional crest performed better on concepts related to credibility, clarity and ethics. Both the diamond and the crest performed better than the current logo.

With respect to the naming options, the name “**Professional** Engineers and Geoscientists British Columbia performed better with members and the public in terms of clarity and memorability and sense of purpose.

For the visual identity, in the interviews, members indicated a clear preference for the Diamond (Direction 1) vs. the Crest (Direction 2). Putting a modern and progressive face on APEGBC was considered important by members in promoting the association to the public and potential members.

In public testing, the crest and the diamond performed similarly in a number of areas, but the public overall demonstrated a preference for the crest.

The most recent consultation results were provided to the members of the Branding Working Group for review. In seeking to provide a recommendation to council, Working Group members were split evenly on support of the diamond or crest, as well as the name options.

### **Options**

The following options are presented for Council consideration:

#### **Council approves a single name and design concept for further development and implementation.**

This decision signals a go-ahead on rebranding the association. Staff would work with the consultant to refine the design concept, develop guidelines for messaging and communications pieces, templates for marketing collateral, and then execute the implementation plan. Brand roll-out would dovetail with and support the launch of the new Strategic Plan. A range of options for a promotional campaign would be brought forward to Council as a part of budget initiatives for the 2017-2020 Strategic Plan.

#### **Council directs staff to provide further options for design concepts for Council decision.**

To, date 9 different design concepts have been explored, and narrowed down to 2 for decision. Should Council feel that neither of the concepts presented meets the criteria of the brand identity to appropriately represent the association and its members, further concept exploration may be warranted. Exploration of additional design concepts would incur extra costs related to development (~\$40k), testing (\$10-15k), as well as another 6 months of staff time. Delays to the planned project timeline would see some expenditures move into the next 3-year budget cycle, and additional costs may be incurred for necessary updates to collateral and hardware that had already been delayed in preparation for branding implementation during FY16/17, and which may need to be updated a second time when implementation does occur.

**Council defers a decision on the Branding Initiative indefinitely.**

This decision would put the Branding Initiative on hiatus. Staff would cease activities related to the development of the new brand and reprioritize resources to other initiatives. In order to support effective long-term planning and service delivery, Council would need to provide direction to staff by clearly articulating what specific circumstances would trigger the reactivation of this project.

To date, approximately \$197k has been spent on this initiative. A loss of momentum for this initiative would mean reproducing much of the work undertaken to date at a similar cost upon resumption, depending on the length of the delay. Costs would be incurred for consultation and testing and possibly further development. In order to resume activities, Staff would need to re-engage with the existing consultants, if they were willing, or undertake a new procurement process.

This also may be a missed opportunity to capitalize on the renewal of the brand, and seek to make it relatable to current and future members ahead of the association's 100<sup>th</sup> anniversary.

**Recommendation**

**Significant cost and effort has been expended on this initiative in the interest of achieving three components of the 2014–2017 Strategic Plan. While delay or termination of the project are options, the value achieved in doing so is unclear.**

**Motion:**

**That Council approve the name Professional Engineers and Geoscientists British Columbia, and the [crest/diamond] logo for development and implementation.**

**Appendix A - Branding Initiative – Implementation Timeline and Resource Information**

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Date: August 15, 2016

Report to: **Council for Decision**

From: Janet Sinclair  
Chief Operating Officer

Subject: Approval of the 2017 – 2020 Strategic Plan Framework

Linkage to Strategic Plan: Continue to implement best practices in governance.

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<b>Purpose:</b>	To review and approve the Framework for the 2017 – 2020 Strategic Plan.
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<b>Motions:</b>	That Council approves the 2017 – 2020 Strategic Plan Framework.
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### Background

On June 15 - 16, 2016, Council held a planning session to begin preparation of a new strategic plan for 2017 – 2020. At the meeting, Council discussed the need to align the plan and the legislative responsibilities of the association. Staff was directed to create a Strategic Plan Framework based on the guidance given by Council and to bring the Framework to the September Council meeting for review and approval. The service plans and associated key performance indicators (KPIs) will be developed based on the Framework.

### Discussion

The main focus of APEGBC for the next several years will be to ensure alignment of the association's activities with the *Engineers and Geoscientists Act*. To that end, the Vision and Mission are focused on the public interest while the goals align with the duties and objects of the *Act*.

Council was not able to reach a final decision at the Planning Session regarding the Mission statement so staff were directed to draft and present two missions to Council for decision at the September Council meeting. The two suggested Missions are presented as options 1 and 2 in the attached draft framework. Council also directed that the three goals be prioritized in the order that they are listed in the *Act*.

### Recommendation

MOTION: That Council approves the 2017 – 2020 Strategic Plan Framework.

# APEGBC DRAFT Strategic Plan Framework 2017 – 2020

<b>VISION</b> Engineering and geoscience professionals creating a better future for all.	
<b>MISSION OPTION #1</b> To be a progressive and engaged regulator in the public interest.	<b>MISSION OPTION #2</b> To serve the public interest as a progressive regulator that supports and promotes the engineering and geoscience professions.
<b>VALUES</b> Integrity                      Accountability                      Innovation	
<b>GOALS</b>	<b>OUTCOMES</b>
1. To uphold and protect the public interest through the regulation of the professions.	a. APEGBC's role as a regulator is broadly understood. b. Stakeholders embrace efforts to enhance professional standards c. The Act is modernized to reflect the evolution of the professions and the regulatory mandate of the Association
2. Establish, maintain and enforce qualifications and professional standards	a. Members and organizations practice to high professional and ethical standards b. APEGBC standards are broadly utilized by all stakeholders. c. All engineering and geoscience is practiced by professionals licensed by APEGBC.
3. Promote and protect the professions of engineering and geoscience (subject to goals 1 & 2)	a. Membership is diverse and inclusive. b. The supply of skilled engineering and geoscience professionals meets the needs of BC's labour demand. c. Stakeholder trust in the professions is maintained. d. Member satisfaction is improved.
<b>PRINCIPLES</b> <ol style="list-style-type: none"> <li>1. We act first and foremost in the public interest.</li> <li>2. We proactively plan for the future.</li> <li>3. We support effective governance.</li> <li>4. We consult our members and stakeholders.</li> <li>5. We foster diversity and inclusivity.</li> <li>6. We support national collaboration.</li> <li>7. We provide sufficient resources to fulfill APEGBC's responsibilities.</li> <li>8. We provide effective support and recognition for volunteers, staff, and members.</li> </ol>	

Date: August 23, 2016

Report to: **Registration Committee for Information and Decision**

From: Gillian Pichler, P. Eng.  
Director, Registration

Issue: Registration Hearings for Proposed approach to holding Registration Hearings

Linkage to the Strategic Plan: Members and Future Members

<b>Purpose:</b>	To establish a policy and procedure on holding Registration Hearings with respect to the good character requirement for registration.
<b>Motions:</b>	<p>That Council delegate its authority to hold Registration hearings to the Registrar under s. 13(8) of the Act on an interim basis until a bylaw is approved by Council to delegate this function to a Registration Hearings Committee</p> <p>That Council approve, in principle, the Policy and Procedure for holding Registration Hearings; and</p> <p>That Council approve that a draft bylaw creating a committee to hold registration hearings be reviewed by legal counsel and brought to the November 2016 meeting with Terms of Reference for approval to conduct a bylaw consultation</p>

## Background

APEGBC has an increasing number of applicants for professional registration whose registration depends upon the testing of conflicting evidence of their good character and repute. In many of these cases, the evidence of good character is in conflict and credibility is an issue.

Bylaw 7(c) that creates the Registration Committee allows in Clause 4<sup>1</sup> that the Registration Committee can refer character issues to Council when there are serious concerns that the applicant is unsuitable for registration or licensing.

To date, the Registration Committee has referred such cases to the Council based on written submissions by the applicant and others; and the Council has decided the issue based on these submissions.

<sup>1</sup> The registration committee may refer an applicant to council for a decision on the applicant's suitability for registration or licensing when, in the opinion of the registration committee, there is a serious concern that the applicant: (i) may not be of good character and good repute; or (ii) may have been convicted in Canada or elsewhere of an offence that, if committed in British Columbia, would be an offence under an enactment of the Province or of Canada, and that the nature or circumstances of the offence render the person unsuitable for registration or licensing.

Recently, a legal precedent has arisen that decided that, in the absence of legislation to the contrary, an oral hearing is a necessary incidental power available to the Council in circumstances where evidence relevant to good character is in conflict, and credibility is in issue. (*Joshi v BC Veterinary Medical Association* (BCCA 2010) - ‘the Joshi case’). As a result of this, an oral hearing (a “registration hearing”) will need to be held for such cases; several of which may need to be heard in the next three to six months. A process needs to be developed to carry out these hearings and the responsibility for carrying out this process decided.

## Discussion

APEGBC already has a procedure for conducting oral hearings by Council for individuals wishing to reinstate membership following revocation due to a character issue. The purpose of these hearings is to satisfy Council that the former member is of good character and good repute and that their conviction does not render them unsuitable for membership. Council last held an oral hearing following revocation of membership in 2001.

APEGBC already has a procedure for dealing with Registration entry-to-practice character issues. The four Members of Council on the Registration Committee review written submissions from applicants. Typically, these issues do not contravene the Act or Code of Ethics, they involve minor infractions and/or the applicant has demonstrated remorse and rehabilitation. Any issues of a more serious nature have been referred to Council. All Registration Committee and Council reviews of character issues have been on a written basis. The most recent issue (in 2013) dealt with by Council involved applicants who cheated on the Professional Practice Examination.

Under Section 13 Admission to Membership, Clause 8 also allows that *the council may, in writing, delegate some or all of its powers and duties under this section to the registrar, on the terms or conditions the council considers advisable.*

The Engineers and Geoscientists Act (the “Act”) is silent on registration hearings. As a result of the Joshi case, APEGBC will have to provide a mechanism to hold oral hearings. There are five options available to APEGBC. In order from the most compliance with the decision from the Joshi case to the least, they are:

1. Council holds the hearings
2. The Registrar holds the hearings
3. The Registration Committee holds the hearings
4. A new, as yet unformed, committee or panel holds the hearings
5. Council continues with the current procedure

The following table lists the options with their benefits and the challenges they present.

Entity holding hearings	How this would be accomplished	Challenges	Benefits
Council	Based on the <i>Act</i> and the Bylaws, Council is the group tasked with conducting registration hearings. A quorum of the Council would be required likely not including the Council appointees to the Registration Committee.	<ul style="list-style-type: none"> <li>Hearing with all of Council may become unwieldy. However, a subset of Council cannot hold the hearings based on <i>Harris v. The Law Society of Alberta</i> (SCC 1936) – a regulatory body must strictly comply with its legislative grant of power and authority</li> <li>The four councillors on the Registration Committee should not participate to avoid allegations of bias and lack of impartiality. This could restrict the Council from achieving the quorum (9 members) required to hold a hearing.</li> </ul>	<ul style="list-style-type: none"> <li>Least vulnerable to legal challenge and most compliant with the precedent set in the Joshi case</li> <li>Decision made by the Council, not by an individual</li> </ul>
The Registrar	It would appear that Council may delegate the function to hold oral hearings to the Registrar under s. 13(8) of the Act	<ul style="list-style-type: none"> <li>The Registrar may not be formally insulated from overhearing information prior to the hearing – we would have to put safeguards in place</li> <li>Unclear in the Act as to whether this is an intended function of the Registrar</li> <li>The Registrar is left exposed as the sole arbiter, possibly assuming increased security risk</li> </ul>	<ul style="list-style-type: none"> <li>Hearing conducted before one person instead of 9 (easier to execute)</li> <li>Reasonably defensible on legal basis</li> </ul>
Registration Committee	Registration Committee does not refer cases to Council under Bylaw 7(c)(5)	<ul style="list-style-type: none"> <li>The Registration Committee is not in the Act</li> <li>This contravenes the intent of Bylaw 7(c)(5) – to have Council deal with difficult cases</li> <li>A single entity cannot be investigator, prosecutor, and adjudicator and this would</li> </ul>	<ul style="list-style-type: none"> <li>The Registration Committee is experienced and knowledgeable in registration issues</li> </ul>



		happen as the Registration Committee would hold all three functions in these cases	
A new Committee or Panel Created by Bylaw	Pursuant to s. 10(1)(r) of the Act, create a new, independent committee by Bylaw and delegate to it the power to hold registration hearings. This panel may be chaired by the Registrar.	<ul style="list-style-type: none"> <li>• It would take at least one year to pass Bylaw amendment</li> <li>• Membership may not vote in favour of the Bylaw</li> </ul>	<ul style="list-style-type: none"> <li>• Council could set quorum for independent committee at a reasonable number of people</li> <li>• Panel members could train by observing Council or Registrar Hearings</li> </ul>
Continue with Current Procedure	Council continues to make determinations of good character on the basis of written submissions	<ul style="list-style-type: none"> <li>• Direct violation of the principles articulated in <i>Joshi v BC Veterinary Medical Association</i> (BCCA 2010)</li> <li>• If an applicant appealed to the Supreme Court, APEGBC likely to lose. Such a loss would be bad for APEGBC's reputation with its members and the public</li> </ul>	<ul style="list-style-type: none"> <li>• Can be done at regular council meeting; no need to convene a special meeting</li> <li>• Requires less training</li> </ul>

Due to the immediate need for a solution for two or more cases that are in need of a hearing, the recommended path forward is to implement Option 2 (The Registrar holds the hearings) as an interim measure while developing a new bylaw creating the Panel including::

- i. drafting a bylaw for the consideration of Council that creates a Panel to hold oral Registration hearings where evidence is in conflict and credibility is an issue (November 2016),
- ii. conducting a bylaw consultation (November 2016 – February 2017)
- iii. approval of Council of the bylaw (February or April 2017)
- iv. conducting a bylaw ballot (September/October 2017)

A policy and procedure for holding Registration hearings is attached:

- Registrar's Hearing Version in Appendix A
- Council Hearing Version in Appendix B

The draft bylaw would be modeled on Act 31 (The Discipline Committee) with respect to structure and would be delegated Council's power and authority to hold Registration hearings to resolve good character questions that depend upon the testing of conflicting evidence where credibility is an issue, e.g.

### **Registration Hearings Committee**

- 7 (d) (1) The registration hearings committee is hereby created
- (2) The registration hearings committee is hereby delegated the council's power and authority to conduct hearings where evidence relevant to the good character of an applicant for registration is in conflict, and credibility is in issue.
- (3) The registration Hearings committee shall be composed of at least 5 members in accordance with the terms of reference for the Registration Hearings Committee as approved by the council
- (4) The registration hearings committee may establish one or more panels composed of at least 3 members of the registration hearings committee
- (5) On matters referred to a panel by the registration hearings committee, a panel has the power and authority of the registration hearings committee

## **Recommendations**

**MOTION:** That Council delegate its authority to hold Registration hearings to the Registrar under s. 13(8) of the Act on an interim basis until a bylaw is approved by Council to delegate this function to a Registration Hearings Committee

That Council approve, in principle, the Policy and Procedure for holding Registration Hearings; and

That Council approve that a draft bylaw creating a committee to hold registration hearings be reviewed by legal counsel and brought to the November 2016 meeting with Terms of Reference for approval to conduct a bylaw consultation.

**Appendix A – Policy and Procedure for Registration Hearings (Registrar’s Version)**

**Appendix B – Policy and Procedure for Registration Hearings (Council Version)**



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Date: August 31, 2016

Report to: **Council for Information**

From: Ann English, P.Eng.  
Chief Executive Officer & Registrar

Subject: Possible Change to Council Report Item 6.7.1

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The Governance Committee is convening a special meeting on Monday Sept 5 to further consider their report to this month's Council meeting. If anything in the report needs to be changed or the whole report is withdrawn, you will be advised through an email that will be sent following the Sept 5 meeting informing you of the status. The report has been included in the agenda package to meet the required distribution deadlines and the courier requirements. Our apologies for any inconvenience this may cause.

Sincerely – Ann English

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Date: August 26, 2016

Report to: **Council for Information and Decision**

From: Governance Committee  
(Report Prepared by: Tony Chong, P.Eng., Chief Regulatory Officer/Deputy Registrar)

Subject: APEGBC Volunteer Group Reporting Structure Review

Linkage to Strategic Plan: Continue to implement best practices in governance

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<b>Purpose:</b>	To inform Council of the Governance Committee's work to date on this topic and to seek Council approval on a number of recommendations from the Committee.
<b>Motion:</b>	<p>That Council approve the following recommendations:</p> <ol style="list-style-type: none"><li>1. That the Statutory (mandated by the Engineers and Geoscientists Act and Bylaws), the Standing, and Advisory Committees except the Mentoring Committee and the Professional Practice related voluntary groups remain intact and continue to report to Council.</li><li>2. That the Mentoring Committee operate as an advisory committee reporting to the CEO.</li><li>3. That all of the Professional Practice related voluntary groups report to the Professional Practice Committee which will report to the CEO.</li><li>4. That all Professional Practice Related Guidelines will continue to be forwarded to Council for approval.</li></ol>

## Background

In 2015, Council considered a governance consultant's report which provided a number of recommendations regarding APEGBC's Volunteer Groups (includes various Boards, Committees, Sub-committees, Panels, Working Groups, etc...). Council adopted some of the recommendations but referred several of the recommendations to the Governance Committee for further review and report back to Council. Amongst the issues that the Governance Committee was asked to review are:

- a. Assess the continuing need for such a large number of volunteer groups (see Appendix A), and
- b. Assess which volunteer group should report to Council and which ones should report to the CEO.

During the past year, the Governance Committee has reviewed a substantial amount of information including the results of extensive consultation with members of the voluntary groups. The Committee is in a position to provide an update to Council with some recommendations. Additional

discussions with other volunteer groups will take place during the next few months. This is necessary before the Committee will be in a position to complete its work on this matter.

## Discussion

The Governance Committee followed a systematic approach in carrying out the assessments requested by Council.

One of the first tasks for the Governance Committee was to review the practice of other Engineering and Geoscience Regulators across the country. The research (Appendix B) indicated that APEGBC has the largest number of formal volunteer groups at 58. Ontario (PEO) has the next highest number at 25. Our sister regulator in Quebec (OIQ) has the fewest at 13. Majority of the other sister regulators have about 20 volunteer groups each. Clearly, APEGBC has the largest number of volunteer groups across the country. This reflects very positively upon APEGBC's membership in that there is obvious on-going interest and commitment on the part of many members to remain engaged in the affairs of the Association. On the other hand, the administrative support for such a large number of volunteer groups is substantial and could consume a good portion of APEGBC's staff resources. However, considering the importance of the work of these volunteers, the cost of hiring paid contractor consultants to replace them would be prohibitively high. Fortunately, in our consultations with members of the various voluntary groups, they remain very committed and generally feel very strongly that the work they are doing is very important in fulfilling APEGBC's mandates and objects under the Engineers and Geoscientists Act in terms of protecting the public interest and promoting the professions. Taking all of this into consideration, it would be prudent not to make wholesale and abrupt reductions in the number of volunteer groups at this time. If the goal is to reduce the number of volunteer groups, it would be better to do so gradually. In the interim, the suggested approach is to manage this large number of volunteers in a more cost-effective manner.

To achieve this, the staff support for these volunteer groups should be looking for opportunities to reduce the frequency of the meetings of the volunteer group whenever it is possible to do so. Additionally, since all of the 58 established volunteer groups have been created by Council (including the appointment of members to each of the various groups) and are therefore accountable and are required to report directly to Council, significant delays can occur if all recommendations from these groups had to be formally approved by Council. From a practical perspective, if some of the volunteer groups can report to the CEO instead of Council, this would assist in expediting the approval of many of the operational recommendations put forward by these volunteer groups.

To assess which volunteer group should report to Council and which ones should report to the CEO, the Governance Committee reviewed information gathered from the other sister regulators across the country. The following characteristics were noted:

- 6 Regulators have volunteer groups reporting to Council directly similar to APEGBC
- 4 Regulators have volunteer groups reporting separately to Council and CEO/Executive Director
- Statutory Committees/Boards in most cases report to Council directly except APEGA and APEGNL
- Operational committees/volunteer groups generally report to the CEO/Executive Director
- Inter-agencies (with external bodies) Committees generally report directly to Council

This information is very helpful but in order for the Governance Committee to do its work in determining which volunteer group would best report to Council and which ones would best report to the CEO, a set of criteria had to be established. After some debate, the following is a list of Governance Committee endorsed criteria and the approach used for the assessment of the various APEGBC volunteer groups:

1. The Voluntary Group is required as per the Engineers and Geoscientists Act.
2. The Volunteer Group is required as per the APEGBC Bylaws.
3. The Volunteer Group performs the functions as described in the Act and/ or Bylaws.
4. Council has delegated its decision making authority to the Volunteer Group.
5. The Volunteer Group involves appointed members of other Regulators.
6. The work of the Volunteer Group is of political or strategic significance which Council should remain engaged with to fully inform itself.
7. The Volunteer Group performs work for which the CEO and Registrar is held to account.
8. The work of the Volunteer Group requires member experts in the subject matter to address either on-going or one-time technical issues.
9. The work of the Committee is somewhat administrative and could be accomplished by other means (application of policy by staff, automation, etc...).
10. Deliverables would still be met if this Volunteer Group ceased to exist.

An example of how the above criteria were applied is as follows:

- Volunteer Groups meeting one or more of the criteria from 1 to 6 above should be Standing Committees reporting to Council
- Volunteer Groups meeting one or more of the criteria from 7 to 9 above should be reporting to the CEO and Registrar. In this case, similar volunteer groups, the sub-committees of the volunteer groups could be created or stood down at the discretion of the CEO and Registrar.
- Volunteer Groups meeting criteria 10 above could be stood down.

In applying these criteria to each of APEGBC's volunteer groups, it was discovered that some cases were straight forward while others were not as clear. Criterion 10 - Deliverables would still be met if this volunteer group ceased to exist; gave staff the most challenge. Feedback from the staff support for each of the volunteer groups found that this specific criterion applied to very few of the groups. By doing away with a specific volunteer group, the benefits of gathering diverse perspectives on a specific issue from practicing members would be lost. APEGBC staff are not subject matter experts on many issues that APEGBC has to deal with. Furthermore, the diverse perspectives, even though at times very different, are very helpful in addressing complex issues. Appendix C attached to this memo is a table summarizing the results of assessing the volunteer groups against the list of developed criteria.

Having reviewed the information contained in Appendix C, the Governance Committee also looked at the current number of volunteer groups and their reporting structures (Appendix A). The Committee then considered the feasibility of eliminating any unnecessary or combining volunteer groups and changing the reporting structure for the various volunteer groups from Council to the CEO. Staff was then asked to follow up on this preliminary assessment and the changes proposed by the Governance Committee by consulting each of the impacted volunteer groups.

All of the feedback received from the impacted volunteer groups was then shared with the Governance Committee. The Committee then made further refinements to their preliminary assessment and proposed changes. The Governance Committee is now able to make the following recommendations to Council after this exercise:

1. That the Statutory (mandated by the Engineers and Geoscientists Act and Bylaws), the Standing, and Advisory Committees except the Mentoring Committee and Professional Practice related voluntary groups remain intact and continue to report to Council.
2. That the Mentoring Committee operate as an advisory committee reporting to the CEO.
3. That all of the Professional Practice related voluntary groups report to the Professional Practice Committee which will report to the CEO.
4. That all Professional Practice Related Guidelines will continue to be forwarded to Council for approval.

Work is continuing in our consultation with other voluntary groups. The following is a summary of the work currently underway.

- A. For the purpose of enhancing communications, reducing duplication and improving effectiveness, the Governance Committee would like to consider moving the 4 Technical Divisions (DEERE, DEP, DEGIRS and MED) to report to the Professional Practice Committee. Feedback has been received from 3 of the Divisions and there is general support for the concept. We are waiting for additional detailed feedback.
- B. The Governance Committee has asked DAWEG to consider broadening their mandate to include diversity and equity. If the feedback is positive, then there will be a need to rename this Division. DAWEG is currently going through a transition as the current Chair is stepping down and the Division is looking to fill a number of vacant positions on their executive. The Division will be consulted once they have a new executive in place.
- C. The Governance Committee would like to formalize the current practice of having all Branches report through the elected Chair of the Branches to Council. The Branches will be considering this during their Fall meetings.
- D. The Editorial Board has considered the Governance Committee's proposal to have it report to the CEO since the work that it does appears to be operational. However, the Board members want to keep the status quo because members feel that their decisions could be fettered if the Board reports to the CEO. The Governance Committee accepted the arguments presented at the August 3, 2016 meeting but asked staff to consult the Board regarding a name change; replacing "Board" with "Committee". Staff will be following up on this.

Finally, the most current proposal for the various APEGBC volunteer groups and their reporting structure including the recommendations contained in this report from the Governance Committee is shown in the chart presented as Appendix D.

## Recommendations

1. That the Statutory (mandated by the Engineers and Geoscientists Act and Bylaws), the Standing, and Advisory Committees except the Mentoring Committee and the Professional Practice related voluntary groups remain intact and continue to report to Council.
2. That the Mentoring Committee operate as an advisory committee reporting to the CEO.



3. That all of the Professional Practice related voluntary groups report to the Professional Practice Committee which will report to the CEO.
4. That all Professional Practice Related Guidelines will continue to be forwarded to Council for approval.

**Appendix A – APEGBC Volunteer Groups and Reporting Structure (April 23, 2015)**

**Appendix B – Number of Committees/Volunteer Groups for other regulators**

**Appendix C - Assessing Volunteer Groups against the Developed Criteria**

**Appendix D – Most Current Proposal from Governance Committee on Volunteer Groups**

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Date: August 25, 2016

Report to: **Council for Decision**

From: Governance Committee

Subject: Overall Risk Management Oversight Revision to Terms of Reference

Linkage to Strategic Plan: Enabling Goal – Continue to implement best practices in governance.

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<b>Purpose:</b>	To review the current terms of reference and consider the recommendation by the Governance Committee, Executive Committee & Audit Committee to include overall oversight of risk management as a responsibility of the Audit Committee.
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<b>Motion:</b>	That Council approves the amended terms of reference as presented.
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### **Background**

#### Review of Risk Management Plan

At the November 27, 2015 Council meeting, Frank Martens (PWC Director of Advisory Practice) presented his observations and findings regarding the risk management review that he performed on APEGBC. Risk management is a part of ongoing operations and governance. Enterprise wide risks and risks to the Association's ability to deliver on its Strategic Plan were reviewed.

As a follow up to the review and Council's input from the presentation, a risk management plan has been developed at a high level to mitigate such risks. The high level plan has been presented to the Executive Committee for feedback on May 30, 2016. At this meeting, the Executive Committee recommended that the overall risk management oversight be given to the Audit Committee and asks that the Audit Committee consider adding this responsibility to their Terms of Reference.

The Audit Committee met on June 21, 2016 and reviewed and discussed the Terms of Reference. The Committee agreed with the Executive Committee's recommendation to have the overall risk management oversight be given to the Audit Committee.

The Governance Committee met on August 3, 2016 and reviewed the proposed changes to the Terms of Reference and agreed that the overall risk management oversight should be given to the Audit Committee.

#### Overall Oversight of Risk Management

Some of the Audit Committee's responsibilities are the oversight of internal controls, verification of appropriate insurance coverage to cover liability needs, and determine whether policies and systems are in place to identify and monitor major business risks. These responsibilities are related and linked to risk management, thus, it would be recommended that the oversight responsibility of risk management be added to the Committee's Terms of Reference.

Key areas of Terms of Reference that have changed are as follows:

- a. Section 3.2 Purpose – the addition of the words of “enterprise-wide risk management” to reflect the additional role as a part of the purpose of the Committee and “external” was added in front of “Audit process” to further clarify that the audit is performed by an external party.
- b. Section 5.3 Other Responsibilities – the addition of point 10 of “Provide oversight of assessment, management, and mitigation of enterprise-wide risk.” to reflect the additional role of risk management to the Committee.
- c. Section 12 Conduct of Meetings – has been revised to be consistent with standard wording of the updated Terms of Reference templates of other APEGBC Committees.

Appended are the black line and red line versions of the Audit Committee Terms of Reference with the amended sections as mentioned in points a to c.

**Appendix A – Audit Terms of Reference (Black-Lined)**

**Appendix B – Audit Terms of Reference (Track Changes)**

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Date: August 29, 2016

Report to: **Council for Decision**

From: Efrem Swartz, LLB  
Director, Legislation, Ethics and Compliance

Subject: Legislative Implementation Task Force

Linkage to Strategic Plan: To provide a solid foundation for the sustainable delivery of APEGBC's mission.

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<b>Purpose:</b>	This memorandum is brought to Council with a recommendation for the dissolution of the Legislative Implementation Task Force (the "LITF")
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<b>Motion:</b>	That Council stands down the Legislative Implementation Task Force and thanks the members for their contribution.
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## Background

The LITF was created in 2012 as an advisory taskforce to Council concerning possible changes to APEGBC's Bylaws, guidelines and policies as a result of the amendments made in 2012 to the *Engineers and Geoscientists Act*, R.S.B. C. 1996, c. 116 (the "Act").

In 2014 Council re-appointed the members of the LITF until June 20, 2016. Neil Nyberg, P. Eng., FEC, the chair of the LITF, supports the task force now being dissolved since much of the intended work of the LITF has been addressed.

## Discussion

The Act was amended on June 25, 2012. The LITF recommended two policies which were implemented by Council. Certain anticipated Bylaws have instead been addressed by way of policy. Council will receive advice from other standing committees on some remaining items which were anticipated to be considered by the LITF.

### (A) Completed Work of the LITF

At its meeting on September 11, 2015, Council accepted two policies recommended by the LITF: (1) the Referral of a Complaint file by the Registrar to the Practice Review Committee; and (2) the Closure of a Complaint File by the Registrar.

### (B) Anticipated Bylaws now Addressed by Policy

It was anticipated that the LITF would give input on certain items which have since been addressed by way of policy or without formal procedure:

1. Procedure for Appearing Before the Investigation Committee – The Investigation Committee is effectively interviewing members subject to investigation. Based on the complexity of the issues involved, the Investigation Committee decides in each instance whether to rely on the assistance of outside counsel and whether to hire a court reporter to create a transcript. The flexible system is currently working without a formal policy.
2. Mobility of Discipline – The prior Director of LEC proposed to create a written policy as to how APEGBC should apply discipline from other provincial organizations. While having a written policy is laudable, the current procedure based on the wording of the Act is functioning. Recently APEGBC successfully applied the discipline imposed by PEO on Gregory G. Saunders, P.Eng., related to the Elliot Lake Mall collapse in Ontario.
3. Publication Bylaw – On April 17, 2015, Council approved a publication policy recommended by the Discipline Committee. Council updated the policy in June 2016 on the recommendation of the same committee. The current policy is functioning well.

#### **(C) Further input from other Committees is Available**

Certain projects anticipated to be reviewed by the LITF remain in contemplation. Should these further proposals be brought forward, Council can receive advice from standing committees other than the LITF, or Council can consult or create a new *ad hoc* taskforce as it seems fit:

1. The Conduct Review Committee (the “CRC”) – Under the direction of the current Director of LEC, the APEGBC law students have been working on a memorandum, a draft Bylaw and policy for the creation of a new committee, the CRC. There are two hurdles to cross before such a proposal is brought to Council. First, further consideration is needed as to whether a new committee is necessary and sustainable given the current resources. Second, it was anticipated that the legislative change package of 2015 would be approved and allow the CRC to enter into a consent resolution without approval from the Discipline Committee. As the government has advised that the Act is not likely to be changed prior to the 2017 election, the CRC would not have the power to enter into a consent resolution. Further input for Council on the creation of the CRC will be available from the Investigation Committee and the Discipline Committee prior to introducing the CRC to Council for approval.
2. “Direct” Supervision Bylaw – The prior Director of LEC proposed that a Bylaw be passed regarding the “direct supervision” of former members that lost their license due to disciplinary action or relinquished their license in light of potential disciplinary action. [The name of such a Bylaw may need renaming as we since have a guideline on Direct Supervision.] While creating a Bylaw to govern the supervision of prior members is a worthy goal, it has not been a priority for the department in recent years. Should Council direct that such a Bylaw be brought forward, Council can receive input from both the Investigation Committee and the Discipline Committee.
3. Reinstatement Bylaw – Such a Bylaw remains a valuable goal. Council can receive input from relevant committees, including the Registration Committee. Separately,

Council is receiving a report at the September 9, 2016 meeting about a possible new Bylaw for Registration hearings so perhaps a more comprehensive Bylaw could be brought forward on registration issues.

4. Discipline Process Bylaw – Under the direction of the current Director of LEC, successive law students have been working on a set of rules for Discipline Hearings. The rules will be presented to Council after consultation with the Discipline Committee and external lawyers. The Discipline Committee is much better suited to advise Council on this matter than the LITF.

### **Recommendation**

The chair of the LITF is in support of the taskforce being stood down. I recommend that Council thank the LITF members for their volunteer service and dissolve the task force.

### **Recommend Motion**

That Council stands down the Legislative Implementation Task Force and thanks the members for their contribution.

## Appendices

Item 5.3      Appendix A

Appendix B

Item 5.8      Appendix A

Item 5.9      Appendix A

Item 5.10     Appendix A

Item 5.11     Appendix A

Item 5.13.2   Appendix A

Item 5.13.3   Appendix A

Item 6.3      Appendix A

Item 6.4      Appendix A

Item 6.6      Appendix A

Appendix B

Item 6.7.1    Appendix A

Appendix B

Appendix C

Appendix D

Item 6.7.2    Appendix A

Appendix B



# Annual General Meeting Rules

October 22, 2016

The Annual General Meeting rules of order set out below are intended to facilitate progress at the meeting, include members in orderly debate and decision-making, and ensure fairness, equality and common sense.

## 1. General Rules

- 1.1 The meeting will be run in accordance with the relevant provisions of the *Engineers and Geoscientists Act and Bylaws*. Where the *Act* and the *Bylaws* are silent, the current edition of Robert's Rules of Order Newly Revised (RONR) will apply.
- 1.2 The meeting shall be scheduled to conclude by 12:30 PM.
- 1.3 Only members in good standing (APEGBC-registered P.Eng., P.Geo, and/or Licensee) are entitled to make or second motions, speak to motions, and vote. At the Chair's discretion, a staff member or a public appointee to Council or other persons may be invited to speak.

## 2. Member Motions

- 2.1 To be considered, member motions must be submitted in writing to AGM staff no later than 10:00 AM on the day of the meeting so they can be reviewed prior to presentation.
- 2.2 All submitted motions will be reviewed by the Chair, the Parliamentarian, the chair of the Governance Committee and if the latter is not available, a member of the Governance Committee, so as to ensure they are in order (as per Robert's Rules)<sup>1</sup> for consideration by the meeting.
- 2.3 All member motions must be written as advisory for the consideration of Council.
- 2.4 The mover and seconder of a member motion must be present when the motion is considered.
- 2.5 Member motions may not include a preamble that is part of the motion. However, after the motion, the written statement may include a brief rationale that is not part of the motion.

## 3. Debate

- 3.1 A member who wishes to speak at the meeting will approach a microphone, wait to be recognized by the Chair, and open by stating his/her name.
- 3.2 On each issue or motion, each member is entitled to speak up to two (2) times, and for no longer than three (3) minutes each time. Speaking a third time or for longer than 3 minutes will require permission from the assembly. If an individual has questions, he or she may ask one follow-up question within the same three-minute time slot.
- 3.3 To speak a second time on the same issue, a member must wait until those who wish to speak on it for the first time have spoken.
- 3.4 Debate must be germane to the pending motion. The Chair may alternate between proponents and opponents to a pending motion.

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<sup>1</sup> In essence, Roberts Rules of Order require that a motion will be considered to be out of order if, amongst other things, it is beyond the objects and business of the Association, or is absurd, discourteous or uses language that reflects on a member's conduct or character.



- 3.5 Speakers must observe decorum, and must avoid personal attacks and disorderly or discourteous behaviour.

#### **4. Voting**

- 4.1 Members must not pass their voting cards to someone else.
- 4.2 Voting will be by a show of voting cards, except when three or more members present request a ballot vote.

### **MOTION REFERENCES**

Proposed motions should relate to the mandate of the association and be respectful.

### **APEGBC BYLAWS**

#### **Bylaw 2(i)**

*The rules contained in the latest edition of Robert's Rules of Order shall govern the conduct of meetings in all cases to which they are applicable and in which they are not inconsistent with the bylaws or the special rules of this association.*

### **ROBERT'S RULES**

#### **With respect to form, Robert's Rules of Order has the following to say:**

*A main motion – particularly an original main motion – is frequently offered as a resolution, either because of its importance or because of its length or complexity. Any resolution – and any long or complicated motion, whether cast as a resolution or not – should always be submitted in writing...In preparing an important written motion or resolution (which should be done in advance of the meeting if possible), it is often advisable to consult with members who can be of assistance in perfecting it... (RONR, 11th edition, p. 105).*

#### **Basis to refuse consideration of a motion:**

1. *Any main or other motion that is absurd in substance is dilatory and cannot be introduced (RONR, 11th edition, p. 342).*
2. *Motions that conflict with the corporate charter, constitution or bylaws of a society, or with procedural rules prescribed by national, state or local laws, are out of order, and if any motion of this kind is adopted, it is null and void (RONR, 11th edition, p. 343).*
3. *No motion can be introduced that is outside the object of the society or assembly as defined in the bylaws, unless by a two-thirds vote the body agrees to its consideration (RONR, 11th edition, p. 343).*
4. *A motion must not use language that reflects on a member's conduct or character, or is discourteous, unnecessarily harsh, or not allowed in debate (RONR, 11th edition, p. 344).*



## Annual General Meeting Rules

October 22, 2016

The Annual General Meeting rules of order set out below are intended to facilitate progress at the meeting, include members in orderly debate and decision-making, and ensure fairness, equality and common sense.

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- 1.2 The meeting shall be scheduled to conclude by 12:30 PM.
- 1.3 Only members in good standing (APEGBC-registered P.Eng., P.Geo, and/or Licensee) are entitled to make or second motions, speak to motions, and vote. At the Chair's discretion, a staff member or a public appointee to Council or other guest persons may be invited to speak.

### 2. Member Motions

- 2.1 To be considered, member motions must be submitted in writing to AGM staff no later than 10:00 AM on the day of the meeting so they can be reviewed prior to presentation.
- 2.2 All submitted motions will be reviewed by the Chair, the ~~designated~~ Parliamentarian, the chair of the Governance Committee and if the latter is not available, a member of the Governance Committee, so as to ensure they are in order (as per Robert's Rules)<sup>1</sup> for consideration by the meeting.
- 2.3 All member motions ~~are~~ must be written as advisory ~~and therefore~~ for the consideration of Council.
- 2.4 The mover and seconder of a member motion must be present when the motion is considered.
- 2.5 Member motions may not include a preamble that is part of the motion. However, after the motion, the written statement may include a brief rationale that is not part of the motion.

### 3. Debate

- 3.1 A member who wishes to speak at the meeting will approach a microphone, wait to be recognized by the Chair, and open by stating his/her name.
- 3.2 On each issue or motion, each member is entitled to speak up to two (2) times, and for no longer than three (3) minutes each time. Speaking a third time or for longer than 3 minutes will require permission from the assembly. If an individual has questions, he or she may ask one follow-up question within the same three-minute time slot.
- 3.3 To speak a second time on the same issue, a member must wait until those who wish to speak on it for the first time have spoken.
- 3.4 Debate must be germane to the pending motion. The Chair may alternate between proponents

<sup>1</sup> In essence, Roberts Rules of Order require that a motion will be considered to be out of order if, amongst other things, it is beyond the objects and business of the Association, or is absurd, discourteous or uses language that reflects on a member's conduct or character.

and opponents to a pending motion.

- 3.5 Speakers must observe decorum, and must avoid personal attacks and disorderly or discourteous behaviour.

#### 4. Voting

- 4.1 Members must not pass their voting cards to someone else. ~~Those who leave the meeting must turn in their voting cards to staff.~~
- 4.2 Voting will be by a show of voting cards, except when three or more members present request a ballot vote.

### MOTION REFERENCES

Proposed motions should:

- ~~Relate to the mandate of the Association and;~~
- ~~Generally not contain a preamble;~~
- ~~and Be~~ respectful.

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### APGBC BYLAWS

#### Bylaw 2(i)

*The rules contained in the latest edition of Robert's Rules of Order shall govern the conduct of meetings in all cases to which they are applicable and in which they are not inconsistent with the bylaws or the special rules of this association.*

### ROBERT'S RULES

**With respect to form, Robert's Rules of Order has the following to say:**

*A main motion – particularly an original main motion – is frequently offered as a resolution, either because of its importance or because of its length or complexity. Any resolution – and any long or complicated motion, whether cast as a resolution or not – should always be submitted in writing...In preparing an important written motion or resolution (which should be done in advance of the meeting if possible), it is often advisable to consult with members who can be of assistance in perfecting it... (RONR, 11th edition, p. 105).*

#### **Use of Preamble:**

~~*It is usually inadvisable to attempt to include reasons for a motion's adoption within the motion itself. To do so may encumber the motion and may weigh against its adoption – since some members who approve of the action it proposes may dislike voting for it if it states reasons with which they disagree...In general, the use of a pre-amble should be limited to cases where it provides little known information without which the point or the merits of a resolution are likely to be poorly understood, where unusual importance is attached to marking certain reasons for a matter of record, or the like (RRO, 11th edition, pp. 106-107).*~~

#### **Basis to refuse consideration of a motion:**

1. *Any main or other motion that is absurd in substance is dilatory and cannot be introduced (RONR, 11th edition, p. 342).*
2. *Motions that conflict with the corporate charter, constitution or bylaws of a society, or with procedural rules prescribed by national, state or local laws, are out of order, and if any motion of this kind is adopted, it is null and void (RONR, 11th edition, p. 343).*
3. *No motion can be introduced that is outside the object of the society or assembly as defined in the bylaws, unless by a two-thirds vote the body agrees to its consideration (RONR, 11th edition, p. 343).*
4. *A motion must not use language that reflects on a member's conduct or character, or is discourteous, unnecessarily harsh, or not allowed in debate (RONR, 11th edition, p. 344).*

## Registration

### ● Policy

### ○ Procedure



## ■ Policy Providing Eng.L a Method to Bridge the Academic Requirements to Full Professional Status

PURPOSE	To ensure fairness in the registration process and provide a path for Eng. L holders to demonstrate that they have satisfied the requirements for professional engineering registration pursuant to the equivalency provision of bylaw 11(e)(1).		
CREATED	BY: COUNCIL	Date: September 11, 2015	Reference: CO15-96
POLICY:	<p>An Eng.L holder shall be considered as having met the academic requirements for full professional status if the applicant:</p> <ul style="list-style-type: none"> <li>a) is an active Eng.L licensee in good standing;</li> <li>b) has obtained a minimum of a 2-year diploma in science or technology but less than a four-year degree in engineering, applied science, science or technology;</li> <li>c) has a low-risk reference profile, ie:             <ul style="list-style-type: none"> <li>i. All references positive;</li> <li>ii. At least two in-discipline P.Eng. supervisor reference; and</li> <li>iii. At least one supervisor P.Eng. reference;</li> </ul> </li> <li>d) has more than 10 years of well-documented progressive work experience, including at least 4 years as an Eng.L, at least one year in a Canadian Environment and has attained a job position that demonstrates the competencies of a P.Eng. that have been assessed through a competency report and validated by acceptable professional referees.</li> <li>e) has passed the FE and PE Exams or other suitable exam protocol determined and set by a Board of Examiners</li> <li>f) has passed an LTE-style interview based on a technical report. The report is to be 5000 to 10000 words long, and based on a design study or a report of original authorship. The topic will be assigned by a technical panel and must be suitable to the applicant's experience and provide opportunity for the applicant to demonstrate technical competence to the standard of an exemplifying qualification. To ensure that the project undertaken is of a sufficient scope and challenge, the topic will be assigned from a project undertaken approximately 18 months after the candidate began practicing as an Eng.L.</li> </ul> <p>The technical report is then provided to an interview panel for an LTE-Style interview. At least one of the interview panel members cannot have been a member of the technical panel that assigned the report. The interview will proceed in the style of a thesis-defense. Interviewers will use the report as a basis to probe the applicant's technical competence.</p> <p>The report and defense will be judged on the extent to which the</p>		

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## Registration

### ● Policy

### ○ Procedure



	applicant can demonstrate a clear understanding of engineering principles and the key technical aspects relating to the topic assigned that one would normally expect from someone who is graduating with an exemplifying qualification (4-year bachelor's degree in engineering or applied science). If the interview meets the requirements set out by the interview panel, the applicant is considered to have the requirements for professional registration.
CROSS REFERENCES	<i>Engineers and Geoscientists Act</i> s.13 Admission to Membership <i>Bylaws of the Association</i> s.11(e) Registered Members Terms of Reference, Registration Committee



# BUDGET GUIDELINES FOR CONSULTING ENGINEERING SERVICES

## INFRASTRUCTURE AND TRANSPORTATION



JULY 2016



ASSOCIATION OF CONSULTING  
ENGINEERING COMPANIES  
BRITISH COLUMBIA



Professional Engineers  
and Geoscientists of BC

## Executive Summary

This document is written to provide the Client and the Consulting Engineering Professional with guidelines to prepare adequate Engineering Services Budgets for Transportation and Infrastructure Projects.

These Budget Guidelines are appropriate for the conventional Design-Tender-Construct method of project delivery. They are not applicable to alternative project delivery methods.

The Budgeting of Engineering Services is not a complicated process, but too often these services are inadequately estimated at the beginning of a project, which imposes financial constraints, limits value added engineering during the design phase and ultimately affects the success of the project. It is, therefore, important that both the Client and the Consulting Engineering Professional develop budgets using a consistent methodology taking into account all of the services required throughout the life cycle of the project and applying tried and tested techniques.

This document describes both the range of services that can be provided by Professional Engineers and the level of service that is required to meet the standard of care identified in APEGBC practice guidelines. These practice guidelines are available on the APEGBC website ([www.apeg.bc.ca](http://www.apeg.bc.ca)). The guidelines identify the level of effort, standard of care and due diligence a member must provide to fulfill their professional obligation under the Engineers and Geoscientists Act, Bylaws and Code of Ethics.

Guidance is also provided on how to estimate allowances for services at the beginning of a project and how to refine this as the project is developed using estimates for core detailed design services based upon historical norms and more detailed estimates for value added services when and where required.

This document should be read in conjunction with other ACEC guidelines published at [www.acec-bc.ca](http://www.acec-bc.ca) including:

- InfraGuide Best Practice for Selecting a Professional Consultant
- Appointing Your Consulting Engineer Using Qualifications Based Selection
- Consulting Engineers Fee Guideline

If Clients are developing Engineering Services Budgets prior to retaining a Consulting Engineering Company, they are encouraged to contact an ACEC-BC Consulting Engineering Company to assist them in scoping out a budget for the project. If they choose not to, the following table can be used to ensure adequate engineering services budgets.

<b>Table 4-1</b> <b>Engineering and Contingency Allowance for Various Stages of Transportation and Infrastructure Projects</b>	
<b>Project Stages</b>	<b>Engineering and Contingency Allowance</b>
1. Advisory Services (Feasibility Study)	60%
2. Preliminary Design Services	50%
3. Final Design Services	40%
4. Tender Services	Provided by consultant

For negotiating scope of work and budget with a selected Engineering Company they can use the Engineering Services Fee Budget spreadsheet provided in Appendix No. 3.

A large portion of the Engineering Services Budget (Final Design and Tender Services) can be established or cross-checked using the following table.

<b>Table 4-2</b> <b>Engineering Services Budgeting for Final Design and Tender Services</b> <b>(See Appendix for Scope of Service and Definition of Scope)</b>		
<b>Cost of Construction</b>	<b>Fee</b>	
Less than \$1,000,000	Use Other Methods	
\$1,000,000 - \$2,000,000	\$68,000 on first \$1,000,000	plus 5.8% on next \$1,000,000
\$2,000,000 - \$5,000,000	\$126,000 on first \$2,000,000	plus 5.6% on next \$3,000,000
\$5,000,000 - \$10,000,000	\$294,000 on first \$5,000,000	plus 5.4% on next \$5,000,000
\$10,000,000 - \$15,000,000	\$565,000 on first \$10,000,000	plus 5.3% on next \$5,000,000
\$15,000,000 - \$20,000,000	\$828,000 on first \$15,000,000	plus 5.2% on next \$5,000,000
Over \$20,000,000	\$1,086,288 on first \$20,000,000	plus 5.2% on balance

Ongoing relationships between a client and a consulting engineer are encouraged. Should a client wish to select a consulting engineer for a project, it is recommended that it be done using a Qualifications Based Selection (QBS) process. This allows the client the benefit of developing the scope and consulting engineering budget collaboratively with the selected consulting engineer.

It is recommended that clients use the industry standard engineer client agreements included in the appendix of this document.



# **Guidelines for Budgeting Engineering Services**

## **Infrastructure and Transportation**

### **Contents**

- i Executive Summary
- 1. Don't Jeopardize Your Project With Low Engineering Fees
- 2. Range of Services
- 3 Ways to Pay a Consulting Engineer
- 4. How to Budget an Engineering Project
- 5. How to Select a Consulting Engineer
- 6. Managing the Project

### **Appendices**

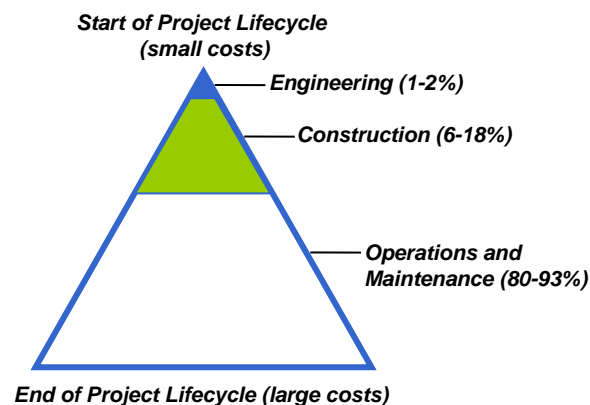
- Appendix No. 1 Categories of Services offered by Consulting Engineers for Transportation and Infrastructure Projects
- Appendix No. 2 Prime Consultant Services
- Appendix No. 3 Organizational Quality Management Program
- Appendix No. 4 Fee Adjustment Factors
- Appendix No. 5 Methods of Payment for a Consulting Engineer
- Appendix No. 6 Budget Calculation Sheets
- Appendix No. 7 Recommended Industry Standard Engineer Client Agreements

## 1. Don't Jeopardize Your Project With Low Engineering Fees

In the 19<sup>th</sup> Century, John Ruskin, an author and scientist from Oxford University made the following quotation:

*"It is unwise to pay too much, but it is worse to pay too little.  
When you pay too little you sometimes lose everything  
because the thing bought was incapable of doing the  
thing you bought it to do."*

How does this quote relate to engineering services for Transportation and Infrastructure Projects? The following diagram shows the breakdown of the cost of a typical transportation and infrastructure project.



The engineering costs are a minor component of the entire project at 1-2%. Working collaboratively with your consulting engineer to establish the scope of work and subsequent engineering budget, gives the client the best opportunity to manage and potentially reduce the remaining 98% to 99% of the project's life cycle cost.

An adequate level of effort at the engineering stage can:

1. Ensure proper cost-benefit analysis of options can be performed, therefore maximizing the project's success.
2. Reduce construction costs by having the time to research, investigate and analyze new construction techniques for projects. A reduced engineering budget would be a disincentive to this creativity.
3. Reduce long term operations and maintenance (O&M) costs and extend the life of the utility by researching new and innovative approaches to reduce O&M costs.

Clients should ensure that adequate budgets for engineering services are established for these projects. Failure to budget sufficient funds and time for engineering services can therefore be costly, particularly in the early stages of the project's life cycle.

## 2. Range of Services

Each Transportation and Infrastructure Project will have common components in their range of services and others will require services specific to their project. Services can be grouped into the following general categories:

- **Advisory Services** – opinions, investigations, feasibility studies, inspections
- **Preliminary Design Services** – define parameters of design
- **Detailed Design** – define solution for construction
- **Tender Services** – documentation for obtaining a contract price
- **Construction Related Services** – contract administration and verification of design
- **Resident Engineering Services** – inspection of the construction
- **Project Management Services** – managing the project and team participants
- **Construction Management Services** – managing the construction contracts

There are many sub-categories under each category. These are listed in **Appendix No. 1 “Categories of Services Offered by Consulting Engineers for Transportation and Infrastructure Projects”**.

The nature of the individual project determines the scope of the required services, with some projects requiring more or less of different elements.

- There are a number of Basic Services related to final design and tendering that are generally performed across all projects and their value can be related to the construction cost of the project, its complexity and typical norms. These Basic Services are highlighted in **Appendix No. 1**.
- Other services will vary depending upon the requirements of the project and the roles and responsibilities allocated to the engineer and other parties. These should be estimated using bottom-up principles as outlined in the next section.

In providing Engineering Services, there is an additional level of Prime Consultant Services that can be an important service to a project. **Appendix No. 2 “Prime Consultant Services”** provides a description of this service.

There is a minimum involvement that all Professional Engineers must provide to meet the standard of care identified in the APEGBC practice guidelines. These practice guidelines are available on the APEGBC website ([www.apeg.bc.ca](http://www.apeg.bc.ca)). These guidelines identify the level of effort, standard of care and due diligence that a member must provide to fulfill their professional obligation under the Engineers and Geoscientists Act, Bylaws and Code of Ethics.

Quality Assurance is a requirement of ACEC and APEGBC. Many consulting engineers are registered under the APEGBC Organizational Quality Assurance Program, **Appendix No. 3 “Organizational Quality Management Program”** provides a description of the quality assurance required under this APEGBC Program.

There are a number of fee adjustment factors that should also be considered when preparing an engineering budget. **Appendix No. 4 “Fee Adjustment Factors”** outlines some variables that could affect an engineering services budget.

Full Time Resident Engineering Services are recommended to be used for projects that have infrastructure buried or covered up:

- To ensure compliance with the Specifications
- To ensure accurate locating of the utility

### 3. Ways to Pay a Consulting Engineer

Consulting Engineers can be compensated for the work they undertake based on one or more of the three following methods of calculated on:

- Method 1 – Time Basis
- Method 2 – Percentage of Probable Cost of Construction
- Method 3 – Fixed Fee or Lump Sum based on a defined scope of services.

The method selected depends largely on the stage of the project, its complexity and how well it is defined.

**Appendix No. 5 “Methods of Payment for a Consulting Engineer”** provides a more in depth description of the 3 methods of payment.

**Table 3-1 “Schedule of Recommended Methods of Remuneration for Transportation and Infrastructure Projects”** outlines the preferred methods of remuneration for the various phases of Transportation and Infrastructure Projects.

<b>Table 3-1 Schedule of Methods of Remuneration for Transportation and Infrastructure Projects</b>	
<b>Category of Services</b>	<b>Recommended Method of Remuneration</b>
1. Advisory Services	Time Basis or Fixed Fee *
2. Preliminary Design Services	Time Basis or Fixed Fee
3. Final Design	Fixed Fee or % Cost of Construction
4. Tender Services	Fixed Fee or % Cost of Construction
5. Construction Related Services	Time Basis or Fixed Fee
6. Resident Engineering Services	Time Basis
7. Project Management Services	Time Basis
8. Construction Management Services	Time Basis

\* When Fixed Fee is used, it is to have a well defined scope of work and an ability to adjust the fee if the scope changes.

## 4. How to Budget Engineering Services

Section 1 of these guidelines shows how important it is to have an engineering budget that is sufficient to ensure the success of the project. This section will demonstrate how to provide an allowance for engineering and also how to calculate a detailed engineering budget.

### 4.1 Allowances

In order to provide guidelines to give a client tools for budgeting their projects, it is assumed that the client already has a construction budget established.

The following **Table 4-1 “Engineering and Contingency Allowance for various stages of Transportation and Infrastructure Projects”**, provides an “Engineering and Contingency Allowance” for various stages of your engineering project.

At the early stages of a project, more uncertainty exists as to the extent of engineering services that will be required for the project. The 2 uncertainties of the project at these early stages are the extent of engineering services required and uncertainty in the construction budget. These 2 uncertainties are generally grouped as “Engineering and Contingency Allowance”. This allowance will be reduced as the project progresses. For most projects these allowances will also cover legal, financial and administration costs.

<b>Table 4-1 Engineering and Contingency Allowance for Various Stages of Transportation and Infrastructure Projects</b>	
<b>Project Stages</b>	<b>Engineering and Contingency Allowance</b>
1. Advisory Services (Feasibility Study)	60%
2. Preliminary Design Services	50%
3. Final Design Services	40%
4. Tender Services	Provided by consultant

Following tender services, most of the uncertainty of the project is removed. The extent of engineering services has been established, the contractor has been selected, the contract price has been established and the length of construction time is known. At this point, the consultant can give the client a more precise estimate of the remaining engineering services required and a more refined contingency for construction and additional Engineering Services that may be needed.

## 4.2 Detailed Engineering Budgets

It is recommended that clients work with their selected engineer to develop the necessary scope of work and level of effort to meet the project goals and objectives.

If a client is developing a detailed engineering budget prior to the selection of their Consulting Engineer, they are encouraged to contact an ACEC-BC consulting engineering company to assist them in this process. Depending on the complexity of the project, a consulting engineering company may or may not charge a fee for this service.

For the majority of the categories, shown in Section 2, a transparent approach to budgeting can be completed by the consulting engineer and reviewed by the client. It is simply a matter of agreeing on the scope of services for the category and assigning the appropriate hours for the various staff assigned. The hourly rates can be checked with the current ACEC-BC “Consulting Engineers Fee Guidelines” for the various personnel assigned.

**Appendix No. 6 “Budget Calculation Sheets”** gives a blank copy of an Excel spreadsheet for calculating engineering services by categories. An example calculation for a category is also given in this Appendix.

There are a small number of categories in the “Final Design” and “Tender Services” sections that represent a large component of the engineering services budget. These services are not so transparent to many clients. It is for this reason that engineering services budgets based on a percentage of cost of construction are provided in this document for the following categories.

### **Final Design**

- Detailed Design
- Working Drawings
- Specification of Tender Documents
- Statement of Probable Cost

### **Tender Services**

- Preparing Tender Call Documents
- Reviewing Tenders submitted and advising

The following **Table 4-2 “Engineering Services Budget for Final Design and Tender Services”** shows the recommended minimum fee budget scale for basic services for Transportation and Infrastructure Projects.

<b>Table 4-2</b> <b>Engineering Services Budgeting for Final Design and Tender Services</b> <b>(See Appendix for Scope of Service and Definition of Scope)</b>		
<b>Cost of Construction</b>	<b>Fee</b>	
Less than \$1,000,000	Use Other Methods	
\$1,000,000 - \$2,000,000	\$68,000 on first \$1,000,000	plus 5.8% on next \$1,000,000
\$2,000,000 - \$5,000,000	\$126,000 on first \$2,000,000	plus 5.6% on next \$3,000,000
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\$15,000,000 - \$20,000,000	\$828,000 on first \$15,000,000	plus 5.2% on next \$5,000,000
Over \$20,000,000	\$1,086,288 on first \$20,000,000	plus 5.2% on balance

Note:

- This table is appropriate for projects of the following description:
  - Water, waste water and industrial waste treatment plants
  - Bridges which are asymmetric or are otherwise complicated, large dams or complicated small dams
  - Highways, urban and suburban arterial streets, grade crossing eliminations, highway and railway tunnels
  - Pumping stations, incinerators intercepting and relief sewer, sanitary sewer lines under 600mm in diameter, water distribution lines under 400mm in diameter
  - Complex foundations, additions to or reconstruction of projects, power plants and distribution systems, airports with complex facilities and infrastructure
- Should projects reflect a higher construction cost to design effort, the above table could be reduced by up to 25%. Examples are:
  - Bridges and other structures of conventional design, simple waterfront facilities
  - Railways, roads and streets
  - Conventional levees, flood walls and retaining walls, small dams
  - Site development
  - Sewer and water tunnels (free air), storm sewers and drains, irrigation works (except pumping plants), sanitary sewer lines 600mm and larger, water distribution lines 400mm and larger
  - Airports with small facilities
- These fees do not cover disbursements or reimbursables. Reference should be made to current ACEC-BC “Consulting Engineers Fee Guidelines”.
- These fees do not include any applicable taxes.



## **5. How To Select A Consulting Engineer**

### **5.1 Ongoing Relationships**

It is recognized that ongoing relationships exist between Clients and Consulting Engineers. These relationships can provide many advantages to Clients, some of which are listed as follows:

- Consulting Engineers familiarity of the Client's systems
- Familiarity of personnel in both organizations
- Consistency in long term strategies for utilities improvements
- Availability in dealing with problems
- Assisting with funding applications
- Keeping up with changing standards

Clients are encouraged to keep these long term relationships and only consider going into an engineering selection process if they are not satisfied with the ongoing relationship.

### **5.2 Selecting a Consulting Engineer**

Previous sections of this document have shown the benefits of developing the Consulting Engineering Budgets collaboratively with the selected Consulting Engineer. For this reason, any consulting engineer selection process should not have a fee component attached to it. Instead, QBS should be used as the selection process.

The ACEC-BC website ([www.acec-bc.ca](http://www.acec-bc.ca)) includes information and testimonials of this QBS approach.

It should be noted that 43 of the 50 states in the USA have adopted the QBS approach. The greatest benefit to the client with QBS is that they get to develop the scope of work and engineering budgets in collaboration with the selected Consulting Engineer to the benefit of the project.

Some of the selection criteria that can be used by a client in selecting their Consulting Engineer using QBS are:

- References from other clients (don't just call the ones that the Consulting Engineer refers you to).
- Past related experience of current personnel
- Capacity of the firm

## **6. Managing the Project**

The client should work with the selected Consulting Engineer for the project to develop roles and responsibilities for each party. The scope of work for the first stage of the project should be clearly defined and an appropriate Engineering Services Budget agreed to. A process should be determined to accommodate any changes in scope of work that will occur as the project proceeds.

The Client and Consulting Engineer should then enter into a legally binding agreement for the consulting engineering services for the project. It is recommended that one of the following industry standard “Engineer-Client” agreements should be used for these contracts:

1. ACEC Document No. 31
2. Master Municipal Construction Documents –Client/Consultant Agreement

Consulting Engineering Services for additional phases of the project can be added to the schedules of these Engineer-Client Agreements by mutual consent.

## **Appendix No. 1**

### **Categories of Services Offered by Consulting Engineers for Transportation and Infrastructure Projects**

**TABLE 1B****Categories of Service Offered by Consulting Engineers for Transportation and Infrastructure Projects**

■ Basic Services    ○ Additional Services

1. ADVISORY SERVICES	2. PRELIMINARY DESIGN SERVICES	3. FINAL DESIGN	4. TENDER SERVICES
<ul style="list-style-type: none"> <li>○ Preparation or review of engineering program</li> <li>○ Expert testimony</li> <li>○ Appraisals, valuations, studies, reports</li> <li>○ Feasibility analysis</li> <li>○ Accident investigations</li> <li>○ Preliminary concept sketch</li> <li>○ Preliminary specification notes</li> <li>○ Development of work estimate</li> <li>○ Litigation/ Claims/ Insurance assistance</li> <li>○ Detailed analysis of owning and operating costs</li> <li>○ Special grants and loans</li> <li>○ Translation and interpretation</li> <li>○ Project management scheduling assistance</li> <li>○ Assistance in preparing purchase enquiries</li> <li>○ Value engineering</li> <li>○ Quality assurance</li> </ul>	<ul style="list-style-type: none"> <li>○ Scope of project</li> <li>○ Statement of probable cost</li> <li>○ Preliminary design reports, alternative conceptual proposals, sketches, schematics, specifications</li> <li>○ Scheduling</li> <li>○ Documents for financing</li> <li>○ Geotechnical Investigative Surveys</li> <li>○ Permits and licences</li> <li>○ Environmental assessments</li> <li>○ Revision of existing designs</li> <li>○ Life cycle costing</li> <li>○ Detailed cost estimates</li> <li>○ Engineering surveys, profiles and cross-sections</li> <li>○ Quality assurance</li> <li>○ WorkSafeBC coordination</li> </ul>	<ul style="list-style-type: none"> <li>■ Detailed design</li> <li>■ Working drawings</li> <li>■ Specifications and tender documents</li> <li>■ Statement of probable cost</li> <li>○ Detailed cost estimates</li> <li>○ Reinforcing bar schedules</li> <li>○ Provision for Client supplied equipment not in contract</li> <li>○ Demolition documents</li> <li>○ Tenant improvements</li> <li>○ Fast-track construction or sequential tendering</li> <li>○ Preparation of shop drawings</li> <li>○ Environmental design</li> <li>○ LEED® documentation</li> <li>○ Design brief</li> <li>○ Draft O&amp;M Manual</li> <li>○ Draft commissioning plan</li> <li>○ Emergency response plan</li> <li>○ Quality assurance</li> <li>○ Geotechnical design</li> </ul>	<ul style="list-style-type: none"> <li>■ Preparing Tender Call Documents</li> <li>■ Reviewing tenders submitted and advising</li> <li>○ Alternative conceptual proposals</li> <li>○ Prequalification of contractors</li> <li>○ Coordinating other consultants' documents</li> <li>○ Non-tender construction contracts</li> <li>○ Bills, materials, detailed cost estimates</li> <li>○ Tender advertisement</li> <li>○ Quality assurance</li> </ul>

When remuneration Method 2 – Percentage of Cost of Construction is used, the services indicated ■ Basic Services for categories 3 and 4 are the services covered by the fees in Tables 4 and 5. Services indicated ○ are considered Additional Services.

**TABLE 1B (continued)**  
**Categories of Service Offered by Consulting Engineers for Transportation and Infrastructure Projects**

■ Basic Services    ○ Additional Services

5. CONSTRUCTION RELATED SERVICES	6. RESIDENT ENGINEERING SERVICES	7. PROJECT MANAGEMENT SERVICES	8. CONSTRUCTION MANAGEMENT SERVICES
<ul style="list-style-type: none"> <li>○ Assisting in the preparation of contract</li> <li>○ Review of shop drawings</li> <li>○ Field review</li> <li>○ Progress review</li> <li>○ Quality assurance</li> <li>○ Testing monitoring</li> <li>○ Change order costing</li> <li>○ Document interpretation</li> <li>○ Payment recommendation</li> <li>○ Substantial performance review</li> <li>○ Advising Client and contractor of continuing or newly observed defects or deficiencies</li> <li>○ Year end warranty review</li> <li>○ System start-up and documentation</li> <li>○ Post-warranty period follow-up</li> <li>○ Fast-track construction or sequential tendering</li> <li>○ Maintenance manuals and drawings</li> <li>○ Certification and testing of systems</li> <li>○ Commissioning/ training</li> <li>○ Environmental monitoring</li> <li>○ Record drawings</li> <li>○ Contract Administration</li> <li>○ Quality assurance</li> <li>○ LEED® documentation and certification service</li> <li>○ LEED® compliance energy model</li> </ul>	<ul style="list-style-type: none"> <li>○ Supplying resident staff on the project to determine if the contractor is carrying out his work in general conformance with the contract documents.</li> <li>○ Quality assurance</li> </ul>	<ul style="list-style-type: none"> <li>○ Consultant selection</li> <li>○ Conceptual studies</li> <li>○ Economic feasibility</li> <li>○ Planning/scheduling/monitoring and controlling</li> <li>○ Estimating/budgeting and cost control</li> <li>○ Arranging financing</li> <li>○ Procurement</li> <li>○ Risk management</li> <li>○ Commissioning</li> <li>○ Prime Consultant Services</li> <li>○ Quality assurance</li> </ul>	<ul style="list-style-type: none"> <li>○ Contract strategy, administration and expediting</li> <li>○ Construction logistics, planning, scheduling and manpower forecasts</li> <li>○ Labour relations, safety</li> <li>○ Field office management, temporary facilities</li> <li>○ Materials receiving and warehousing</li> <li>○ Progress monitoring, trending and reporting</li> <li>○ Cost performance monitoring, trending and claims processing</li> <li>○ Quality assurance</li> </ul>

When remuneration Method 2 – Percentage of Cost of Construction is used, the services indicated ■ Basic Services for categories 3 and 4 are the services covered by the fees in Tables 4 and 5. Services indicated ○ are considered Additional Services.

## **Appendix No. 2**

### **Prime Consultant Services**

## **Prime Consultant Services**

The role of Prime Consultant is defined in most jurisdictions in BC as the role of the Coordinating Registered Professional or CRP. When more than one consulting discipline is necessary on a project, it is expected that one of the disciplines will take on the role of CRP. This creates a point of coordinated communication for both the Client and the Authority Having Jurisdiction with the rest of the Consulting Engineer.

The role of Prime Consultant typically includes a series of unique responsibilities, which may include, but are not necessarily limited to the following:

1. Negotiate the scope of professional services, compensation and terms of payment with other consultants where applicable.
2. Prepare a time schedule based upon the Client's program for the project in agreement with the Client and other consultants where applicable.
3. Identify and assist the Client in obtaining any regulatory Permits and Approvals.
4. Obtain from the Client, or arrange for the performance of surveys, sub-surface and soil investigations and obtaining of other necessary data.
5. Arrange for the project conferences with the Client and maintain coordination on all project matters.
6. Establish and coordinate design standards with concurrence of other consultants where applicable and coordinate statements of probable construction costs.
7. Where construction is involved:
  - a. Prepare and arrange for the printing, publication and distribution of the construction contract documents.
  - b. Advise the Client on construction contract procedures, compile a list of bidders and aid in negotiations with the selected contractor.
  - c. Perform general administration during construction as Coordinating Registered Professional (CRP) consistent with the Role of the Consultant as defined by CCDC.
  - d. With the assistance of the other consultants, recommend acceptance of the work. In most jurisdictions, recommendation of acceptance of the work is identified by release of a Letter of Assurance by the Coordinating Registered Professional.

### **Appendix No. 3**

## **Organizational Quality Management Program**



## PREFACE

APEGBC introduced the Organizational Quality Management (OQM) Program in recognition of the significant influence that *organizations* have on the practice of the professions by the *APEGBC professionals* they employ. The OQM Program, as documented in this manual, aims to address that influence and provide guidance for professional practice *quality management* at the organizational level for professional engineering and professional geoscience. This voluntary, self-funded program is available to all *organizations* that employ professional engineers or professional geoscientists in BC and provide products or services requiring the application of professional engineering or professional geoscience. *APEGBC professionals* remain ultimately responsible and accountable for their engineering or geoscience work, and for carrying out that work in a manner that meets their professional obligations.

One key finding from the 2009 report of APEGBC's Professional Renewal Program was that *quality management* policies of *organizations* employing *APEGBC professionals* have a significant impact on the practice of the professions. In response, APEGBC established a task force of representatives from *organizations* providing engineering or geoscience related products and services in manufacturing, consulting, utilities, construction, mining, and municipal and provincial government. In 2010, this task force launched a pilot program to help *organizations* implement policies and procedures that are consistent with the *quality management* obligations that their *APEGBC professionals* have under the *Engineers and Geoscientists Act* and *Bylaws*. The pilot OQM Program evaluated nine *organizations* in the high tech, consulting, construction, government, manufacturing, and utilities sectors.

In December 2010, APEGBC Council approved the development of the OQM Program and the establishment of the OQM Committee. The OQM Committee reports to the APEGBC Professional Practice Committee and has responsibility for implementing the APEGBC-administered OQM Program.

In creating the OQM Program, APEGBC has **not** created a *quality management system* for *organizations*. Instead, this manual provides guidance to *organizations* on how to confirm, adapt, adopt or create policies and procedures within their *quality management system* that are consistent with the *quality management requirements* that their *APEGBC professionals* must meet under the *Act* and *Bylaws* that govern them. Such policies and procedures would form an important component of the *organization's* overall *quality management system*.

APEGBC will issue an OQM certificate to *organizations* that have implemented policies and procedures consistent with these requirements:

- Apply relevant APEGBC practice guidelines (Section 2)
- Retain complete project documentation (Section 3)
- Carry out documented checks of engineering and geoscience work using a written quality control process (Section 4)
- Carry out documented independent review of structural designs prior to construction (Section 5)
- Appropriately use APEGBC seals (Section 6)
- Have APEGBC professionals directly supervise engineering or geoscience work that they delegate to others (Section 7)
- Carry out documented field reviews during implementation or construction (Section 8)

As described in Section 9 of this manual, *organizations* have a number of options to implement the OQM Program and achieve OQM certification, to the benefit of their customers, the public, *APEGBC professionals* and the *organization*.

For your convenience, the OQM Manual provides links to all of the APEGBC Quality Management Guidelines hosted on the APEGBC web site. Figure P-1 explains the difference between the OQM Manual and the Quality Management Guidelines.

**Appendix No. 4**  
**Fee Adjustment Factors**

## Fee Adjustment Factors

The design and construction industry has become increasingly complex. Many projects have unique factors that must be considered when determining an appropriate engineering fee. Examples of factors to consider in the development of an engineering budget follow. This is not intended to be a comprehensive list, but rather as an indication of how seemingly common project considerations can impact the consultant team if they are not accounted for when determining fees.

### 1. Project Delivery Method

The type of project delivery or procurement of construction services can vary from the traditional design-bid-build methodology. Complex projects, newer delivery methods, pre-purchasing of major equipment and contractors with limited experience result in more time expended by the Consulting Engineer. For example, unit price contracts or construction management arrangements that result in multiple Owner-Contractor agreements will increase construction phase administration and require an increase in Consulting Engineer fees.

### 2. Project Documentation and Building Information Modeling (BIM)

Many Clients are now demanding use of Client-specific digital standards of documentation or document control. This requires a learning curve for the Consulting Engineer that could vary from system to system, or Client to Client. In addition, the trend into BIM can result in the need to provide drawing information in multiple formats to facilitate office use, field use and client records. BIM has also shifted the fee structure by requiring more time during the design phase to develop and maintain the model as the project evolves. As such, this additional effort is required to be compensated. However, such increases may be offset by the BIM goal of having fewer conflicts in the fields, leading to potential savings from fewer claims in the construction phase.

### 3. Approvals and Authorities Having Jurisdiction

The number of approvals required by Authorities Having Jurisdiction continues to grow. This affects the Consulting Engineer in a number of ways. Examples include having to have phased building permits resulting in multiple drawing submissions; or submission of formalized documentation for issues such as demonstrating quality management, or compliance with local energy utilization bylaws. When the Authority Having Jurisdiction demands more than a base building permit submission, Consulting Engineers' fees need to be adjusted to suit.

### 4. New Technologies

New technology is constantly appearing in the form of new building products, new means to increase energy performance, design tools and advanced construction methods. Requests by clients to incorporate the latest innovations can be costly as there are unknown risks related to new products; the potential for unfamiliar testing

and certification requirements; and/or the need for approval of documentation that is unfamiliar to the Consulting Engineer. Additional specialist consultants may be required in some cases.

5. Project Location and Site Conditions

The best qualified Consulting Engineer may not be geographically close to the project site. As such, considerable reimbursable expense may be incurred by the Consulting Engineer. Also, the use of the site may dictate construction sequencing limitations and may also require the Consulting Engineer to supply personnel outside normal working hours to facilitate meetings or construction field review services. These factors need to be considered when determining Consulting Engineering fees.

6. Demobilization and Remobilization (stop and start-up of workforce)

Occasionally a project must stop due to delays in funding or other circumstances beyond the control of the Consulting Engineer. This requires reassignment of staff and in some cases, may force release of personnel. There is also the less tangible issue of lost opportunity, given the Consulting Engineer was previously committed to the project. Similarly, if projects that are on hold are suddenly restarted, significant staffing moves may be necessary to service the Client's needs adequately. This can have a significant financial impact on the Consulting Engineer and should require a fee adjustment when this occurs.

7. Certain areas of British Columbia are prone to a high risk of strong earthquake hazard. Sites that are underlain by subsurface conditions that would perform poorly under strong earthquake shaking may require involved geotechnical characterization, ground improvement and/or complex structural design to satisfy performance expectations. The costs related to these items can be somewhat independent of normal construction costs for the particular item of infrastructure and should be considered when determining fees.

## **Appendix No. 5**

### **Methods of Payment for a Consulting Engineer**

## Method 1 – Time Basis

ACEC-BC and APEGBC recommend using the Time Basis method when the scope of engineering services is difficult to determine, cannot be determined, is not well defined, or when the consultant is not in total control of the required time and disbursements at any stage of the project.

All time expended on the assignment is billable, including travel, time in the consulting engineer's office and time on the client's premises or elsewhere. This billable time also applies to technical and clerical services including, but not limited to, scheduling and clerical staff engaged in producing correspondence and documents such as reports and specifications. Billable time also will include all costs associated with development of or determining the scope of the project.

The consultant can be expected to closely monitor progress and provide regular status reports on the project.

A variation to the Time Basis method is to include an "upset limit" on the time related fee budgets. To develop the "upset limit", assumptions are made based on very little information. ACEC-BC and APEGBC discourage the use of "upset limits", as it does not promote optimal solutions because it results in the consultant defining tasks prior to proper planning and prior to a clear definition of the project. In addition, the method leads to the consultant closely monitoring changes to their originally defined scope, which can promote an adversarial relationship with the client.

Time Basis method fees should be invoiced in accordance with the ACEC-BC **"Consulting Engineers Fee Guidelines"**.

### *Special Expertise*

Fees for senior personnel rendering specialized or expert service or testimony for which they are eminently qualified should be twice the hourly rates.

### *Salary Adjustments*

Salary adjustments during the life of a project are normally reflected in adjustments to charge out rates unless noted otherwise by agreement.

## **Method 2 - Percentage of Cost of Construction**

Fee based on the percentage of Cost of Construction may be suitable for engineering services where the cost of the consulting engineering service is a function of the construction of installation costs and where the project scope and construction or installation budgets are well defined. Where the cost of construction for an individual discipline within an overall project is under \$1,000,000 methods other than Method 2 should be used for those components.

Client Agreements should clearly define whether the cost of construction is based on an estimate established at commencement of a project or on the completed actual construction cost.

Fees for full time resident engineering are in addition to fees determined under Method 2. For full time resident engineering, Method 1 - Time Basis is recommended.

Table 4-2 is the recommended table for determining the fee budget as a percentage of the cost of construction.

## **Cost of Construction for Engineering Projects**

The cost of construction includes the following:

- The total cost of all materials, equipment and labour (including duty, taxes, grants-in-aid and subcontractors' and general contractors' overhead and profit) necessary to complete the work for which the consulting engineer prepares drawings and specifications or for which the consulting engineer is responsible to the client.
- In the event that the client furnishes material, equipment, services or other labour that is incorporated in the work, the cost of construction includes the fair market value of those materials or equipment as if newly purchased. In addition, the cost of construction includes the current prices of labour or other services at the time of construction. In the event construction does not proceed, market prices at the estimated time of construction shall prevail.
- In the event that the client or contractor furnishes used material or equipment at the client's request, the cost of construction includes the fair market value of those materials or equipment as if newly purchased.

Fee budgets are based on the cost of construction including all extras to the construction contract. No deduction may be made from the consulting engineer's fee because of penalties or damages claimed by the client from the contractor or other sums withheld from the contractor. The cost of construction does not include professional fees and reimbursements payable to the consulting engineer.

### **Method 3 - Fixed Fee or Lump Sum Contract**

A Fixed Fee or Lump Sum Contract is suitable if the scope and schedule of the project are sufficiently defined to allow the consulting engineer to accurately estimate the effort required. This type of contract is frequently developed from time based projections or specific service requirements for particular tasks. It is also often derived from the appropriate percentage fee method. Disbursements may or may not be included in the lump sum.

This method provides cost certainty for clients and encourages innovation and efficiency by the consultant.



**Appendix No. 6**  
**Budget Calculation Sheets**



<b>ABC Municipality</b> <b>North Road Water Main</b> <b>Fee and Disbursement Schedule – Engineering Construction Services</b>									
<b>Services</b>	Senior Engineer	Junior Engineer	Resident Engineer	Survey Assistant	Admin	Total Fees	Disbursements	Subconsultants	Total Fees, Disbursements & Subconsultants
	\$220	\$125	\$125	\$70	\$70	\$	\$	\$	\$
Hourly Charge Out Rate									
1 Tendering	16	32			2	7,660.00	2,000.00		9,660.00
2 Resident Engineering Services			800			100,000.00	7,205.00		107,205.00
3 General Engineering Services	128					28,160.00			28,160.00
4 Review Shop Drawings		16				2,000.00			2,000.00
5 Prepare Progress Draws		16				2,000.00			2,000.00
6 Attend Site Meetings	16					3,520.00			3,520.00
7 Electrical programming						-	355.00	7,100.00	7,455.00
8 Structural Inspection						-	214.00	4,275.00	4,489.00
9 Environmental						-	28.00	552.00	580.00
10 Post Construction Services	16	24	80		16	17,640.00			17,640.00
						-			-
<b>Disbursements (8% of fees)</b>						-	<b>12,878.40</b>		<b>12,878.40</b>
<b>TOTAL</b>	<b>176</b>	<b>88</b>	<b>880</b>	<b>-</b>	<b>18</b>	<b>160,980.00</b>	<b>22,680.40</b>	<b>11,927.00</b>	<b>195,587.40</b>

Notes:

1. This budget assumes 4 months of full time Resident Inspection. Should this time be extended, the construction services budget will be increased accordingly to accommodate that inspection.
2. This budget assumes a 50 hour work week for the Inspector to include travel time to the site.
3. Disbursements for Resident Engineering Services are mileage \$0.50/km x 14,410 km.

**\*Reader should refer to the annual Consulting Engineers Fee Guideline for current charge-out rates**

## **Appendix No. 7**

### **Recommended Industry Standard Engineer Client Agreements**



ASSOCIATION OF CONSULTING  
ENGINEERING COMPANIES | CANADA

**ASSOCIATION OF CONSULTING ENGINEERING COMPANIES–CANADA**

**DOCUMENT NO. 31 - 2010**

**ENGINEERING AGREEMENT BETWEEN CLIENT AND ENGINEER**

**Rights and Privileges**

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Users are advised to first consult with legal counsel prior to agreeing to any changes to the agreement outlined in this document.

1981  
Revised 1991  
Addendum 1996  
Revised 2009  
Revised 2010

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### SCHEDULE A - ENGINEER'S SCOPE OF SERVICES ..... A-1

### SCHEDULE B – FEES AND REIMBURSABLE EXPENSES ..... B-1

**ENGINEERING AGREEMENT BETWEEN CLIENT AND ENGINEER**

dated as of the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

by and between:

hereinafter called the “*Client*”

*(Insert legal name and address)*

**and:**

hereinafter called the “*Engineer*”.

*(Insert legal name and address)*

**AGREEMENT**

The *Client* and *Engineer* agree as follows:

**A-1 THE SERVICES**

1.1 The *Engineer* will provide *Services* in connection with the following *Project*:

*(Insert a short description of the Project)*

The location of the *Project* (the “*Place of the Work*”) is as follows:

*(Insert the address, location or legal description of the site of the Work)*

1.2 The *Engineer* will provide *Services* for the *Project* in accordance with Schedule A – ENGINEER’S SCOPE OF SERVICES.

1.3 Any change to the *Services* listed in Schedule A – ENGINEER’S SCOPE OF SERVICES will be made by written order signed by both parties identifying the change plus adjustments, if any, to the *Engineer’s Fees* and *Reimbursable Expenses* and time for completion of the *Services*.

**A-2 AGREEMENT AND AMENDMENTS**

- 2.1 This *Engineering Agreement* constitutes the entire agreement between the *Client* and the *Engineer* relating to the *Project*, and supersedes all prior agreements between them, whether written or oral, respecting the *Services*. No other terms, conditions or warranties, whether express or implied, form a part of this *Engineering Agreement*.
- 2.2 This *Engineering Agreement* may be amended only by a written document signed by both the *Client* and the *Engineer*.

**A-3 ENGINEERING AGREEMENT DOCUMENTS**

The following sections and documents form part of and are incorporated into the *Engineering Agreement*:

In this *Engineering Agreement*:

- Agreement
- Definitions
- General Conditions
- Schedule A - ENGINEER'S SCOPE OF SERVICES
- Schedule B - FEES AND REIMBURSABLE EXPENSES

Other documents:

\*

*\* (Insert here, attaching additional pages if required, a list of all other sections and documents, including any supplementary conditions, other schedules and lists that are to be incorporated into the Engineering Agreement. )*

**A-4 FEES AND REIMBURSABLE EXPENSES**

- 4.1 The *Fees* for the *Services* of the *Engineer* are set forth in Schedule B – FEES AND REIMBURSABLE EXPENSES.
- 4.2 *Reimbursable Expenses* are the costs and charges identified in Schedule B – FEES AND REIMBURSABLE EXPENSES that are incurred by the *Engineer* in performing the *Services*.



**A-5 PAYMENT**

- 5.1 The *Client* will pay to the *Engineer* the *Fees* and *Reimbursable Expenses* set out in this *Engineering Agreement*.
- 5.2 The *Engineer* will issue monthly invoices for *Fees* and *Reimbursable Expenses*, together with applicable *Value Added Taxes*.
- 5.3 The *Engineer's* invoices are due when presented. Invoices unpaid by the *Client* 30 days after presentation will bear interest of % per annum calculated monthly.

**A-6 NOTICES**

- 6.1 A *Notice* will be addressed to the recipient at the address set out below. The delivery of a *Notice* will be by personal delivery, receipted courier delivery or by facsimile. A *Notice* delivered by one party in accordance with this *Engineering Agreement* will be deemed to have been received by the other party on the first *Working Day* after actual delivery. An address for a party may be changed by *Notice* to the other party setting out the new address in accordance with this Article.
- 6.2 Although the parties may use electronic communications for the purposes of general communication, e-mail will not be used for delivery of a *Notice*.
- 6.3 The addresses for the parties are as follows:

*Client\**

*(name of Client)\**

*(address)*

*(facsimile number)*

*Engineer\**

*(name of Engineer)\**

*(address)*

*(facsimile number)*

*\*(If it is intended that a specific individual or officer must receive the Notice, indicate that individual's name and/or office.)*

**A-7 LANGUAGE OF THE CONTRACT**

- 7.1 *(For use in the Province of Quebec.)* The parties confirm their wish that this *Engineering Agreement* as well as any other related documents including future amendments, *Notices* and correspondence be drawn in English. Parts of the *Engineering Agreement* may be included as available in English or in French or both, according to the language or languages in which they originally were drawn.

*Les parties confirment leur volonté que cette convention de même que tous les documents s'y rattachant, y compris tous amendements, avis et correspondance futures, soient rédigés en anglais. Des portions de la Convention d'ingénierie sont incluses telles que disponibles, soit en français ou en anglais ou les deux, selon la langue ou les langues dans lesquelles la portion pertinente de la Convention d'ingénierie aura été rédigée à l'origine.*

**A-8 SUCCESSION**

- 8.1 This *Engineering Agreement* will inure to the benefit of and be binding upon the parties, and upon their executors, administrators, successors and permitted assigns.

*(Signatures next follow)*

**IN WITNESS WHEREOF** the parties hereto have executed this *Engineering Agreement* as of the day and year first above written.

**CLIENT**

*name of Client*

*signature*

*name and title of person signing*

*signature*

*name and title of person signing*

**ENGINEER**

*name of Engineer*

*signature*

*name and title of person signing*

*signature*

*name and title of person signing*

**WITNESS**

*(only required where the Client is an individual)*

*signature*

*name and title of person signing*

*signature*

*name and title of person signing*

**WITNESS**

*(only required where the Engineer is an individual)*

*signature*

*name and title of person signing*

*signature*

*name and title of person signing*

*Where legal jurisdiction, local practice, or Client or Engineer requirements calls for:*

- (a) proof of authority to execute this document, attach such proof of authority in the form of a certified copy of a resolution naming the representative(s) authorized to sign the Engineering Agreement for and on behalf of the corporation or partnership; or*
- (b) the affixing of a corporate seal, this Engineering Agreement should be properly sealed.*

## DEFINITIONS

**1. Construction Contract**

*Construction Contract* means the contract between the *Client* and the *Contractor* for the performance of the *Work* by the *Contractor*.

**2. Construction Administration Services**

*Construction Administration Services* means those services, if any, which relate to the administration of the *Construction Contract* and which are identified as such in Schedule A – ENGINEER'S SCOPE OF SERVICES and which form part of the *Services*.

**3. Construction Contract Documents**

*Construction Contract Documents* means all documents relating to the *Work* issued by or through the *Engineer* that are incorporated into the *Construction Contract* and all variations and modifications issued by or approved by the *Engineer*.

**4. Construction Contract Time**

*Construction Contract Time* means the period from the *Notice* to proceed with the *Work* issued to the *Contractor* to the completion date of the *Work* in accordance with the *Construction Contract*.

**5. Construction Cost**

*Construction Cost* means the total cost to the *Client* of the *Work*, and includes:

- (a) all materials, equipment, labour, *Value Added Taxes*, *Contractor's* overhead and profit provided in accordance with the *Construction Contract Documents*;
- (b) the cost of all installations for the *Project* carried out by parties other than the *Contractor*;
- (c) the cost of all *Work* carried out under the *Construction Contract*;
- (d) refunds or sales tax exemptions on any materials or equipment, or both;
- (e) the cost of *Work* carried out by direct labour or direct purchase of materials or equipment by the *Client* at prevailing prices;
- (f) the value of new or old materials provided by the *Client*;
- (g) the value of all deletions made by the *Client* from the *Work* after the *Engineer* has completed a design for the deleted items as a part of the *Work*; and
- (h) the value of any monetary damages or set offs retained by the *Client* from the *Contractor* with respect to the *Work*;

but does not include:

- (i) *Fees and Reimbursable Expenses* of the *Engineer*;
- (j) the fees and reimbursable expenses of *Consultant of the Client*;

- (k) the salary of the *Client's* representative or other salary and administrative costs of the *Client*;
  - (l) the cost of land and any related rights or easements; or
  - (m) the costs of items, such as equipment, furniture or fixtures, that do not form a part of the *Construction Contract*.
- 6. Consultant or Consultant of the Client**  
*Consultant* or *Consultant of the Client* means a registered or licensed professional engineer, architect, or other specialist engaged directly by the *Client* other than the *Engineer* or *Sub-Consultants of the Engineer*.
- 7. Contractor**  
*Contractor* means a person or entity contracting with the *Client* to perform some or all of the *Work*.
- 8. Coordinate or Coordination**  
*Coordinate* or *Coordination*, when referring to the *Services* of the *Engineer*, means the management and supervision of communications between the *Engineer* and a *Sub-Consultant* or a *Consultant of the Client*.
- 9. Engineering Agreement or Agreement**  
*Engineering Agreement* or *Agreement* means this agreement between the *Client* and the *Engineer*, including all of the documents identified in Article A-3 ENGINEERING AGREEMENT DOCUMENTS and any amendments thereto.
- 10. Engineering Documents**  
*Engineering Documents* means drawings, plans, models, designs, specifications, reports, photographs, computer software if proprietary to the *Engineer*, surveys, calculations and other data, including computer print outs, contained in the *Construction Contract Documents* or which are otherwise used in connection with the *Project*, and which were prepared by or on behalf of the *Engineer* and are instruments of service for the execution of the *Work*.
- 11. Fees**  
*Fees* means those fees that are identified in Schedule B – FEES AND REIMBURSABLE EXPENSES and which are payable by the *Client* to the *Engineer*.
- 12. Hazardous Substances**  
*Hazardous Substances* means any toxic or hazardous solid, liquid, gaseous, thermal, or electromagnetic irritant or contaminant, and includes, without limitation, pollutants, moulds, and hazardous and special materials and wastes whether or not defined as such in any federal, provincial, territorial, or municipal laws, statutes, or regulations.
- 13. Notice**  
*Notice* means a written communication between the parties that is delivered in accordance with the provisions of Article A-6 – RECEIPT OF AND ADDRESSES FOR NOTICES. Use of the verb “**to notify**” means to send a *Notice* in the above manner.

**14. Place of the Work**

*Place of the Work* means the designated site or location of the *Work* identified in this *Engineering Agreement*.

**15. Project**

*Project* means the total endeavour contemplated in this *Engineering Agreement* of which the *Services* and the *Work* may be the whole or a part.

**16. Project Budget**

*Project Budget* means the estimated cost of the *Work*, including the *Services* and other professional services, but excluding expenses relating to site acquisition, promotion and marketing.

**17. Reimbursable Expenses**

*Reimbursable Expenses* means those expenses that are identified in Schedule B – FEES AND REIMBURSABLE EXPENSES and which are payable by the *Client* to the *Engineer*.

**18. Services**

*Services* means those services that are identified in Schedule A – ENGINEER'S SCOPE OF SERVICES.

**19. Shop Drawings**

*Shop Drawings* means drawings, diagrams, illustrations, schedules, performance charts, technical brochures, and other data that are to be provided by the *Contractor* or by others to illustrate details of a portion of the *Work*.

**20. Sub-Consultant or Sub-Consultant of the Engineer**

*Sub-Consultant* or *Sub-Consultant of the Engineer* means any registered or licensed professional engineer, architect, or other specialist engaged by the *Engineer* to perform a discreet scope of services in connection with the *Project*, but does not include employees of the *Engineer* or consultants working under a personal services agreement with the *Engineer*.

**21. Substantial Performance of the Work**

*Substantial Performance of the Work* means, where defined in the lien legislation applicable to the *Place of the Work*, the meaning given to that term in the lien legislation. If such legislation is not in force or does not contain such definition or if the *Work* is governed by the Civil Code of Quebec, *Substantial Performance of the Work* will have been reached when the *Work* is ready for use or is being used for the purpose intended and is so certified by the *Engineer* or by the certifier, if any, appointed under the *Construction Contract*, as the case may be.

**22. Suspension Expenses**

*Suspension Expenses* means expenses incurred by the *Engineer*, including demobilization and remobilization expenses, which are directly attributable to suspension of the *Services* by the *Client*.

**23. Termination Expenses**

*Termination Expenses* means expenses incurred by the *Engineer* which are directly attributable to termination of the *Services* and include the *Engineer's* expenses reasonably and necessarily incurred in winding down the *Services*.

**24. Value Added Taxes**

*Value Added Taxes* means such sum as levied upon the *Fee*, *Reimbursable Expenses* and the *Work* by a Federal, Provincial or Territorial Government and is computed as a percentage of the same and includes the Goods and Services Tax, the Quebec Sales Tax, the Harmonized Sales Tax, and any similar tax, the payment or collection of which is imposed by legislation.

**25. Work**

*Work* means the total construction and related services required by the *Construction Contract*.

**26. Working Day**

*Working Day* means a day other than a Saturday, Sunday, statutory holiday or statutory vacation day that is observed by the construction industry in the area of the *Place of the Work*. Reference to a day, other than a *Working Day*, indicates a calendar day.



## GENERAL CONDITIONS

### PART 1 AGREEMENT DOCUMENTS

GC 1.1 If there is a conflict within the *Engineering Agreement*, the order of priority of the documents which make up the *Engineering Agreement*, from highest to lowest, will be:

- (a) Agreement;
- (b) Definitions;
- (c) Any supplementary conditions to the General Conditions;
- (d) General Conditions;
- (e) Schedule A – ENGINEER’S SCOPE OF SERVICES;
- (f) Schedule B – FEES AND REIMBURSABLE EXPENSES;
- (g) Other schedules to the *Engineering Agreement*.

GC 1.2 The documents which make up the *Engineering Agreement* are complementary, and what is required by any one will be as binding as if required by all.

GC 1.3 Words and abbreviations with well known technical or trade meanings are used in the *Engineering Agreement Documents* in accordance with such recognized meanings.

GC 1.4 References in the *Engineering Agreement Documents* to the singular will be considered to include the plural as the context requires.

GC 1.5 References in the *Engineering Agreement Documents* to regulations and codes are considered to be references to the latest published version as of the signature date of the *Engineering Agreement*, unless otherwise indicated.

### PART 2 LAW OF THE CONTRACT

GC 2.1 The law of the *Place of the Work* will govern the interpretation of the *Engineering Agreement*.

GC 2.2 The *Client* acknowledges receipt of sufficient information from the *Engineer*, including information concerning the *Fees* and *Services* of the *Engineer*, so as to allow the *Client* to assess the nature, extent and cost of the *Services* of the *Engineer* and the obligations which the *Client* assumes under this *Engineering Agreement*.

### PART 3 RIGHTS AND REMEDIES

GC 3.1 Except as expressly provided in the *Engineering Agreement Documents*, the duties and obligations imposed by the *Engineering Agreement Documents* and the rights and remedies



available thereunder will be in addition to and not a limitation of any duties, obligations, rights, and remedies otherwise imposed or available by law.

- GC 3.2 No action or failure to act by the *Client* or *Engineer* will constitute a waiver of a right or duty afforded or imposed under this *Engineering Agreement*, except as may be specifically specified in writing.

#### **PART 4 ASSIGNMENT**

- GC 4.1 Neither party may assign this *Engineering Agreement* in whole or part without the written consent of the other, which consent will not be unreasonably withheld.

#### **PART 5 ENGINEER'S RESPONSIBILITIES**

- GC 5.1 The *Engineer* is bound by the legislation governing the *Engineer's* profession. Nothing in this *Engineering Agreement* requires the *Engineer* to derogate from obligations prescribed by law that are binding upon the *Engineer*.

- GC 5.2 The *Engineer* will provide the *Services* in accordance with this *Engineering Agreement* and with the degree of care, skill, and diligence normally provided by engineers in the performance of comparable services in respect of projects of a similar nature to that contemplated by this *Engineering Agreement*.

- GC 5.3 The *Engineer* will maintain records of *Reimbursable Expenses* and time records for *Services* performed for which the *Fee* is computed on an hourly basis. These records will be maintained to acceptable accounting standards and made available to the *Client* at mutually convenient times during the term of this *Engineering Agreement* and for a period not exceeding one year following completion of the *Services*.

- GC 5.4 The *Engineer* will:

- (a) not be responsible for the performance by the *Contractor*, subcontractors, suppliers or any other contractors of the *Work* or for the failure of any of them to carry out the *Work* in accordance with the *Construction Contract*;
- (b) not be responsible for, nor control, direct or supervise, the construction methods, means, techniques, sequences or procedures of the *Contractor*, subcontractors, suppliers, or any other contractors;
- (c) not be responsible for acts or omissions of the *Consultant of the Client*, or the *Contractor*, subcontractors, suppliers, or any other contractor;
- (d) not be responsible for safety precautions and programs required in connection with the *Work* or for general site safety at the *Place of the Work* under applicable health and construction safety legislation at the *Place of the Work*;
- (e) not be responsible for the advice of any independent expert engaged either by the *Client* or the *Contractor*, whether or not recommended by the *Engineer*; and
- (f) not be responsible to make exhaustive or continuous on-site reviews.

GC 5.5 The *Engineer* may engage *Sub-Consultants* to enable the *Engineer* to provide the *Services*. Should the *Client* reasonably object to a *Sub-Consultant* engaged by the *Engineer*, the *Client* may request the *Engineer* to replace the *Sub-Consultant*. In this event, the *Client* will pay all costs resulting from termination and replacement of that *Sub-Consultant* and the parties will adjust the *Fees* and time for completion of the *Services* to take into account the termination and replacement.

GC 5.6 The *Engineer* will *coordinate* the activities of its *Sub-Consultants*.

GC 5.7 The *Engineer* has discretion, where the *Client* provides equipment or materials for the *Project*, to request the *Client* to arrange that items to be used or installed in the *Work* first be tested or verified before being used for the purposes intended by the *Client* or be validated by an appropriate certificate of compliance.

Upon receipt of the requested test or verification reports or certificate of compliance, the *Engineer* will *notify* the *Client* of the *Engineer's* acceptance or refusal of equipment or materials concerned, with or without such reservations as the *Engineer* considers to be appropriate. If the *Client* insists upon using an item to which the *Engineer* has objected or expressed reservations in writing or if the *Client* declines to arrange to test, verify or certify an item as requested by the *Engineer*, the *Client* will be considered to have waived any recourse against the *Engineer* resulting from the use of such item or from a defect or inadequacy in such item.

GC 5.8 The *Engineer* is entitled to rely upon the accuracy and completeness of information and data furnished by the *Client*, including information and data originating from a *Consultant of the Client*, whether such *Consultant* is engaged at the request of the *Engineer*, the *Client* or otherwise.

GC 5.9 The *Engineer* is entitled to rely upon the accuracy and completeness of records, information, data and specifications furnished by:

- (a) government authorities and public utilities; and
- (b) by manufacturers and suppliers of equipment, material or supplies.

Should such records, information, data, and specifications prove to be erroneous or inaccurate, the *Engineer* is entitled to make the necessary changes to the *Engineering Documents* at the expense of the *Client*.

GC 5.10 The *Engineer* is not responsible for manufacturing defects in equipment, material or supplies specified or recommended by the *Engineer*.

GC 5.11 The *Engineer* will not accept a commission or other compensation from a manufacturer, supplier or contractor involved in the *Project*. The *Engineer* will have no financial interest in the materials or equipment specified or recommended by the *Engineer* as part of the *Services*. However, ownership of less than 1% of the securities issued by a company whose securities are traded on a recognized securities exchange will not be deemed to constitute a financial interest.

GC 5.12 Where the *Engineer* does not provide *Construction Administration Services* under this *Engineering Agreement* but the *Client* nevertheless requests the *Engineer* to attend at the

*Place of the Work* for any reason, the *Engineer* will not incur any liability to the *Client* for having attended at the *Place of the Work* unless the *Client* makes a specific request to the *Engineer* in writing stating why the *Client* has requested the *Engineer's* attendance and the *Engineer* has agreed to attend for that sole purpose. In such event, the only responsibility of the *Engineer* will be to respond to the *Client's* specific request provided such request falls within the mandate and competence of the *Engineer*.

## **PART 6 CLIENT'S RESPONSIBILITIES**

- GC 6.1 The *Client* will promptly fulfill all of the *Client's* responsibilities so as not to impede the *Engineer's* orderly performance of the *Services*.
- GC 6.2 The *Client* will fully advise the *Engineer* in writing of the *Client's* requirements in connection with the *Project*, including the *Project Budget* and time constraints of the *Client*.
- GC 6.3 The *Client*, when so *notified* by the *Engineer*, will make available to the *Engineer* all information or data pertinent to the *Project* which is required by the *Engineer* to perform the *Services*.
- GC 6.4 The *Client*, when so *notified* by the *Engineer*, will directly engage the services of a specialist to provide information or to perform ancillary services that are necessary to enable the *Engineer* to carry out the *Services*. Ancillary services may include, but are not limited to, topographic surveys and mapping of the *Place of the Work*, site services reports, technical investigations, geotechnical reports, quantity surveys and testing services. The parties will jointly agree on the selection of any such specialist.
- GC 6.5 Should the *Client* not provide the information required by the *Engineer* to perform the *Services* as mentioned in GC 6.3 or not accept the request of the *Engineer* to engage a specialist as mentioned in GC 6.4, the *Engineer* will be entitled at the *Engineer's* option and upon a further *Notice* to the *Client* either to terminate this *Engineering Agreement* or to be relieved of any responsibility for the consequences of the *Client's* decision not to provide the information or to engage a specialist as requested by the *Engineer*.
- GC 6.6 The *Client* will ensure that *Consultants of the Client* have adequate professional liability insurance, commensurate with the services they will provide for the *Project* and the *Work*.
- GC 6.7 Should the *Engineer* be required to act as the agent of the *Client* in order to perform some of the *Services*, the *Client* will authorize the *Engineer* in writing to act as the *Client's* agent for such purposes as may be necessary. Where the *Engineer* acts as the *Client's* agent pursuant to a written authorization, the *Client* is responsible for the authorized actions of the *Engineer* as agent of the *Client*. The *Client* will indemnify the *Engineer* for damages and expenses incurred by the *Engineer*, including reasonable legal fees, when acting as agent of the *Client*.
- GC 6.8 The *Client* will promptly consider requests by the *Engineer* for directions or decisions and diligently inform the *Engineer* of the *Client's* direction or decision within a reasonable time so as not to delay the *Services*.
- GC 6.9 The *Client* will pay the *Engineer* as provided in this *Engineering Agreement*.

- GC 6.10 The *Client*, at the request of the *Engineer*, will furnish reasonable evidence to the *Engineer* that financial arrangements have been made to fulfill the *Client*'s payment obligations under this *Engineering Agreement* before signing the *Engineering Agreement*, and promptly from time to time thereafter.
- GC 6.11 The *Client* will *notify* the *Engineer* of any material change in the *Client*'s financial arrangements that affect the *Client*'s ability to fulfill the *Client*'s payment obligations under this *Engineering Agreement*.
- GC 6.12 The *Client* will provide those legal, accounting, insurance, bonding and other counselling services which are necessary for the preparation of tenders or requests for proposals and the like or for the performance of other *Services* of the *Engineer*. If the *Client* is unable to provide such counselling services and requests the *Engineer* to do so, the *Client* will reimburse the *Engineer* for expenses incurred in securing any such counselling services.
- GC 6.13 The *Client* is responsible for obtaining legal advice regarding tenders, requests for a proposal or information, bids, contract awards and the like, regarding the *Project*. The *Client* is responsible for decisions relating to the issuance, validity or award of tenders, proposals or bids and for the resulting consequences, even where the *Services* require the *Engineer* to review or assist in the preparation of tenders, proposals or bids and the like or to make recommendations regarding them or regarding the qualification or selection of bidders.
- GC 6.14 The *Client* will arrange where necessary for the *Engineer*'s access to the *Place of the Work* or other required locations to enable the *Engineer* to perform the *Services*.
- GC 6.15 The *Client* will designate in writing an individual to act as the *Client*'s representative who will have authority to transmit instructions to and receive information from the *Engineer*.
- GC 6.16 The *Client* will promptly *notify* the *Engineer* whenever the *Client* or the *Client*'s representative becomes aware of any defects or deficiencies in the *Services*, the *Engineering Documents* or in the *Construction Contract Documents*.
- GC 6.17 The *Client* will obtain required approvals, licences, and permits from municipal, governmental or other authorities having jurisdiction over the *Project* so as not to delay the *Engineer* in the performance of the *Services*.
- GC 6.18 The *Client* will not enter into contracts with *Consultants of the Client* or *Contractors* that are incompatible or inconsistent with the *Services* to be provided under this *Engineering Agreement*.

## **PART 7 CONSTRUCTION ADMINISTRATION**

- GC 7.1 This PART 7 CONSTRUCTION ADMINISTRATION applies only when and to the extent that the *Engineer* provides *Construction Administration Services* under Schedule A – ENGINEER'S SCOPE OF SERVICES.
- GC 7.2 *Construction Administration Services* provided by the *Engineer* are for the benefit of the *Client*.



- GC 7.3 The *Engineer* will have authority to act on behalf of the Client but only to the extent provided in the *Construction Administration Services*.
- GC 7.4 The *Client* may modify or extend the duties, responsibilities, and authority of the *Engineer* as set forth in the *Construction Administration Services* with the written consent of the *Engineer*.
- GC 7.5 *Notices*, instructions, requests, claims, or other communications between the *Client* and the *Contractor* and between the *Client* and any *Consultants of the Client* will be made by or through the *Engineer*, unless the *Client* notifies the *Engineer* otherwise.
- GC 7.6 The *Engineer*, in the first instance, will be the interpreter of the requirements of the *Engineering Documents* and will make findings on all claims made by either the *Client* or the *Contractor* under the *Construction Contract*, and on all matters relating to the interpretation of the *Engineering Documents*, unless otherwise provided in the *Construction Contract*.
- GC 7.7 The *Engineer*, if specified in the *Construction Administration Services* and in the contracts among the *Client* and its *Consultants*, will coordinate the activities of the *Consultants of the Client*.
- GC 7.8 The *Engineer* will visit the *Place of the Work* at such intervals as the *Engineer*, in the *Engineer's* judgment, considers to be appropriate relative to the progress of construction in order to enable the *Engineer* to assess whether the *Contractor* is carrying out the *Work* in general conformity with the *Engineering Documents*. Only *Work* which the *Engineer* has reviewed during the construction will be considered to have been assessed. Should the *Engineer* comment on parts of the *Work* which the *Engineer* has not reviewed, the comments of the *Engineer* must be construed as being assumptions only and must not be relied upon unless the *Client* notifies the *Engineer* to review, and the *Engineer* reviews, the parts of the *Work* in question.
- GC 7.9 The *Engineer* is not responsible for performance of the *Construction Contract*. The *Contractor* is solely responsible for the execution, quality, schedule and cost of the *Work*.
- GC 7.10 The *Engineer* is not responsible to the *Client*, the *Contractor* or any *Consultant of the Client* for the means, methods, techniques, sequences, procedures and use of equipment for the *Project*, whether or not reviewed by the *Engineer*, which are employed by the *Contractor* or by a *Consultant of the Client* in executing, designing or administering the *Work*; or for the services of a *Consultant of the Client*; or for commissioning and start-up of any facility or equipment; or for health and safety precautions and programs incidental to the *Project* or to the commissioning and start-up of any facility or equipment.
- GC 7.11 No acceptance by the *Engineer* of the *Work* or of the services of the *Consultants of the Client*, whether express or implied, will relieve the *Contractor* or the *Consultants of the Client* from their responsibility to the *Client* for the proper performance of the *Work* or their services.
- GC 7.12 Unless otherwise specifically stated within the *Engineering Documents* or included in the *Construction Administration Services*, the *Contractor's Shop Drawings* will be reviewed by the *Engineer* only for the limited purpose of checking for general conformance with information given and the design concept expressed in the *Construction Contract Documents*. The *Engineer's* review of *Shop Drawings* is not for the purpose of determining the feasibility

or constructability of the *Work* detailed within the *Shop Drawings* or the accuracy or completeness of:

- (a) details such as dimension and quantities;
- (b) instructions for installation or performance of equipment or systems;
- (c) *Contractor's* construction means, methods, techniques, sequences or procedures; or
- (d) safety precautions for those engaged in the *Work* or others at the *Place of the Work*.

GC 7.13 Where required by the *Services*, at the end of the *Project* the *Engineer* will compile and deliver to the *Client* a reproducible set of record documents showing significant changes made to the *Work*, based upon, without additional verification on the part of the *Engineer*, updated record drawings, as-built and other data provided by the *Contractor*, *Consultants of the Client*, or other parties.

## **PART 8 CERTIFICATIONS BY THE ENGINEER**

GC 8.1 This PART 8 CERTIFICATIONS BY THE ENGINEER applies only when and to the extent that the *Engineer* is required to issue certifications under Schedule A – ENGINEER'S SCOPE OF SERVICES.

GC 8.2 The *Engineer* will issue those certifications which the *Engineer* is required to give as part of the *Services* with the degree of care, skill, and diligence normally provided by engineers issuing comparable certifications in respect of projects of a similar nature to that contemplated by this *Engineering Agreement*, based upon data reasonably available to the *Engineer*.

GC 8.3 If included in the *Construction Administration Services*, the *Engineer's* issuance of a certificate for payment constitutes a representation by the *Engineer* to the *Client*, based on the *Construction Administration Services* performed by the *Engineer* and on review of the *Contractor's* schedule of values and applications for payment, that, to the best of the *Engineer's* information and belief:

- (a) the *Work* has progressed to the value indicated;
- (b) *Work* observed by the *Engineer* while performing *Construction Administration Services* conforms generally with the *Construction Contract Documents*; and
- (c) the *Contractor* is entitled to payment in the amount certified.

GC 8.4 The *Engineer's* issuance of a certificate for payment is subject to:

- (a) review and evaluation of the *Work*, to the extent specified in the *Services*, as it progresses for general conformity with the *Construction Contract Documents*;
- (b) the results of any subsequent tests required by the *Construction Contract Documents*;
- (c) correction of deviations from the *Construction Contract Documents* detected prior to completion or after completion, as the case may be; and

- (d) any specific qualifications stated in the certificate for payment.
- GC 8.5 The *Engineer's* issuance of a certificate for payment is not a representation that the *Engineer* has inquired into the *Contractor's*:
- (a) use or allocation of monies paid on account of the contract price specified in the *Construction Contract*; or
  - (b) compliance with obligations imposed on the *Contractor* by law, including requirements of workplace health and safety legislation at the *Place of the Work*.

## **PART 9 CONSTRUCTION COST AND CONTRACT TIME ESTIMATES**

- GC 9.1 This PART 9 - CONSTRUCTION COST AND CONTRACT TIME ESTIMATES applies only in the event the *Services* require the *Engineer* to provide the *Client* with an estimate of the probable *Construction Cost* or *Construction Contract Time*, whether to assist the *Client* with a call for tenders for the *Work* or otherwise.
- GC 9.2 The parties acknowledge that an estimate of probable *Construction Cost* and an estimate of *Construction Contract Time* provided by the *Engineer* are subject to change and are contingent upon factors, including market forces, over which the *Engineer* has no control. The *Engineer* does not guarantee the accuracy of such estimates nor does the *Engineer* represent that bids, negotiated prices or the time for performance will not vary from such estimates. More definitive estimates regarding costs and time for performance may be assessed only when bids and negotiated prices are received for the *Work*.

## **PART 10 TERMINATION AND SUSPENSION**

- GC 10.1 This *Engineering Agreement* is terminated on the earliest of:
- (a) the date when the *Engineer* has performed all of the *Services*; or
  - (b) the date of termination if termination occurs in accordance with this GC 10 TERMINATION AND SUSPENSION.
- GC 10.2 If the *Engineer* is a natural person practicing alone (and not part of a company or a partnership) and should the *Engineer* die or become seriously incapacitated before having supplied all of the *Services*, either the *Client* or the estate or legal representative of the *Engineer* may terminate this *Engineering Agreement* upon *Notice* to the other, with effect from the date of decease or, in the case of serious incapacity, from the date of the *Notice* of termination.
- GC 10.3 If the *Engineer* is in material default in the performance of any of the *Engineer's* obligations under this *Engineering Agreement*, the *Client* will *notify* the *Engineer* that the default must be corrected. If the *Engineer* does not correct the default within 30 days after receipt of such *Notice* or if the *Engineer* does not take reasonable steps to correct the default if the default is not susceptible of immediate correction, the *Client* may terminate this *Engineering Agreement* upon further *Notice* to the *Engineer*, without prejudice to any other rights or recourses of the *Client*. Such termination will not release the *Client* from its obligation to pay

all *Fees* and *Reimbursable Expenses* incurred by the *Engineer* up to the date of termination in the manner provided in this *Engineering Agreement*.

- GC 10.4 If the *Client* is in material default in the performance of any of the *Client's* obligations set forth in this *Engineering Agreement*, including but not limited to the non-payment of *Fees* and *Reimbursable Expenses* of the *Engineer* in the manner specified in this *Engineering Agreement*, the *Engineer* will notify the *Client* that the default must be corrected. If the *Client* does not correct the default within 30 days after receipt of such *Notice*, the *Engineer* may terminate this *Engineering Agreement* upon further *Notice* to the *Client*. In such event, the *Client* will promptly pay the *Fees* and *Reimbursable Expenses* of the *Engineer* that are incurred and unpaid as of the date of such termination, plus the *Termination Expenses*, without prejudice to any other rights or recourses of the *Engineer*.
- GC 10.5 If the *Client* is unwilling or unable to proceed with the *Project*, the *Client* may suspend or terminate this *Engineering Agreement* by *Notice* of 30 days to the *Engineer*. Upon receipt of such *Notice*, the *Engineer* will perform no further *Services* other than those reasonably necessary to suspend or terminate that portion of the *Project* for which the *Engineer* is responsible. In such event, the *Client* will pay all of the *Fees* and *Reimbursable Expenses* incurred by the *Engineer* up to the date of suspension or termination, plus the *Suspension Expenses* or *Termination Expenses*, as the case may be, in the manner provided for in this *Engineering Agreement*.
- GC 10.6 If the *Client* suspends performance of the *Services* at any time for more than 30 consecutive or non-consecutive days through no fault of the *Engineer*, then the *Engineer* may choose to terminate this *Engineering Agreement* upon *Notice* to the *Client*. In this event, the *Client* will promptly pay the *Fees* and *Reimbursable Expenses* of the *Engineer* that are incurred and unpaid as of the date of such termination, plus the *Termination Expenses*, without prejudice to any other rights or recourses of the *Engineer*.

## **PART 11 OWNERSHIP AND USE OF DOCUMENTS, PATENTS AND TRADEMARKS**

- GC 11.1 The *Engineering Documents* are the property of the *Engineer*, whether the *Work* is executed or not. The *Engineer* reserves the copyright therein and in the *Work* executed therefrom. The *Client* is entitled to keep a copy of the *Engineering Documents* for its records.
- GC 11.2 The *Engineer* retains ownership of all patents, trademarks, copyrights, industrial or other intellectual property rights resulting from the *Services* or from concepts, products, or processes which are developed or first reduced to practice by the *Engineer* in performing the *Services*. The *Client* will not use, infringe or appropriate such proprietary rights without the prior consent and compensation of the *Engineer*.
- GC 11.3 Provided the *Fees* and *Reimbursable Expenses* of the *Engineer* are paid, the *Client* will have a non-exclusive license to use any proprietary concept, product or process of the *Engineer* which relates to or results from the *Services* for the life of the *Project* and solely for purposes of its maintenance and repair.
- GC 11.4 The *Engineer* warrants that the designs, drawings, and calculations developed by the *Engineer* under this *Engineering Agreement* will not infringe the patent, copyright, trade mark or other intellectual property rights of another person.



- GC 11.5 The *Engineer* will retain the original of the *Engineering Documents* and of those parts of the *Construction Contract Documents* which are generated by the *Engineer*, including computer-generated designs relating thereto, but excluding any models or graphic presentations specifically commissioned and paid for by the *Client*.
- GC 11.6 Should the *Client* use the *Engineering Documents* or provide them to third parties for purposes other than in connection with the *Project* without *notifying* the *Engineer* and without the *Engineer's* prior written consent, the *Engineer* will be entitled either to compensation for such improper use or to prevent such improper use, or to both. The *Client* will indemnify the *Engineer* against claims and costs (including legal costs) associated with such improper use. In no event will the *Engineer* be responsible for the consequences of any such improper use.
- GC 11.7 Should the *Client* alter the *Engineering Documents* without *notifying* the *Engineer* and without the *Engineer's* prior written consent, the *Client* will indemnify the *Engineer* against claims and costs (including legal costs) associated with such improper alteration. In no event will the *Engineer* be responsible for the consequences of any such improper alteration.
- GC 11.8 The *Client* may not use the *Engineering Documents* without having paid the *Fees* and *Reimbursable Expenses* of the *Engineer*. The *Engineer* is entitled to injunctive relief should the *Engineering Documents* be used without payment of the *Fees* and *Reimbursement Expenses* provided for in this *Engineering Agreement*.
- GC 11.9 The *Engineering Documents* are not to be used on any other project without the prior written consent and compensation of the *Engineer*.

## **PART 12 BUILDING CODES AND BY-LAWS**

- GC 12.1 The *Engineer* will interpret building codes and by-laws as they apply to the *Project* at the time of design to the best of the *Engineer's* ability. As the *Work* progresses, building codes and by-laws may change or the interpretation by an authority having jurisdiction may differ from the interpretation of the *Engineer*. In this event, the *Client* will compensate the *Engineer* for any additional *Services* of the *Engineer* that are required in order to have the *Work* conform to such changes or interpretations.

## **PART 13 PROJECT OWNERSHIP, IDENTIFICATION AND CONFIDENTIALITY**

- GC 13.1 The *Client* represents to the *Engineer* that the *Client* is the owner of the *Place of the Work*. If the *Client* is not the owner, the *Client* will *notify* the *Engineer* of the identity of the owner before signature of this *Engineering Agreement*.
- GC 13.2 The *Engineer* will be identified on *Project* signage and promotional material whenever other *Project* design professionals are mentioned. The *Engineer* may refer to the *Project* in the *Engineer's* promotional material.
- GC 13.3 Information regarding the design, functionality, equipment, management, costs, or progress of the *Project* is confidential where one party has *notified* the other party of the confidential or proprietary nature of such information and where such information is not public knowledge. The parties agree not to disclose confidential information to third parties, except

to the extent required for performance of the *Services* or where required by law or by mutual consent of the parties.

## **PART 14 INSURANCE AND LIABILITY**

GC 14.1 The *Engineer* will carry professional liability insurance of \$250,000 per claim and \$500,000 in the aggregate within any policy year. Coverage will be maintained continuously from the commencement of the *Services* until completion or termination of the *Services* and, subject to availability at reasonable cost, for 2 years after completion or termination of the *Services*.

GC 14.2 The *Client* may choose to increase the amount or the coverage of the *Engineer's* professional liability insurance above that provided in GC 14.1 so as to obtain additional insurance that is specific to the *Project*. The *Engineer* will cooperate with the *Client* to obtain such additional insurance, at the *Client's* expense.

GC 14.3 If the *Engineer* carries professional liability insurance for amounts greater than those specified in GC 14.1, such insurance will be available under this *Engineering Agreement* only up to the amount specified in GC 14.1 plus, if applicable, the amount of additional insurance obtained under GC 14.2.

GC 14.4 Where the *Project* involves construction, the *Client* will provide or arrange for *Project* specific liability (wrap-up) insurance and property ("broad form"/builder's risk) insurance in respect of the *Work* and include the *Engineer* thereunder as an additional insured.

GC 14.5 The *Engineer's* liability for claims which the *Client* has or may have against the *Engineer* or the *Engineer's* employees, agents, representatives and *Sub-Consultants* under this *Agreement*, whether these claims arise in contract, tort, negligence or under any other theory of liability, will be limited, notwithstanding any other provision of this *Engineering Agreement*:

- (a) to claims brought within the limitation period prescribed by law in the jurisdiction in which the *Project* is located or, where permitted by law, within 2 years of completion or termination of the *Services*, whichever occurs first; and
- (b) to re-performance of defective *Services* by the *Engineer*, plus:
  - (i) where claims are covered by insurance under section GC 14.1, and, if applicable, by any additional insurance under section GC 14.2 - to the amount of such insurance; or
  - (ii) where claims are not covered by insurance under section GC 14.1, and, if applicable, by any additional insurance under section GC 14.2 - to the amount of \$250,000.

GC 14.6 The *Engineer* will not be liable for the failure of any manufactured product or any manufactured or factory assembled system of components to perform in accordance with the manufacturer's specifications, product literature or written documentation.

GC 14.7 Where the *Engineer* is a corporation or partnership, the *Client* and *Consultants of the Client* will limit any claim they may have to the corporation or partnership, without liability on the part of any officer, director, member, employee, or agent of such corporation or partnership.

- GC 14.8 The liability of each party with respect to a claim against each other is limited to direct damages only and neither party will have any liability whatsoever for consequential or indirect loss or damage (such as, but not limited to, claims for loss of profit, revenue, production, business, contracts or opportunity and increased cost of capital, financing or overhead) incurred by the other party.
- GC 14.9 The *Engineer* is not responsible for the identification, reporting, analysis, evaluation, presence, handling, removal or disposal of *Hazardous Substances* at or adjacent to the *Place of the Work*, unless specified in Schedule A – ENGINEER'S SCOPE OF SERVICES, or for the exposure of persons, property or the environment to *Hazardous Substances* at or adjacent to the *Place of the Work*.
- GC 14.10 Subject to the limitations of liability set out in this *Engineering Agreement*, each party will indemnify the other party, to the extent of the fault or negligence of the indemnifying party, for damages and costs (including reasonable legal fees) resulting from:
- (a) claims of third parties; or
  - (b) a breach of contractual obligations under this *Engineering Agreement* by the indemnifying party or anyone for whom that party is responsible; or
  - (c) negligent or faulty acts or omissions of the indemnifying party or anyone for whom that party is responsible.

## **PART 15 DISPUTE RESOLUTION**

- GC 15.1 The parties will make reasonable efforts to resolve disputes arising under this *Engineering Agreement* by amicable negotiations. They agree to provide frank, candid and timely disclosure of relevant facts, information and documents to facilitate these negotiations, without prejudice to their rights and recourses.
- GC 15.2 If a dispute has not been resolved by negotiations, either party may *notify* the other party that it wishes the dispute to be resolved by mediation. If the parties are unable to agree upon the choice of a mediator, either party may apply to a superior court in the jurisdiction where the *Project* is located to appoint a mediator.
- GC 15.3 Should mediation not resolve the dispute, a party may refer the unresolved dispute to the courts or, upon mutual agreement, to any other form of dispute resolution, including binding arbitration.
- GC 15.4 Unless the parties otherwise agree, any mediation or arbitration under this *Agreement* will be conducted in accordance with the latest edition of CCDC 40 - Rules for Mediation and Arbitration of Construction Disputes, as applied to and compatible with this *Engineering Agreement*, save that arbitration will be limited to a single arbitrator.
- GC 15.5 Any endeavour to resolve disputes arising out of this *Engineering Agreement* by negotiation, mediation or other means of dispute resolution, including arbitration, will be conducted on a confidential basis.

- GC 15.6 The parties agree to submit to the exclusive jurisdiction of the courts in *Place of the Work* if a dispute is to be resolved by the courts, or to mediation or arbitration at the *Place of the Work* if a dispute is to be resolved by mediation or arbitration.

## **PART 16 PAYMENT**

- GC 16.1 The *Client* will pay to the *Engineer* the amount of the *Fees* and *Reimbursable Expenses* of the *Engineer* together with applicable *Value Added Taxes*, when invoiced by the *Engineer* for *Services* which have been rendered, in accordance with Article A5 – PAYMENT and Schedule B – FEES AND REIMBURSABLE EXPENSES.
- GC 16.2 In the event the *Client* disputes in good faith a portion of the *Fees* and *Reimbursable Expenses* invoiced by the *Engineer*, the *Client* will pay the uncontested portion within the prescribed time.
- GC 16.3 Disputes regarding *Fees* and *Reimbursable Expenses* of the *Engineer* will be resolved in the manner specified in PART 15 - DISPUTE RESOLUTION.
- GC 16.4 Where the *Engineer* provides *Construction Administration Services* which extend beyond the period contemplated at the time this *Engineering Agreement* was signed, the *Engineer* will notify the *Client* and, upon mutual agreement of the parties, the *Fees* of the *Engineer* will be increased in order to take into account the extended time required for providing the *Construction Administration Services*.
- GC 16.5 Should the *Client* request a change to the *Project* or *Work* which requires the *Engineer* to provide additional *Services* beyond those contemplated at the time the *Engineering Agreement* is signed, before undertaking such additional *Services* the *Client* and the *Engineer* will agree in writing upon the *Engineer's* remuneration and time for providing the additional *Services*. Failing an agreement with the *Client*, the *Client* will pay the *Engineer* for the additional *Services* at the hourly rates set out in Schedule B – FEES AND REIMBURSABLE EXPENSES and any additional *Reimbursable Expenses* incurred, and grant a reasonable extension of time to the *Engineer* for the performance of the additional *Services*.
- GC 16.6 Should the *Client* request a change to the *Project* or *Work* which renders useless a part of the *Services* already provided, the *Client* nonetheless will pay the *Engineer* in accordance with this *Engineering Agreement* for *Services* already provided which the change has rendered useless.
- GC 16.7 Should it prove necessary for the *Engineer* to rework or revise the plans and specifications forming part of the *Services* for reasons which the *Engineer* could not reasonably foresee when the *Engineering Agreement* was signed, or owing to the default or the insolvency of the *Client* or the *Contractor* or a subcontractor, or as a result of the *Client's* suspension of the *Services* or *Work* on the *Project*, or because of damage to the *Project* by fire or some other cause, the *Client* will pay the *Engineer* for any reworked or revised plans and specifications at the hourly rates set out in Schedule B – FEES AND REIMBURSABLE EXPENSES.

**PART 17 SEVERABILITY**

GC 17.1 If any provision of this *Engineering Agreement* is declared by a court of competent jurisdiction to be invalid, illegal, or unenforceable, such provision will be severed from this *Engineering Agreement* and the other provisions of this *Engineering Agreement* will remain in full force and effect.

*(End of the General Conditions. Schedules A and B next follow.)*





# Schedules to ACEC Document 31

## **ENGINEERING AGREEMENT BETWEEN CLIENT AND ENGINEER**



## SCHEDULE A - ENGINEER'S SCOPE OF SERVICES

*Note: when determining the Services to be provided, the parties should take into account that:*

- *the identified Services are predicated upon the Client entering into a single Construction Contract.*
- *some identified Services are a function of whether the Engineer is acting either:*
  - (a) as the lead professional who has overall Project responsibilities or*
  - (b) only as a professional who is subordinate to the lead professional. In the latter situation, the particular Services of the Engineer are limited to the Engineer's specialization under this Agreement.*

The *Engineer* WILL PROVIDE the *Services* next described that are marked (X) in the column entitled YES and WILL NOT PROVIDE the *Services* which are marked (X) in the column entitled NO.

### A-1 Consulting and Advisory Services

	Description of Services	Yes	No
If <b>Consulting and Advisory Services</b> WILL <u>NOT</u> BE PROVIDED, check this box:			
If <b>Consulting and Advisory Services</b> WILL BE PROVIDED, identify them by completing the following:			
1.1	Preparation and periodic updating of: <ul style="list-style-type: none"> <li>• an estimate of probable <i>Construction Cost</i>; and</li> <li>• an estimate of <i>Construction Contract Time</i>.</li> </ul>		
1.2	Assistance in the preparation of pre-construction <i>Project</i> operating cost budgets.		
1.3	Preparation for and/or attendance at a public participation or information program.		
1.4	Preparation for and/or participation in a value engineering program.		
1.5	Preparation of reports relating to the <i>Client's</i> long-range plans.		
1.6	Preparation of operational studies.		
1.7	Provision of renderings.		
1.8	Provision of models.		
1.9	Technical representation at meetings.		

Initials	
<i>Client</i>	<i>Engineer</i>

**A-1 Consulting and Advisory Services (continued)**

	Description of Services	Yes	No
1.10	Preparation of specified alternative designs.		
1.11	Calculation of quantities of <i>Work</i> to be performed.		
1.12	Preparation of <i>Project</i> commissioning and start-up procedures.		
1.13	Preparation of applications and supporting documents for governmental grants, loans, and subsidies.		
1.14	Preparation of applications and supporting documents for payments in connection with the <i>Project</i> .		
1.15	Assistance in obtaining required approvals, licences and permits from governmental authorities having jurisdiction over the <i>Project</i> .		
1.16	Arrangement for the translation of documents into a language other than the language of this <i>Engineering Agreement</i>		
1.17	Arrangement for special testing of the <i>Work</i> .		
1.18	Investigation of specified conditions (such as failures, accidents, groundwater and drainage issues, stability, etc).		
1.19	Preparation of operating or maintenance manuals, operating drawings or charts.		
1.20	Assistance in litigation, arbitration, negotiation, or other legal or administrative proceedings on behalf of the <i>Client</i> , and all necessary preparation in respect thereof.		
1.21	Provision of peer review of documents provided by <i>Consultants of the Client</i> .		
	<i>Enter here any additional Consulting and Advisory Services or references to them in documents such as Requests for Proposals, Terms of Reference, or Statements of Requirements. Attach additional pages if required.</i>		

Initials	
<i>Client</i>	<i>Engineer</i>



**A-2 Engineering Project Services**

	Description of Services	Yes	No
If <b>Engineering Project Services</b> WILL <u>NOT</u> BE PROVIDED, check this box:			
If <b>Engineering Project Services</b> WILL BE PROVIDED, identify them by completing the following:			
2.1	Preparation of an engineering and <i>Project</i> implementation program based upon: a) the <i>Client's</i> written instructions regarding the <i>Project</i> requirements, b) the <i>Client's Project Budget</i> , and c) the <i>Client's</i> time constraints		
2.2	Preparation of a statement of requirements and <i>Project</i> design criteria to be used in the design process.		
2.3	Coordination of <i>Consultants of the Client</i> (where the <i>Engineer</i> is the lead professional) .		
2.4	Participation in or preparation of specified <i>Project</i> feasibility studies.		
2.5	Arrangement for expert and specialist studies for use in conceptual, preliminary, and detailed design services.		
2.6	Preparation of and/or participation in environmental assessments and impact studies.		
2.7	Review of environmental assessments and impact studies prepared by others.		
2.8	Assistance in obtaining approvals of authorities having jurisdiction over the <i>Project</i> .		
	<i>Enter here any additional Engineering Project Services or references to them in documents such as Requests for Proposals, Terms of Reference, or Statements of Requirements. Attach additional pages if required.</i>		

Initials	
<i>Client</i>	<i>Engineer</i>

**A-3 Conceptual Design Services**

	Description of Services	Yes	No
If <b>Conceptual Design Services</b> WILL <u>NOT</u> BE PROVIDED, check this box:			
If <b>Conceptual Design Services</b> WILL BE PROVIDED, identify them by completing the following:			
3.1	a) review of the statement of requirements provided by the <i>Client</i> b) analysis of information provided by the <i>Client</i> , including: i) conditions or methods of operations ii) technical and economic feasibility iii) location of the <i>Project</i> , and iv) similar matters c) establish the sizes, capacity, location, method of operation and other principal features which form the basis for the design of a proposed Project d) analysis of expert and specialist studies prepared in support of the Conceptual Design Service e) evaluation of alternatives f) preparation of concept sketches and developing specification notes g) preparation of a <i>Project</i> brief outlining the relevant criteria to be followed in preliminary and detailed design <i>Services</i> h) submission of conceptual design and <i>Project</i> brief for review and approval by <i>Client</i>		
	<i>Enter here any additional Conceptual Design Services or references to them in documents such as Requests for Proposals, Terms of Reference, or Statements of Requirements. Attach additional pages if required.</i>		

Initials	
<i>Client</i>	<i>Engineer</i>

**A-4 Preliminary Design Services**

	Description of Services	Yes	No
If <b>Preliminary Design Services</b> WILL <u>NOT</u> BE PROVIDED, check this box:			
If <b>Preliminary Design Services</b> WILL BE PROVIDED, identify them by completing the following:			
4.1	a) obtaining advice and information from any <i>Consultants of the Client</i> to carry out duties and responsibilities b) preparation of preliminary design including drawings or sketches illustrating and defining the design concept c) preparation of specification outlines d) preparation of preliminary design report covering alternatives, preliminary sketches, and outline specifications e) preparation of documents in support of applications for approval from authorities having jurisdiction regarding the <i>Project</i> or designated specific aspects of the <i>Project</i> f) submission of preliminary design report for review and approval by <i>Client</i>		
	<i>Enter here any additional Preliminary Design Services or references to them in documents such as Requests for Proposals, Terms of Reference, or Statements of Requirements. Attach additional pages if required.</i>		

Initials	
<i>Client</i>	<i>Engineer</i>

**A-5 Detailed Design Services**

	Description of Services	Yes	No
If <b>Detailed Design Services</b> WILL <u>NOT</u> BE PROVIDED, check this box:			
If <b>Detailed Design Services</b> WILL BE PROVIDED, identify them by completing the following:			
5.1	a) preparation of Engineering Documents b) preparation of bill of quantities c) preparation of documents in support of applications for approval from authorities having jurisdiction for the <i>Project</i> or designated specific aspects of the <i>Project</i> d) submission of <i>Engineering Documents</i> for review and approval by <i>Client</i> #		
5.2	Preparation and submission of <i>Construction Contract Documents</i> for review and approval by the <i>Client</i> (where the <i>Engineer</i> is the lead professional). OR Review of <i>Construction Contract Documents</i> prepared by others.	OR	
	<i>Enter here any additional Detailed Design Services or references to them in documents such as Requests for Proposals, Terms of Reference, or Statements of Requirements. Attach additional pages if required.</i>		

Initials	
<i>Client</i>	<i>Engineer</i>

**A-6 Construction Procurement Services**

	Description of Services	Yes	No
If <b>Construction Procurement Services</b> WILL <u>NOT</u> BE PROVIDED, check this box:			
If <b>Construction Procurement Services</b> WILL BE PROVIDED, identify them by completing the following:			
6.1	Advice regarding: a) the preparation of requests for proposals, requests for qualifications and tender information b) bid forms.		
6.2	Assistance in the preparation of pre-qualification documents for procurement tenders or proposals.		
6.3	Assistance in the preparation of tender documents incorporating relevant <i>Engineering Documents</i> , <i>Construction Contract Documents</i> and other documents prepared by <i>Consultants of the Client</i> on the <i>Project</i> .		
6.4	Assistance in obtaining bids.		
6.5	Assistance in the preparation of addenda.		
6.6	Review of bids.		
6.7	Assistance in the preparation of the <i>Construction Contract</i> .		
	<i>Enter here any additional Construction Procurement Services or references to them in documents such as Requests for Proposals, Terms of Reference, or Statements of Requirements. Attach additional pages if required.</i>		

Initials	
<i>Client</i>	<i>Engineer</i>

### A-7 Construction Administration Services

Construction Administration Services include the scope of services indicated below. Note that Construction Administration Services do not include Construction Contract Resident Services, which are dealt with separately at A-8 if applicable.

	Description of Services	Yes	No
If <b>Construction Administration Services</b> WILL <u>NOT</u> BE PROVIDED, check this box:			
If <b>Construction Administration Services</b> WILL BE PROVIDED, identify them by completing the following:			
7.1	Periodic visits to the <i>Place of the Work</i> in accordance with GC 7.8 of PART 7 CONSTRUCTION ADMINISTRATION.		
7.2	Attendance at meetings necessary to the coordination of the design, <i>Construction Administration Services</i> , and execution of the <i>Work</i> .		
7.3	Preparation and distribution of <i>Notices</i> of change, change orders, and other necessary <i>Project</i> documentation during the course of the execution of the <i>Work</i> (where the <i>Engineer</i> is the lead professional).		
7.4	Obtain advice, data, and information from <i>Consultants of the Client</i> when required.		
7.5	Review of <i>Shop Drawings</i> in accordance with GC 7.12 of PART 7 CONSTRUCTION ADMINISTRATION.		
7.6	Monitor compliance with the program of construction reviews and testing which may be required by the <i>Engineer</i> or imposed by law in connection with the execution of the <i>Work</i> by the <i>Contractor</i> .		
7.7	Interpretation of the <i>Construction Contract Documents</i> (where the <i>Engineer</i> is the lead professional and if so provided in the <i>Construction Contract</i> ).		
7.8	Evaluation of <i>Contractor's</i> applications for payment.		
7.9	Certification of the <i>Contractor's</i> applications for payment, subject to PART 8 CERTIFICATIONS BY THE ENGINEER (where the <i>Engineer</i> is the lead professional).		
7.10	Review of an application for <i>Substantial Performance of the Work</i> noting defects and deficiencies observed in the <i>Work</i>		
7.11	Certification of the <i>Contractor's Substantial Performance of the Work</i> , subject to PART 8 CERTIFICATIONS BY THE ENGINEER (where the <i>Engineer</i> is the lead professional).		

Initials	
<i>Client</i>	<i>Engineer</i>

**A-7 Construction Administration Services (continued)**

	Description of Services	Yes	No
7.12	Review of the correction of defects and deficiencies observed in the <i>Work</i> when completed.		
	<i>Enter here any additional Construction Administration Services or references to them in documents such as Requests for Proposals, Terms of Reference, or Statements of Requirements. Attach additional pages if required.</i>		

Initials	
<i>Client</i>	<i>Engineer</i>

**A-8 Construction Contract Resident Services**

Construction Contract Resident Services are considered to be “resident” or “at site” when office facilities and staff assigned by the Engineer are on site full time for a continuous work period.

	Description of Services	Yes	No
If <b>Construction Contract Resident Services</b> WILL <u>NOT</u> BE PROVIDED, check this box:			
If <b>Construction Contract Resident Services</b> WILL BE PROVIDED, identify them by completing the following:			
8.1	Arranging for reference surveys for use in the <i>Contractor's</i> layout of the <i>Work</i> (not including surveys of legal property boundaries).		
8.2	Review of <i>Contractor's</i> surveys and layout.		
8.3	Regular site reviews of the <i>Work</i> of the <i>Contractor</i> to ascertain if the reviewed <i>Work</i> is in general conformance with the <i>Construction Documents</i> .		
8.4	Arrangement of field-testing and inspection of materials and equipment for <i>Client's</i> quality assurance program		
8.5	Investigation, reporting, and providing recommendations on unusual circumstances that arise during the <i>Project</i> implementation.		
8.6	Maintenance of sufficient data to outline current progress of the <i>Work</i> .		
8.7	Final inspection at the conclusion of the <i>Project Construction Contract</i> , including any elements of commissioning agreed to as part of the <i>Client's</i> acceptance program.		
	<i>Enter here any additional Construction Contract Resident Services or references to them in documents such as Requests for Proposals, Terms of Reference, or Statements of Requirements. Attach additional pages if required.</i>		

Initials	
<i>Client</i>	<i>Engineer</i>



**A-9 Post Construction Engineering Services**

	Description of Services	Yes	No
If <b>Post Construction Services</b> WILL <u>NOT</u> BE PROVIDED, check this box:			
If <b>Post Construction Services</b> WILL BE PROVIDED, identify them by completing the following:			
Post Construction Engineering Services comprising the following:			
9.1	Provision of commissioning and start-up assistance.		
9.2	Collection and organization of operating and maintenance manuals.		
9.3	Identification of deficiencies during the warranty period at the <i>Client's</i> request.		
9.4	Assistance in facility management or operations after commissioning and start-up.		
9.5	Preparation of record documents in accordance with GC 7.13 of PART 7 CONSTRUCTION ADMINISTRATION.		
	<i>Enter here any additional Post Construction Engineering Services or references to them in documents such as Requests for Proposals, Terms of Reference, or Statements of Requirements. Attach additional pages if required.</i>		

Initials	
<i>Client</i>	<i>Engineer</i>

**SCHEDULE B – FEES AND REIMBURSABLE EXPENSES**

*Note: when determining the Fees, the parties should take into account that:*

- *the Fees are predicated upon the Client entering into a single Construction Contract*
- *some Fees are a function of whether the Engineer is acting either:*
  - (a) as the lead professional who has overall Project responsibilities or*
  - (b) only as a professional who is subordinate to the lead professional.*

**B-1 Fees for Services**

The following table identifies the method for determining the *Fees* due to the *Engineer* under this *Engineering Agreement* for the *Services* described in Schedule A:

<b>Engineers Services (Refer to Schedule A)</b>		<b>Select Fee Basis Applicable to this Agreement</b>		
		<b>Hourly Rate Fees (B-1.1)</b>	<b>Fixed Fees (B-1.2)</b>	<b>Fees as % of Construction Cost (B-1.3)</b>
A-1	Consulting and Advisory Services			N/A
A-2	Engineering Project Services			N/A
A-3	Conceptual Design Services			
A-4	Preliminary Design Services			
A-5	Detailed Design Services			
A-6	Construction Procurement Services			
A-7	Construction Administration Services			
A-8	Construction Contract Resident Services			N/A
A-9	Post Construction Engineering Services			N/A

Refer to Section B-1.1, B-1.2, and B-1.3 for a detailed description of the method for calculating the *Fees* due to the *Engineer*.

*Reimbursable Expenses* (Section B-2) are additional to the *Fees* due to the *Engineer*.

*Value added taxes* are not included in *Fees* and *Reimbursable Expenses*.

Initials	
<i>Client</i>	<i>Engineer</i>

**B-1.1 Hourly Rate Fees**

Hourly Rate *Fees* shall be calculated on an hourly basis as the *Project* progresses at the following rates:

a)	Principals	\$	per hour
b)	Senior staff	\$	per hour
c)	Intermediate staff	\$	per hour
d)	Junior staff	\$	per hour
e)	Clerical	\$	per hour
f)		\$	per hour
g)		\$	per hour
h)		\$	per hour

The rates in this table shall be applicable for (*select one*):

the duration of the Engineering Agreement

twelve months from the effective date of this Agreement at which time the rates will be increased by                      %, unless otherwise agreed in writing by the parties

other (*specify*)

(Enter additional provisions below. Append extra pages if required.)

Initials	
<i>Client</i>	<i>Engineer</i>

**B-1.2 Fixed Fees**

*Fees* for the project shall be calculated as a fixed fee of \$ \_\_\_\_\_, apportioned as follows:

	Percentage	Milestone/Task
•	% of fee for	
•	% of fee for	
•	% of fee for	
•	% of fee for	
•	% of fee for	

The fixed fees shall be applicable for (*select one*):

the duration of the Engineering Agreement

twelve months from the effective date of this Agreement at which time the rates will be increased by \_\_\_\_\_%, unless otherwise agreed in writing by the parties

other (specify)

(Enter additional provisions below. Append extra pages if required.)

Initials	
<i>Client</i>	<i>Engineer</i>

**B-1.3 Fees Based on Percentage of Construction Cost**

*Fees* shall be calculated as \_\_\_\_\_ % of the *Construction Cost*, apportioned as follows (*where not applicable, insert Nil or N/A*):

- A-3 - Conceptual Design Services %
- A-4 - Preliminary Design Services %
- A-5 - Detailed Design Services %
- A-6 - Construction Procurement Services %
- A-7 - Construction Administration Services %
- TOTAL FEE %

*Fees* based on a percentage of the *Construction Cost* are NOT applicable to the following Services which should be calculated either on an Hourly Rate Basis (Section B-1.1) or a Fixed Fee Basis (Section B-1.2):

- A-1 - Consulting and Advisory Services
- A-2 - Engineering Project Services
- A-8 - Construction Contract Resident Services
- A-9 - Post Construction Engineering Services.

For purposes of Section B-1.3 (Fees Based on Percentage of Construction Cost) and notwithstanding Definition 5 (*Construction Cost*), when determining *Fees* based on a percentage, the *Construction Cost* is calculated in the following manner in regard to those phases of the *Engineering Agreement* which are applicable to the *Services* to be provided by the *Engineer*:

PHASE	BASIS FOR CALCULATION
A-3 - Conceptual Design services	The budget at the commencement of the conceptual design services as agreed by the Engineer and the Client.
A-4 - Preliminary Design services	The estimate of probable <i>Construction Cost</i> at the commencement of the preliminary design services as agreed by the Engineer and the Client.
A-5 - Detailed Design services	The estimate of probable <i>Construction Cost</i> at the commencement of the detailed design services as agreed by the Engineer and the Client.
A-6 - Construction procurement services	The estimate of probable <i>Construction Cost</i> at the commencement of the Construction procurement services as agreed by the Engineer and the Client.
A-7 - Construction Administration Services	The actual final <i>Construction Cost</i> .

Initials	
<i>Client</i>	<i>Engineer</i>

*(Enter additional provisions below. Append extra pages if required.)*

## **B-2 Reimbursable Expenses**

*Reimbursable Expenses* incurred by the *Engineer* in carrying out the *Services* are subject to a mark-up of \_\_\_\_\_ % to cover office and administrative costs of the *Engineer* - unless otherwise agreed as follows:

*(if applicable, indicate alternate methods for determining Reimbursable Expenses)*

*Reimbursable Expenses* include the following expenses where incurred in relation to the performance of the *Services*:

- Transport, subsistence, and lodging in connection with the *Project* beyond \_\_\_\_\_ kilometres of the *Engineer's* office. Use of vehicles shall be charged at \$ \_\_\_\_\_ per kilometre.
- Long distance telephone and facsimile communications.
- Reproduction of information, drawings, specifications, and other documents necessary to the *Project*.
- Testing services.
- Courier and messenger services.
- Fees paid for securing approvals, permits, or licences from regulatory agencies having jurisdiction over the *Project*.
- Providing and maintaining *Project* site offices, telephones, facsimile as required for use by the *Engineer* and *Sub-Consultants of the Engineer*.
- Advertising incidental to the *Project*.

Initials	
<i>Client</i>	<i>Engineer</i>

- Obtaining necessary legal, accounting, insurance, bonding, and other counselling services pertaining to the *Project*.
- Specialized *Project* specific computer hardware and software charges and related expenses as agreed to between the *Client* and the *Engineer*.
- Customs, excise, or any other taxes incurred by the Engineer with respect to the *Services*, but excluding *Value Added Taxes*.
- Special or increased insurance coverage required by the *Client* according to paragraph GC 14.2.
- Fees and disbursements of *Sub-consultants* required in the performance of the *Services* where not included in the *Fees* in connection with the *Project*.
- Costs incurred by the *Engineer* in the performance of *Services* in connection with the *Project* where the *Engineer* has obtained the prior written approval of the *Client*.

*Enter additional descriptions to be used. Append additional sheets if required*

Initials	
<i>Client</i>	<i>Engineer</i>



# MMCD

Master Municipal Construction Documents

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## Client/Consultant Agreement

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## INTRODUCTION

The Client/Consultant Agreement is a project of the Master Municipal Construction Document Association (MMCDA). The MMCDA is a partnership of the Consulting Engineers of British Columbia. The Road Builders and Heavy Construction Association, and the Municipal Engineer's Division of the Association of Professional Engineers and Geoscientists of British Columbia.

The objectives of the document are similar to those for the construction Contract Documents, namely fair to all parties, minimize the need for risk taking by the Consultant and provide an equitable means of resolving disputes, and addressing changes. Another primary objective is to provide the Consultant with adequate resources to foster innovation and analysis of alternatives to provide the best possible design and project for the Client.

## ACKNOWLEDGMENTS

The document committee consisted of volunteers from the Consulting and Client sectors. The MMCDA wishes to acknowledge the following members of the Client/Consultant Agreement committee for their assistance and expertise during the preparation of the document.

Robert Campbell, P. Eng.	Binnie & Associates
Dave Kirk, P. Eng.	Delcan Consultants
To-hin Lau, P. Eng.	New East Consulting Services Ltd.
Robert Lee, P. Eng.	City of Surrey
Dave Smith, P. Eng.	Thurber Engineering Ltd.
Frank Wilton, P. Eng.	Citiwest Consulting Ltd.
Ken Wright, P. Eng.	City of Coquitlam, Chair

In addition legal review services were provided by John Haythorne, P.Eng. of Bull Housser and Tupper.

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*Or visit the MMCD web site at [www.mmcd.net](http://www.mmcd.net)*

**MMCD Client/Consultant Agreement** - for use to retain consulting services for municipal engineering projects, including projects using the Master Municipal Construction Documents.

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**Agreement**  
**Between Client and Consultant**

**(FOR USE TO RETAIN CONSULTING SERVICES ON MUNICIPAL ENGINEERING PROJECTS, INCLUDING PROJECTS USING THE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS.)**

**THIS AGREEMENT** made in duplicate this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

**BETWEEN:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**( NAME , OFFICE ADDRESS AND FAX OF CLIENT )**

(the "*Client*")

**AND:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**( NAME , OFFICE ADDRESS AND FAX OF CONSULTANT )**

(the "*Consultant*")

Whereas the *Client* intends to engage the professional services of the *Consultant* in connection with the following project:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**(TITLE OF PROJECT)**

(the "*Project*")

The *Client* and the *Consultant* agree as follows:

**DEFINITIONS      1.**

**Definitions      1.1      1.1.1** For the purposes of this *Agreement*, the following definitions will apply.

(a) “*Additional Services*” means services provided by the *Consultant* which are outside the scope of *Basic Services* under this *Agreement*.

(b) “*Agreement*” means this Agreement between the *Client* and the *Consultant*.

(c) “*Basic Services*” means the services which the *Consultant* is required to perform as identified under Schedule A of this *Agreement*.

(d) “*Business Day*” means a day other than a Saturday, Sunday or statutory holiday in British Columbia. A *Business Day* will end at 5:00 p.m. on that day.

(e) “*Client*” means the person, firm, corporation or municipality identified on page 1 of this *Agreement*.

(f) “*Consultant*” means the person, firm or corporation identified on page 1 of this *Agreement*.

(g) “*Contract*” means an agreement between the *Client* and a *Contractor* for the performance of all or part of the *Work*.

(h) “*Contract Administrator*” means the person, if any, identified as Contract Administrator in the *Contract Documents*.

(i) “*Contract Documents*” means the documents comprising the *Contract*.

(j) “*Contractor*” means the person, firm, or corporation who has entered into a *Contract* with the *Client*.

(k) “*Defined Remuneration Services*” means the *Services* where the cost of, and the time required for, the performance of such *Services* can be predicted to a reasonable level of accuracy by professionals experienced in providing services similar to the *Services*.

(l) “*Disbursement*” has the meaning set out in paragraph 5.2.

(m) “*Field Services*” means making such visits to the *Project* site at intervals appropriate to the stage of the *Work* as reasonably necessary to enable the *Consultant* to ascertain whether the *Contractor* is carrying out the *Work* in general conformity with the *Contract Documents*.

(n) “*Hazardous Materials*” means any material or substance which is a “hazardous product”, “contaminant”, “toxic substance”, “deleterious substance”, “special waste”, “dangerous good” or “reportable substance” that is identified or described in or defined by an applicable statute, regulation or law.

(o) “*Instruments of Service*” has the meaning set out in paragraph 7.2.1.

(p) “*Master Municipal Construction Documents*” means the latest edition, as of the date of this *Agreement*, of the Master Municipal Construction Documents published by The Master Municipal Construction Documents Association. (Copies of the documents can be purchased from Support Services Unlimited, Suite 302, 1107 Homer Street, Vancouver, BC, V6B 2Y1, Tel. 681-0295, or obtained on-line from [www.mmcd.net](http://www.mmcd.net).)

(q) “*Other Consultant*” means a registered or licensed Professional Engineer, Architect or other specialist, other than the *Consultant*, engaged directly by the *Client* in connection with the Project.

(r) “*Project*” means the project identified on page 1 of this *Agreement*.

(s) “*Proposal*” means the formal or informal written submission, if any, made by the *Consultant* to the *Client* prior to the execution of this *Agreement* describing proposed scope of services to be provided by the *Consultant*, or portion of such submission, which is accepted by the *Client* and attached to this *Agreement* as Schedule D.

(t) “*Services*” means all services to be provided by the *Consultant* under this *Agreement*.

(u) “*Sub-Consultant*” means any registered or licensed Professional Engineer, Architect or other specialist such as, without limitation, any geotechnical, environmental, legal, accounting, insurance or bonding specialist, engaged by the *Consultant* in connection with the *Services*.

(v) “*Termination Expenses*” means expenses reasonably and necessarily incurred by the *Consultant* as a direct result of the termination of this *Agreement* or the suspension of the *Services*.

(w) “*Variable Remuneration Services*” means the *Services* where the cost of, and the time required for, the performance of such *Services* cannot be predicted to a reasonable level of accuracy by professionals experienced in providing services similar to the *Services*. For illustration, *Variable Remuneration Services* may include:

- (1) negotiating real property rights required for the Project;
- (2) participating in public consultation processes beyond the level of effort as may be defined in this *Agreement*;
- (3) providing *Field Services* beyond the level of effort as may be defined in this *Agreement*; and
- (4) Obtaining permits, licenses or approvals for the Project from authorities having jurisdiction.

(x) “*Work*” means the labour, materials and equipment to be supplied and incorporated into the *Project* by a *Contractor* under a *Contract*.

## **SCHEDULES 2.**

**Schedules** 2.1 2.1.1 The following schedules form a part of this *Agreement*:

- (a) Schedule A - Services
- (b) Schedule B - Fees
- (c) Schedule C - Insurance
- (d) Schedule D - Proposal (if any)
- (e) Schedule E – Other Conditions (if any)

## **SCOPE OF SERVICES 3.**

**Services** 3.1 3.1.1 The *Consultant* shall in accordance with this *Agreement* perform and provide the *Services* described in this *Agreement*.

**Basic Services** 3.2 3.2.1 Without limiting any other provision of this *Agreement*, the *Consultant* shall perform and provide the following *Basic Services*:

- (a) Review Requirements At the commencement of the performance of the *Services*, and from time to time during the performance of the *Services*, review the *Client’s* total requirements for the *Project*, and advise the *Client* if the requirements cannot be met within the *Client’s Project* budget and schedule.

(b) Suggest Alternatives If requested by the *Client* suggest alternatives or changes to reduce the costs of the proposed *Project* so that the *Client's Project* budget and schedule can be met.

(c) Review Client Data Generally review information and data provided by or through the *Client* to determine its sufficiency and applicability and immediately notify the *Client* of errors or deficiencies. The *Consultant* shall be entitled to rely on the accuracy and completeness of such information and data except to the extent it contains errors or deficiencies that would be obvious or apparent to a consultant qualified in British Columbia to perform services similar in scope, nature and complexity to the *Services*. The *Consultant* shall not be responsible for information or data provided by *Other Consultants*.

(d) Submit Reports Submit technical memoranda, reports and drawings to the *Client* as necessary throughout the course of providing the *Services* and generally keep the *Client* informed in a timely manner by way of written reports on all issues relevant to the *Services*, including progress of the *Services*, any anticipated cost overruns and delays, and on decisions required to be made by the *Client*.

(e) Notice of Other Consultants Advise the *Client* in a timely manner of any *Other Consultant* or *Sub-Consultant*, other than those identified in the *Proposal*, necessary for the performance of the *Services*. If the need for such *Other Consultant* or *Sub-Consultant* would not reasonably have been anticipated at the time of submitting the *Proposal* by a consultant qualified to perform services similar in scope, nature and complexity to the *Services*, then the *Client* shall pay the cost of any such additional *Other Consultant* or *Sub-Consultant*, but if such consultant would reasonably have anticipated the need for the *Other Consultant* or *Sub-Consultant* then the *Consultant* shall pay such costs. If the *Client* does not agree to the engagement of such *Other Consultant* or *Sub-Consultant*, then paragraph 10.7 shall apply.

(f) Access to Property Advise the *Client* as soon as practicable of any need for access to public or private properties necessary to enable the *Consultant* to perform its *Services*.



(g) Notice of Defects Respond promptly to *Client's* notices of apparent defects and deficiencies in the performance of the *Services*.

(h) Approvals, Licences and Permits Advise the *Client* in a timely manner of any necessary approvals, licences and permits required by authorities having jurisdiction, and provide to the *Client* the documentation required by authorities having jurisdiction in connection with such approvals, licences and permits. As *Work* proceeds, monitor compliance with the terms of such approvals, licences and permits and advise the *Client* of the extent of compliance.

**Services as Contract Administrator** 3.3

3.3.1 If the *Client* appoints the *Consultant* under Schedule A to act as the *Contract Administrator* under the *Master Municipal Construction Documents*, or to perform similar contract administration services under a *Contract* based on a form other than the *Master Municipal Construction Documents*, then the *Consultant* shall provide such contract administration services and shall act on behalf of the *Client* in that capacity, only to the extent expressly provided in the *Contract Documents*. Unless specifically provided otherwise in Schedule A:

(a) all such contract administration services shall be deemed to be *Basic Services*; and

(b) all contract administration services under this paragraph 3.3.1, whether provided as *Basic Services* or *Additional Services*, shall be paid for as *Variable Remuneration Services*.

3.3.2 If appointed by the *Client* to provide contract administration services as described in paragraph 3.3.1, the *Consultant* shall:

(a) immediately upon such appointment nominate in writing a person reasonably acceptable to the *Client* to undertake such services;

(b) without limiting any other provision of this *Agreement* or the *Contract Documents*, inform the *Client* promptly of any observed defects or deficiencies in the *Work* of the *Contractor* and any failure by the *Contractor* to otherwise meet the requirements under the *Contract*; and

(c) give the *Client* prompt notice of possible budget overruns

and shall update the construction cost projection monthly with progress draw approvals.

3.3.5 Nothing in the *Contract Documents* shall create any contractual relationship between the *Consultant* and the *Contractor*.

**Additional Services** 3.4

3.4.1 The *Consultant* may, at the *Consultant's* absolute discretion and without invalidating this *Agreement*, decline to take on any *Additional Services* requested by the *Client* under this *Agreement* which the *Consultant* decides are beyond the *Consultant's* normal fields of expertise.

3.4.2 The *Consultant* shall not undertake any *Additional Services* without the prior written approval of the *Client*. Prior to proceeding with any *Additional Services*, the *Consultant* and the *Client* shall agree on the scope of the *Additional Services* to be performed and the basis of payment. If the *Additional Services* consist of any *Variable Remuneration Services*, the *Consultant* shall provide the *Client* with a cost estimate breakdown for the performance of such *Variable Remuneration Services* prior to undertaking such *Services*. If the *Client* gives approval for the performance of the *Additional Services*, the *Consultant* shall not exceed the scope or the cost estimate accepted by the *Client* for the *Variable Remuneration Services* without first providing timely written notice to the *Client* setting out the revised scope and/or cost estimate and a reasonable justification for the increase in scope and/or costs. The *Consultant* shall not proceed to provide any *Additional Services* in excess of the *Client* approved scope and cost estimate without the *Client's* prior written approval.

**Standard of Service** 3.5

3.5.1 The *Consultant* shall undertake and perform all *Services* with such degree of care, skill and diligence as would reasonably be expected from a consultant qualified in British Columbia to perform services similar in scope, nature and complexity to the *Services*. The *Consultant* warrants and represents that the *Consultant* is qualified and has sufficient expertise and experience to perform expeditiously and efficiently all of the *Services* in a proper and professional manner to the standard set out above.

**Compliance with Laws** 3.6

3.6.1 In performing the *Services*, the *Consultant* shall in all respects comply with all applicable laws, rules, codes, regulations, bylaws, orders and ordinances of authorities having jurisdiction.

<b>Consultant's Representative</b>	3.7	3.7.1 Immediately upon execution of this <i>Agreement</i> , the <i>Consultant</i> shall designate in writing a representative to act as the <i>Consultant's</i> representative for the purposes of all communications with the <i>Client</i> under this <i>Agreement</i> , such representative to have authority to provide information to, and receive instructions from, the <i>Client</i> . The representative shall be available on a reasonably continuous basis during the performance of the <i>Services</i> , and for any periods when the representative is absent or unavailable a replacement with equivalent expertise and authority shall be appointed by the <i>Consultant</i> .
<b>Confidentiality</b>	3.8	3.8.1 The <i>Consultant</i> shall maintain confidentiality on all information, documentation and data provided by the <i>Client</i> to the <i>Consultant</i> or otherwise acquired by the <i>Consultant</i> during the course of carrying out the <i>Services</i> . Except with the prior written consent from the <i>Client</i> , or as required by law or an authority having jurisdiction, neither the <i>Consultant</i> , nor any of its employees, officers, agents, representatives or <i>Sub-Consultants</i> , shall divulge or disclose any of such information to third parties, or use any of such information for any purpose other than as required under this <i>Agreement</i> in connection with the <i>Project</i> .
<b>Sub-Consultants</b>	3.9	3.9.1 If the <i>Consultant</i> retains or employs any <i>Sub-Consultants</i> or other parties to assist in the performance of the <i>Services</i> , then the <i>Consultant</i> shall incorporate into any agreement with and shall bind such <i>Sub-Consultants</i> and other parties to all of the terms of this <i>Agreement</i> . The <i>Consultant</i> shall be responsible for such <i>Sub-Consultant's</i> and other parties' work, and for overseeing and coordinating such <i>Sub-Consultants'</i> or other parties' work.
<b>Key Personnel</b>	3.10	3.10.1 The <i>Consultant</i> shall maintain the key personnel as may be listed in the <i>Proposal</i> attached as Schedule D, or as otherwise specified in this <i>Agreement</i> , and shall not replace any of such key personnel without the <i>Client's</i> prior written agreement, which agreement shall not be unreasonably withheld or denied.
<b>Cooperation and Coordination</b>	3.11	3.11.1 The <i>Consultant</i> shall cooperate and coordinate with <i>Other Consultants</i> as necessary, but in no event, except as otherwise agreed in writing between the <i>Client</i> and the <i>Consultant</i> , shall the <i>Consultant</i> be responsible for the services or performance of any such <i>Other Consultants</i> .

**Hazardous Waste  
and Environmental  
Issues**

3.12

3.12.1 Unless otherwise specifically provided in this *Agreement*, the scope of *Basic Services* shall not include engineering services for the treatment or containment of *Hazardous Materials* or *Hazardous Materials* site remediation, and if provided, such services shall be considered *Additional Services*. The Client and the *Consultant* acknowledge and agree that such services require specialized knowledge and expertise, and consideration of additional provisions such as additional liability insurance.

**CLIENT'S DUTIES  
AND  
RESPONSIBILITIES  
TO THE  
CONSULTANT**

4.

**Duties and  
Responsibilities**

4.1

4.1.1 The *Client* shall:

(a) Description of Requirements Provide the *Consultant* with a written description of the *Client's* requirements for the *Project*, including, where applicable, the *Client's Project* budget and *Project* schedule.

(b) Disclose Data Unless otherwise provided in this *Agreement*, make reasonable efforts to disclose and make available to the *Consultant*, in a timely manner and at no cost to the *Consultant*, all information or data in the *Client's* possession or control relevant to the performance of the *Services*.

(c) Other Consultants When requested by the *Consultant* in writing, give due consideration to engaging, at the *Client's* own cost, *Other Consultants* as may be reasonably necessary for the *Consultant* to undertake the *Services*. The *Client* shall not have an obligation to retain any *Other Consultants* if requested to do so by the *Consultant*. All *Other Consultants* engaged by the *Client* at the *Consultant's* request shall be paid for by the *Client* and shall be reasonably acceptable to both the *Client* and the *Consultant*.

(d) Timely Decisions Give timely consideration to all requests from the *Consultant*, including requests for decisions required relating to the *Services*, and inform the *Consultant* of the *Client's* decisions and provide all feedback in a timely manner so as not to unduly delay the *Consultant's*

performance of the *Services*.

(e) Access to Property Arrange and make provision for the *Consultant's* reasonable and ready access to public and private properties as necessary for the *Consultant* to perform the *Services*.

(f) Notice of Observed Deficiencies Give prompt notice to the *Consultant* whenever the *Client* becomes aware of any apparent defects or deficiencies in the *Services*.

(g) Permits, Licences and Permits Obtain required approvals, licences and permits from authorities having jurisdiction so as not to unduly delay the *Consultant* in the performance of the *Services*.

<b>Client's Representative</b>	4.2	4.2.1 Immediately upon execution of this <i>Agreement</i> , the <i>Client</i> shall designate in writing a representative to act as the <i>Client's</i> representative, for the purposes of all communications with the <i>Client</i> under this <i>Agreement</i> , such representative to have authority to provide instructions to, and receive information from, the <i>Consultant</i> . The representative shall be available on a reasonably continuous basis during the performance of the <i>Services</i> , and for any periods when the representative is absent or unavailable a replacement with equivalent expertise and authority shall be appointed by the <i>Client</i> .
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<b>Confidentiality</b>	4.3	4.3.1 The <i>Client</i> shall maintain confidentiality on all information, documentation and data provided by the <i>Consultant</i> which is expressly identified in the <i>Proposal</i> or other provision of this <i>Agreement</i> , as being proprietary or confidential in nature. Except with the prior written consent from the <i>Consultant</i> , or as required by law or an authority having jurisdiction, neither the <i>Client</i> nor any of its employees, officers, agents, representatives or <i>Other Consultants</i> shall divulge or disclose any of such information to third parties, or use any of such information for any purpose other than as required under this <i>Agreement</i> in connection with the <i>Project</i> .
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## **FEES, RATES AND DISBURSEMENTS 5.**

<b>Fees</b>	5.1	5.1.1 The <i>Client</i> shall pay the <i>Consultant</i> the fees described in Schedule B as compensation for the <i>Services</i> provided by the <i>Consultant</i> .
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5.1.2 The fees for *Defined Remuneration Services*, whether rendered as *Basic Services* or *Additional Services*, may be, on written agreement by the parties, either a lump sum fee or a fee based on the actual hours reasonably expended in performing such *Defined Remuneration Services* at the hourly charge out rates set out in Schedule B, but shall not exceed the maximum amount, if any, specified in Schedule B.

5.1.3 The fees for *Variable Remuneration Services*, whether rendered as *Basic Services* or *Additional Services*, shall be based on the actual hours reasonably expended in performing such *Variable Remuneration Services* at the hourly charge out rates as set out in Schedule B, but shall not exceed the maximum amount, if any, as estimated and approved under paragraph 6.3.

**Disbursements**      5.2

5.2.1 In addition to other amounts payable to the *Consultant* for the *Services* under this *Agreement*, the *Client* shall pay the *Consultant* the *Consultant's* actual out of pocket costs for the items set out below, as reasonably incurred by the *Consultant* or the *Sub-Consultants* to perform the *Services* and substantiated by supporting invoices reasonably acceptable to the *Client* (called in the aggregate the “*Disbursements*”), plus, unless specified otherwise in this *Agreement*, a 10% markup on all *Disbursements*. *Disbursements* means the costs of:

- (a) Reproduction of documents including reports or submissions to the *Client* or authorities having jurisdiction, and tender and construction documents;
- (b) Messenger or courier services, long distance telephone calls, faxes and postage;
- (c) Advertising on behalf of the *Client*, with the *Client's* prior written approval;
- (d) Travel expenses, with the *Client's* prior written approval;
- (e) Fees, including user fees, paid to authorities having jurisdiction in order to obtain necessary approvals, permits or licenses;
- (f) Fees paid to any authority having jurisdiction in order to obtain any required record information or data;
- (g) Federal, provincial or municipal taxes paid by the

*Consultant* in respect of the *Services*;

(h) Testing and laboratory services;

(i) Additional insurance required by the *Client* in excess of the insurance coverage specified in this *Agreement*;

(j) Expenses to provide, operate and maintain a *Project* site office, with the *Client's* prior written approval;

(k) Expenses to provide and operate specialized equipment of a kind not normally used by consultants providing services similar in nature and scope to the *Services*, with the *Client's* prior written approval, including, where requested by the *Client*, the applicable charge-out rates and an estimated total cost of using such equipment;

(l) Expenses to provide digitized data or transparency reproduction of plans, drawings, designs or models, if requested by the *Client*;

(m) Items specifically identified in Schedule B;

(n) Other costs reasonably incurred by the *Consultant* in the performance of the *Services* with the prior written approval of the *Client*.

### **Sub-Consultants      5.3**

5.3.1 In addition to any other amounts payable by the *Client* to the *Consultant* under this *Agreement*, the *Client* will reimburse the *Consultant* for the fees and *Disbursements* the *Consultant* pays to *Sub-Consultants* as follows:

(a) Lump Sum Fees If a *Sub-Consultant* undertakes *Services* which the *Client* and the *Consultant* have agreed will be paid for on a lump sum basis, whether undertaken as *Basic Services* or *Additional Services*, then all fees payable by the *Client* will be included in the lump sum, and no additional amount will be payable by the *Client* on account of the *Sub-Consultant's* fees the *Consultant* pays to the *Sub-Consultant*;

(b) Hourly Rate Fees If a *Sub-Consultant* undertakes *Services* which the *Client* and the *Consultant* have agreed will be paid for based on the actual hours expended in performing such *Services*, whether undertaken as *Basic Services* or *Additional Services*, then the *Client* will reimburse the *Consultant* for the actual amount of fees the *Consultant* pays to the *Sub-Consultant*, plus a markup of 5% on the *Sub-Consultant* fees;

(c) Disbursements In addition to the fees as described in subparagraph (a) and (b) above, the *Client* will reimburse the *Consultant* for amounts the *Consultant* pays a *Sub-Consultant* for *Disbursements*, without markup to the *Consultant*. (A *Sub-Consultant* may claim its actual out of pocket costs of *Disbursements* as reasonably incurred in undertaking the *Services*, plus the markup specified in paragraph 5.2.1, or other markup as specified otherwise in this *Agreement*, on all such *Disbursements*.)

## **PAYMENT 6.**

### **Payment Procedures 6.1**

6.1.1 Each month, the *Consultant* shall submit to the *Client* an invoice for the *Consultant's* fees and *Disbursements*, and any charges of *Sub-Consultants* retained by the *Consultant* upon the *Client's* request as provided in this *Agreement*. Each invoice will be accompanied by supporting documentation as may reasonably be required by the *Client*.

6.1.2 The *Client* shall pay such invoices in full within thirty (30) calendar days of receipt. If the *Client* reasonably determines that the full amount of an invoice is not owing then the *Client* will pay the amount it determines is owing, and forthwith provide the *Consultant* with written reasons for any deduction in the amount of the invoice.

6.1.3 Accounts unpaid by the *Client* thirty (30) calendar days after presentation shall bear monthly interest calculated at 2% per annum over the prime commercial lending rate of the Royal Bank of Canada, which amount shall be due and payable until payment. Such interest shall be calculated and added to any unpaid amounts monthly.

### **Defined Remuneration Services 6.2**

6.2.1 Monthly claims for *Defined Remuneration Services* shall be based either on the actual hours of work performed by the *Consultant* and *Sub-Consultants*, or the percentage of the *Services* completed, depending on the manner of compensation agreed upon by the parties under paragraph 5.1.2, but the aggregate of all such claims shall not exceed the maximum amount, if any, specified in Schedule B. If compensation for *Defined Remuneration Services* is agreed by the parties to be based on actual hours of work performed as provided in paragraph 5.1.2, the *Consultant* shall keep, or cause to be kept, timesheets to support the hourly effort and shall make them available for review by the *Client* upon



request.

**Variable  
Remuneration  
Services**      6.3

6.3.1 Without limiting any other provision of this *Agreement*, the *Consultant* shall keep separate records of the hours and *Disbursements* applicable to the provision of any *Variable Remuneration Services* and, unless otherwise agreed in writing between the parties, shall submit to the *Client* a weekly summary, within 3 *Business Days* after the end of each week, setting out the *Variable Remuneration Services* performed in the previous week and applicable fees, together with an updated projection of *Variable Remuneration Services* still to be provided and the estimated fees and *Disbursements* to completion. If the *Client* does not dispute the fees set out in the summary by written notice to the *Consultant* within 7 *Business Days* of receipt, the fees and the updated projection will be deemed to be accepted by the *Client* and the fees and *Disbursements* shall be invoiced and paid in accordance with paragraph 5.

6.3.2 The *Consultant* shall not undertake any *Variable Remuneration Services*, whether or not identified in Schedule A, without the prior written approval from the *Client*. Prior to proceeding with any *Variable Remuneration Services*, the *Consultant* shall provide the *Client* with a description of the scope of the *Variable Remuneration Services* to be performed and a cost estimate breakdown for the performance of such *Variable Remuneration Services*. If the *Client* grants its permission for the performance of such *Variable Remuneration Services*, the *Consultant* shall not exceed the scope or the cost estimate accepted by the *Client* without first providing timely written notice to the *Client* setting out the revised scope and/or cost estimate and a reasonable justification for the increase in scope and/or costs. The *Consultant* shall not proceed to provide *Variable Remuneration Services* in excess of the *Client* approved scope and cost estimate without the *Client*'s prior written approval.

**OWNERSHIP AND  
USE OF  
DOCUMENTS**      7.  
**Service Continuity**      7.1

7.1.1 The *Client* acknowledges that all plans, specifications, drawings and designs are provided by the *Consultant* to the *Client* on the assumption that the *Consultant* will continue with the *Services* during construction and installation relating to such plans, specifications, drawings or designs. Accordingly, such plans, specifications, drawings and designs may not be sufficient or reliable on their own in the absence

of such continuity of *Services*. The *Client* shall give due consideration to continuing with the *Consultant's Services* during construction and installation and shall consult with the *Consultant* prior to retaining any party other than the *Consultant* to continue the *Services* during construction and installation. If the *Consultant* is not retained to provide services during construction and installation then the *Consultant* shall not be liable in contract or in tort for any loss or damage incurred as a result of any defect or deficiency in any plans, specifications, drawings or designs provided by the *Consultant* to the *Client*, except where such defect or deficiency would be obvious or apparent to an experienced professional performing services similar to the *Services*.

## **Ownership      7.2**

7.2.1 All concepts, plans, drawings, specifications, designs, models, reports, photographs, computer software, surveys, calculations, construction and other data, documents, and processes produced by the *Consultant* in connection with the *Project* (the “*Instruments of Service*”), including all copyright and other intellectual property therein, are and shall at all times remain the property of the *Consultant* unless otherwise agreed in writing between the parties.

7.2.2 The *Client* may copy and use any of the *Instruments of Service* for record and maintenance purposes and for any future renovation, repair, modification and extension work undertaken with respect to that part of the *Project* to which the *Services* relate.

7.2.3 In no event shall the *Client* copy or use any of the *Instruments of Service* for any purpose other than those noted above or in relation to any project other than the *Project* without the prior written permission of the *Consultant*. The *Consultant* shall not unreasonably withhold or deny such consent but shall be entitled to receive additional equitable remuneration in connection with its grant of consent.

7.2.4 The *Client* shall have a permanent non-exclusive royalty-free license to use any *Instruments of Service* which is capable of being patented or registered as a trademark for the life of the *Project* only. For the purposes of this paragraph, “life of the *Project*” means the period during which the physical asset or assets described on page 1 of this *Agreement* are designed, under construction or operational. The *Consultant* shall have full rights to any *Instruments of Service* arising from his *Services* which is capable of being patented or registered as a trademark and may use any such

*Instruments of Service* on any other project.

<b>Changes to Instruments of Service</b>	7.3	7.3.1 The <i>Client</i> accepts full responsibility for any changes made to any <i>Instruments of Service</i> without the prior written consent of the <i>Consultant</i> and shall indemnify and hold harmless the <i>Consultant</i> from any claims arising from use of such changed <i>Instruments of Service</i> .
<b>INSURANCE AND LIABILITY</b>	<b>8.</b>	
<b>General Insurance Requirements</b>	8.1	<p>8.1.1 The <i>Consultant</i> shall obtain and maintain insurance policies as specified in Schedule C of this <i>Agreement</i>.</p> <p>8.1.2 The above insurance policies shall be approved by the <i>Client</i> prior to commencement of the <i>Services</i>, and the <i>Consultant</i> shall provide the <i>Client</i> with satisfactory evidence of such insurance at any time upon request.</p> <p>8.1.3 All policies shall contain a cancellation clause requiring the insurer to give at least 30 days' written notice to the <i>Client</i> prior to policy cancellation.</p> <p>8.1.4 Should the <i>Consultant</i> neglect to obtain or maintain insurance as required under this <i>Agreement</i>, or to provide satisfactory evidence of such insurance to the <i>Client</i> upon request, the <i>Client</i> may elect to either secure such insurance, at the <i>Consultant's</i> cost and without terminating this <i>Agreement</i>, in which event the <i>Consultant</i> shall reimburse the <i>Client</i> immediately upon demand for any costs reasonably incurred by the <i>Client</i> in that connection, or declare the <i>Consultant</i> to be in default, in which event the provisions of paragraph 10.1 shall apply.</p>
<b>Additional Insurance</b>	8.2	8.2.1 If the <i>Client</i> for any reason requires the <i>Consultant</i> to obtain insurance in addition to that required under this <i>Agreement</i> , the <i>Consultant</i> shall use its best efforts to obtain such additional insurance. The <i>Client</i> will pay the premiums owing for such additional insurance.
<b>Limits of Liability</b>	8.3	8.3.1 In consideration of the provision of the <i>Services</i> by the <i>Consultant</i> to the <i>Client</i> under this <i>Agreement</i> , the <i>Client</i> agrees that any and all claims which the <i>Client</i> may have against the <i>Consultant</i> , its employees, officers, agents, representatives and <i>Sub-Consultants</i> in respect of the <i>Services</i> , howsoever arising, whether in contract or in tort, save and except for claims arising out of or in connection

with any malicious act or malicious omission under paragraph 9.1.1, shall be absolutely limited to the amount of the insurance available at the date such claim is brought, including any deductible portion therein, provided that neither the *Consultant* nor any of its employees, officers, agents, representatives nor *Sub-Consultants* has done anything to prejudice or impair the availability of such insurance.

8.3.2 In no event shall the *Consultant* be liable for any loss or damage occasioned by delays or other causes or circumstances beyond the *Consultant's* reasonable control.

## **INDEMNITY 9.**

- 9.1.1 Notwithstanding the provision of any insurance coverage by the *Client*, and subject to paragraphs 8.3.1 and 8.3.2, the *Consultant* shall indemnify and save harmless the *Client*, its officers, employees, agents, successors, assigns, representatives, *Contractors* and *Other Consultants* from and against any losses, claims, damages, actions and causes of action, costs, expenses, judgments and proceedings arising out of or in connection with any error, or negligent or malicious act or omission, by the *Consultant* or any of its officers, agents, representatives, employees or *Sub-Consultants*, except to the proportionate extent of any contributing negligent or wrongful act or omission of the *Client*, or any of its officers, agents, representatives, employees, *Contractors* or *Other Consultants*. The terms and conditions of this indemnity provision shall survive the completion of all *Services* and the termination of this *Agreement* for any reason.

## **SUSPENSION AND TERMINATION 10.**

- By Client due to  
Default of the  
Consultant** 10.1 10.1.1 If the *Consultant* is in default in the performance of any of the *Consultant's* material duties and responsibilities under this *Agreement*, then the *Client* may, by written notice to the *Consultant*, require such default to be corrected. If within 5 *Business Days* after receipt of such notice, such default shall not have been corrected or reasonable steps to correct such default shall not have been taken, the *Client* may, without limiting any other right or remedy the *Client* may have, give a further written notice to the *Consultant* to terminate this *Agreement*. In the event of such termination the *Client* shall pay for the cost of the *Services* rendered and *Disbursements* incurred by the *Consultant* pursuant to this

*Agreement* and remaining unpaid as of the effective date of such termination. Notwithstanding the above, the *Client* may deduct from amounts owing to the *Consultant* any reasonable additional costs and expenses incurred as a result of the *Consultant's* default, and if the payments owing to the *Consultant* are not sufficient to cover such costs then the *Consultant* shall immediately pay the *Client* the shortfall. In the event of termination for default, *Termination Expenses* shall not be payable by the *Client*.

**By the Consultant  
due to Default of the  
Client**

10.2

10.2.1 If the *Client* fails to make payment to the *Consultant* in accordance with this *Agreement*, then the *Consultant* may, by written notice to the *Client*, require that such default be corrected. If within 5 *Business Days* after receipt of such notice such default shall not have been corrected, or reasonable steps taken to correct such default, the *Consultant* may, without limiting any other right or remedy he may have, give a further written notice to the *Client* to terminate immediately this *Agreement*. In such event, in addition to any other rights or remedies the *Consultant* may have, the *Consultant* shall be paid by the *Client* for all *Services* performed and for all *Disbursements* incurred pursuant to this *Agreement* and remaining unpaid as of the effective date of such termination, plus *Termination Expenses*. In the event of any other default by the *Client*, the *Consultant* shall only have the right to claim damages, but not the right to terminate this *Agreement*.

**By the Client for  
Own Reasons**

10.3

10.3.1 The *Client* has the right to suspend or terminate further performance of all or any portion of the *Services* at any time, for convenience or any other reason, by written notice to the *Consultant*. Upon receipt of such notice, the *Consultant* shall immediately discontinue the performance of the *Services* as instructed, whether being performed by the *Consultant* or any *Sub-Consultants*, except to the extent that those *Services* are reasonably necessary to comply with the *Client's* instructions, and shall preserve and protect all work in progress and all completed work. Any contracts relating to the *Services* entered into by the *Consultant* with a third party including a *Sub-Consultant*, shall, at the written request of the *Client*, be assigned to the *Client*.

10.3.2 In the event of suspension or termination under paragraph 10.3.1, the *Client* shall, in addition to any other rights or remedies the *Consultant* may have, pay the *Consultant* for that portion of the *Services* satisfactorily performed or completed to the date of the notice, including *Disbursements* incurred as provided under this *Agreement*, plus *Termination Expenses*.

- |  |      |   |
|--|------|---|
| <b>By Mutual Consent</b>   | 10.4 | 10.4.1 If the <i>Project</i> is terminated by mutual consent of the parties, the <i>Consultant</i> shall be paid by the <i>Client</i> for all <i>Services</i> performed, and for all <i>Disbursements</i> incurred pursuant to this <i>Agreement</i> and remaining unpaid as of the effective date of such termination, plus <i>Termination Expenses</i> .  |
| <b>By the Consultant<br/>due to Client's<br/>Suspension in Excess<br/>of 60 Days</b> | 10.5 | 10.5.1 If the <i>Services</i> are suspended by the <i>Client</i> at any time for more than 60 calendar days, either consecutive or in the aggregate, through no fault of the <i>Consultant</i> , then the <i>Consultant</i> may, at any time until such suspension is lifted by the <i>Client</i> , give written notice to the <i>Client</i> of termination due to suspension. If within 15 <i>Business Days</i> after receipt of such notice such suspension has not been lifted, the <i>Consultant</i> may, without limiting any other right or remedy the <i>Consultant</i> may have, give a further written notice to the <i>Client</i> to terminate this <i>Agreement</i> . In such event the <i>Consultant</i> shall be paid by the <i>Client</i> for all <i>Services</i> performed and for all disbursements incurred pursuant to this <i>Agreement</i> and remaining unpaid as of the effective date of such suspension, plus <i>Termination Expenses</i> . |
| <b>Death or Incapacity</b>   | 10.6 | 10.6.1 If a party to this <i>Agreement</i> is an individual and dies or becomes incapacitated before completing the <i>Services</i> under this <i>Agreement</i> , this <i>Agreement</i> shall automatically terminate as of the date of the said death or incapacity, and payment shall be made in accordance with this <i>Agreement</i> for the <i>Services</i> performed and <i>Disbursements</i> incurred pursuant to this <i>Agreement</i> and remaining unpaid as of the effective date of termination.  |
| <b>Failure to Engage<br/>Other Consultants or<br/>Sub-Consultants</b>                | 10.7 | 10.7.1 If the <i>Client</i> does not give approval for the engagement of an <i>Other Consultant</i> or <i>Sub-Consultant</i> that under paragraph 3.2.1(e) the <i>Consultant</i> has advised the <i>Client</i> is necessary for the performance of the <i>Services</i> , then the <i>Consultant</i> may give 5 <i>Business Days</i> written notice of intended termination to the <i>Client</i> describing why the engagement of the <i>Other Consultant</i> or <i>Sub-Consultant</i> , as the case may be, is essential for the <i>Consultant</i> to perform the   |

*Services*, and if the *Client* has failed or refused to engage the *Other Consultant* or *Sub-Consultant* then on further written notice to the *Client* the *Consultant* may terminate this *Agreement*.

## **DISPUTE RESOLUTION 11.**

**Purpose** 11.1 11.1.1 The purpose of this paragraph is to establish a process whereby any dispute or difference of opinion under or in connection with this *Agreement* can be resolved in a fair, efficient and cost-effective manner.

**Amicable  
Negotiation** 11.2 11.2.1 Both parties shall use their best efforts to resolve any dispute or difference of opinion under or in connection with this *Agreement* by good faith amicable negotiations on a “without prejudice” basis, and shall provide frank, candid and timely disclosure of all relevant facts, information and documents to facilitate negotiations.

**Mediation** 11.3 11.3.1 If the dispute or difference of opinion is not resolved to the reasonable mutual satisfaction of the parties within 10 *Business Days* of the commencement of negotiations, or within such longer period as may be agreed to by the parties, the dispute or difference of opinion shall be submitted to mediation. Both parties agree not to make a request for arbitration or to commence litigation without first seeking agreement through the mediation process.

11.3.2 Mediation shall consist of structured, non-binding negotiations with the assistance of a mediator on a “without prejudice” basis. The mediator shall be appointed by agreement of the parties and shall be impartial and free from any actual or apparent conflict of interest. Failing such agreement, the mediator shall be appointed by the Executive Director of the Master Municipal Construction Document Association.

11.3.3 The costs of mediation shall be shared equally by both parties.

**Arbitration or  
Litigation** 11.4 11.4.1 If the dispute or difference of opinion is not resolved to the reasonable mutual satisfaction of both parties within 30 calendar days of the appointment of the mediator, or within such longer time as may be mutually agreed to by the parties, the dispute or difference of opinion may, upon the mutual written agreement of the parties, be submitted to binding arbitration in accordance with the laws of the Province of

British Columbia. If the parties do not agree to arbitration, each party shall be free to commence litigation without further notice.

**Disputed Fees**      11.5      11.5.1 If the dispute relates to the *Consultant's* fees or disbursements under this *Agreement*, the *Client* shall be entitled to withhold the amount of fees and/or disbursements which are in dispute and the balance of the fees and disbursements not in dispute shall be paid by the *Client* in accordance with this *Agreement*.

**GENERAL      12.**

**Notices**      12.1      12.1.1 All notices under this *Agreement* shall be in writing and delivered by hand, fax or pre-paid registered mail to the recipient's designated representative at the address set out on page 1 of this *Agreement*, and shall be considered to have been received:

- a) immediately upon delivery, if delivered by hand; or
- b) immediately upon transmission, if sent by fax, provided a confirmation has been received; or
- c) 3 *Business Days* from date of mailing, if sent by pre-paid registered mail.

12.1.2 Either party may, at any time, change its address for notice by giving written notice to the other party in accordance with this *Agreement*.

**Assignment and Successors**      12.2      12.2.1 Neither party shall assign this *Agreement*, or any portion of this *Agreement*, without the prior written consent of the other party.

12.2.2 If a party to this *Agreement* who is an individual or partnership should desire to bring in a partner or partners, it may do so, and such a change shall not be deemed to be a breach of this *Agreement*, provided that the other party is first notified in writing. The new or altered entity so created shall be deemed a successor entity to share the benefits and obligations of this *Agreement*.



12.2.3 If a party to this *Agreement* is a partnership, and a partner thereof either dies or retires then the remaining partner(s) therein shall be deemed a new successor entity to share the benefits and obligations of this *Agreement*.

<b>Rights and Remedies</b>	12.3	<p>12.3.1 The duties and obligations imposed by this <i>Agreement</i> and the rights and remedies available under this <i>Agreement</i> shall be in addition to and not in substitution for any duties, obligations, rights and remedies otherwise imposed by or available at law or equity.</p> <p>12.3.2 No action or failure to act by either party shall constitute a waiver by that party of any of its rights or remedies, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach under this <i>Agreement</i>.</p>
<b>Conflicts of Interest</b>	12.4	<p>12.4.1 The <i>Consultant</i> declares and confirms that it has no pecuniary or other interest in the business of any third party that would cause a conflict of interest or be seen to cause a conflict of interest in performing the <i>Services</i>. If any such conflict of interest occurs during the term of this <i>Agreement</i>, then the <i>Consultant</i> shall immediately declare it in writing to the <i>Client</i> and, at the direction of the <i>Client</i>, the <i>Consultant</i> shall promptly and diligently take steps to the satisfaction of the <i>Client</i> to resolve the conflict.</p>
<b>Independent Contractor</b>	12.5	<p>12.5.1 The <i>Consultant</i> shall be, and in all respects be deemed to be, an independent contractor and nothing in this <i>Agreement</i> shall be construed to mean that the <i>Consultant</i> is an employee of the <i>Client</i> or that any joint venture or partnership exists between the <i>Consultant</i> and the <i>Client</i>.</p>
<b>Governing Law</b>	12.6	<p>12.6.1 This <i>Agreement</i> shall be interpreted and construed according to the laws of British Columbia.</p>
<b>Headings</b>	12.7	<p>12.7.1 The headings included in this <i>Agreement</i> are for convenience only and do not form part of this <i>Agreement</i> and will not be used to interpret, define or limit the scope or intent of this <i>Agreement</i>.</p>
<b>Number</b>	12.8	<p>12.8.1 Unless otherwise specified, words importing the singular, include the plural and vice versa.</p>
<b>Enurement</b>	12.9	<p>12.9.1 This <i>Agreement</i> shall be binding upon and enure to the benefit of the parties hereto and their respective executors, administrators, successors and assigns.</p>

**Entire Agreement**    12.10    12.10.1    This *Agreement* constitutes the entire agreement between the parties relating to the matters covered in this *Agreement* and supersedes all prior agreements, negotiations, understandings and representations between the parties, whether written or oral, relating to the subject matter hereof unless specifically provided otherwise in this *Agreement*.

**Unenforceability**    12.11    12.11.1    If any provision of this *Agreement* is found to be invalid, illegal or unenforceable, it shall be severed from this *Agreement* and any such severance shall not affect the validity, legality or enforceability of the remaining provisions of this *Agreement*.

**Conflicting Provisions**    12.12    In the event of a conflict or ambiguity between a provision of Schedule D and another provision of this *Agreement*, including Schedules A, B, C or E of this *Agreement*, such other provision will prevail over the provision of Schedule D to the extent of the conflict or ambiguity.

**OTHER CONDITIONS    13.    See Schedule E.**

IN WITNESS WHEREOF the parties hereto have executed this *Agreement* the day and year first written above.

*Consultant:*

\_\_\_\_\_  
(FULL LEGAL NAME OF CORPORATION, PARTNERSHIP OR INDIVIDUAL)

\_\_\_\_\_  
(AUTHORIZED SIGNATORY)

\_\_\_\_\_  
(AUTHORIZED SIGNATORY)

*Client:*

\_\_\_\_\_  
(FULL LEGAL NAME OF CLIENT)

\_\_\_\_\_  
(AUTHORIZED SIGNATORY)

\_\_\_\_\_  
(AUTHORIZED SIGNATORY)

## Schedule A

### **SERVICES**

A.1 The *Consultant* shall perform the following services as *Basic Services* under this *Agreement*:

A.1.1 *Defined Remuneration Services*:

A.1.2 *Variable Remuneration Services*:

## Schedule B

### **FEES**

- B.1 The *Client* shall pay the *Consultant* for *Defined Remuneration Services* as follows:
  
  
  
  
  
  
  
  
  
  
- B.2 The *Client* shall pay the *Consultant* for *Variable Remuneration Services* in accordance with the following hourly charge out rates:
  
  
  
  
  
  
  
  
  
  
- B.3 The *Disbursement* items referred to in paragraph 5.2.1(m), if any, shall be as follows:

Schedule C

**INSURANCE**

**Professional  
Liability Insurance**

C.1 C.1.1 The *Consultant* shall obtain and maintain for the duration of the *Services* and for a minimum of 1 year thereafter, at its own cost, Professional Liability Insurance on terms and from an insurer satisfactory to the *Client*.

C.1.2 The Professional Liability Insurance policy shall insure the *Consultant's* legal liability for errors, omissions and negligent acts, to the extent of no less than:

\$500,000.00 per claim  
\$1,000,000.00 aggregate

**General Liability  
Insurance**

C.2 C.2.1 The *Consultant* shall obtain and maintain for the duration of the *Services*, at its own cost, the following insurance, on terms and from insurers satisfactory to the *Client*:

- a) Comprehensive General Liability coverage, covering premises and operations liability;
- b) Consultant's Contingency Liability coverage, covering operations of *Sub-Consultants*;
- c) Completed Operations Liability coverage;
- d) Contractual Liability coverage; and
- e) Owned and Non-owned Automobile Liability Insurance coverage.

C.2.2 The limits of coverage shall not be less than the following:

- (a) Bodily Injury Liability - \$2,000,000.00 each occurrence; \$2,000,000.00 aggregate products and/or completed operations
- b) Property Damage Liability - \$2,000,000.00 each occurrence; \$2,000,000.00 aggregate products and/or completed operations

- c) Owned & Non-owned Automobile - \$2,000,000.00  
any one accident

C.2.3 A Cross Liability clause shall be made part of the Comprehensive General Liability Insurance.

Schedule D

**PROPOSAL**

(see attached)

## Schedule E

### **ARTICLE 13 - OTHER CONDITIONS**

The following provisions, if any, constitute Article 13 of this *Agreement* and amend, modify and supplement Articles 1 through 12 of this *Agreement* to the extent required. In the event of any conflict or inconsistency between the provisions of this Schedule E and any provision of Articles 1 through 12 of this *Agreement*, the provisions of this Schedule E shall prevail to the extent of that conflict or inconsistency.

13.1



# ABCFP/APEGBC/CAB PROFESSIONAL PRACTICE GUIDELINES – LEGISLATED RIPARIAN ASSESSMENTS IN BC

## DRAFT

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## 1.0 FOREWORD

These Professional Practice Guidelines – Legislated Riparian Area Assessments in BC (referred to herein as the Guidelines) were prepared by a team comprising members of the College of Applied Biologists (the College) and the Association of Professional Engineers and Geoscientists of BC (APEGBC) with input from the Association of BC Forest Professionals (ABCFP), the BC Institute of Agrologists (BCIA) and the Applied Science Technologists and Technicians of BC (ASTTBC). In this document, these are collectively referred to as the Associations. A review group included *member* practitioners and representatives of the British Columbia Ministry of Forests, Lands and Natural Resource Operations (MFLNRO). Appendix A contains a list of authors and reviewers.

British Columbia continues to grow in population. There is increased pressure for various forms of development (e.g., residential, commercial or industrial activities) that can have a direct impact on riparian areas. In 2001, the Streamside Protection Regulation (B. C. Reg 10/2001) was enacted to protect riparian areas from impacts due to new *development*. In 2005, the Streamside Protection Regulation was repealed and replaced by the Riparian Areas Regulation. To take effect, the Riparian Areas Regulation must be adopted in the form of bylaws or policies by *local government*. Once adopted, the Riparian Areas Regulation requires that a *riparian assessment* be completed by a *Qualified Environmental Professional* before a development permit can be issued for *development* within a *riparian assessment area*.

These Guidelines were developed in response to issues raised with respect to the carrying out of *riparian assessments*. These issues included matters related to the respective roles and responsibilities of various registered professionals involved in a *riparian assessment*. Until now, while assessment methods have been appended to the regulation, professional practice guidelines for *riparian assessments* have not been available.

A need for professional guidelines was initially identified both by MFLNRO and by some practitioners soon after enactment of the Riparian Areas Regulation (2005), when *riparian assessments* became a requirement in the communities that had adopted riparian protection bylaws. In 2013, the College, APEGBC, ABCFP, BCIA and ASTTBC were contacted by the Office of the Ombudsperson, Province of British Columbia, to provide input on the investigation being carried out by that Office. The investigation was initiated in order to examine how the province has administered the Riparian Areas Regulation since it was enacted in 2005. One of the major areas for concern was the professional reliance model central to the Riparian Areas Regulation, and whether MFLNRO was providing adequate oversight. As part of the consultation process, the above referenced professional regulatory bodies identified that the Ombudsperson should include as one of the recommendations that professional practice guidelines be developed to provide guidance on conducting professional assessments under the Riparian Areas Regulation in a manner which meets the *Qualified Environmental Professional's* professional obligations under the professional legislation.

Subsequently, in March 2014, the Office of the Ombudsperson, Province of British Columbia, issued a report entitled *Striking a Balance: The Challenges of using a professional reliance model in environmental protection – British Columbia's Riparian Areas Regulation*.

*Recommendation 7 in the Ombudsperson's report states the following:*

*"I recommended that the Ministry of Forests, Lands and Natural Resource Operations work with professional associations to draft professional guidelines for use by individuals who conduct*

*assessments under the Riparian Areas Regulation that are designed to constitute an enforceable standard of professional conduct.”*

*The Ministry of Forests, Lands and Natural Resource Operations has accepted this recommendation.*

As a result of the Ombudsperson’s recommendation, the Associations have worked together to develop a professional practice guideline modelled on others previously developed by the APEGBC and ABCFP for various professional activities. Ministry of Forests, Lands and Natural Resource Operations provided additional technical assistance and funding.

These Guidelines have been written with the intention of guiding professional practice when carrying out *riparian assessments* pursuant to the Riparian Areas Regulation. They provide the basis for meeting an appropriate professional standard of practice when carrying out *riparian assessments* that are consistent with the Regulation. It should be noted that the specific assessment methodology employed for the Riparian Areas Regulation requires a specific approach that differs from broader evaluations of fisheries values required for other purposes.

Appendix C outlines the legislative and regulatory framework relevant to carrying out such assessments. The objectives of the Riparian Areas Regulation, enacted under the *Riparian Areas Protection Act*, is to ensure that in the *local governments* where it applies, riparian areas are considered and protected as part of any *development* process which could impact them. Riparian areas include the *stream* banks and the trees and vegetation growing on the *stream* banks. These are essential to maintaining the health of *streams* and in turn the fish that live in them, such as salmonids.

## 2.0 DEFINITIONS

The definitions in this section are specific to these Guidelines. For terms that are also in the Regulation, the definitions here align with definitions for the same terms in the Regulation.

*Note: blue italicized references denote definitions that come from the Regulation.*

### **Active floodplain** *(from Riparian Areas Regulation)*

An area of land that supports *floodplain plant species* and is

- (a) adjacent to a *stream* that may be subject to temporary, frequent or seasonal inundation, or
- (b) within a boundary that is indicated by the visible *high water mark*;

### **Agreement**

A contract or terms of engagement, whether formal (written) or informal (verbal or implied), between the *client* and the *Qualified Environmental Professional*, or his/her company, for conducting a *riparian assessment*.

### **Approving Authority**

Approving officer of a local, provincial or First Nation government with the authority to authorize *development*.

### **Assessment methods**

The methods set out in Schedule A of the Regulation

### **Assessment report**

A report prepared in accordance with the *assessment methods* to assess the potential impact of a proposed *development* in a *riparian assessment area* and establishes the size of the *Streamside Protection and Enhancement Area*. The report is certified for the purposes of the Regulation by the *Qualified Environmental Professional*.

### **Client**

A party who engages a *member* to conduct a *riparian assessment*. For the purpose of these Guidelines this could include a *local government*, the *land owner*, or an individual or company retained by a *land owner* to plan and oversee development of a parcel of land or to look after the affairs of the land. For example, this individual or company may be an Architect, a BC Land Surveyor, a Civil (Land Development) Engineer, a Land Use Planner, a consultant, a contractor, a Realtor or a family member.

### **Covenant**

A registered agreement, established by the Land Title Act (Section 219), between a *land owner* and the local or provincial government that sets out certain conditions for a specific property with regards to building use, building location, land use, property subdivision and property sale.

**Development** *(from Riparian Areas Regulation)*. NOTE: some *local government* bylaws for this regulation have a different definition.

Any of the following associated with or resulting from the *local government* regulation or approval of residential, commercial or industrial activities or ancillary activities to the extent that they are subject to *local government* powers under Part 14 of the *Local Government Act*:

- (a) removal, alteration, disruption or destruction of vegetation;

- (b) disturbance of soils;
- (c) construction or erection of buildings and structures;
- (d) creation of non-structural impervious or semi-impervious surfaces;
- (e) flood protection works;
- (f) construction of roads, trails, docks, wharves and bridges;
- (g) provision and maintenance of sewer and water services;
- (h) development of drainage systems;
- (i) development of utility corridors;
- (j) subdivision as defined in section 872 of the *Local Government Act*.

**Development proposal** (*from Riparian Areas Regulation*)

Any *development* that is proposed in a *riparian assessment area* that is within or partly within the boundaries of an area administered by a *local government*.

**Environmental monitoring**

The service provided by a person(s) to assure construction activities comply with environmental management and protection provisions so that no *HADD* occurs during the site works or on completion of *development*. It involves:

- site visits during the work to check that worksite procedures are not adversely affecting fish or fish habitat including killing or stranding fish, introducing deleterious material such as spills, sediment, or muddy runoff to *streams*; and with the authority to suspend work activities if work site procedures, *stream* flow, water levels or weather conditions are such that these effects cannot be avoided;
- systematic and purposeful observation and recording of construction activities related to project environmental management and all environmental activities.

**Field review**

Such reviews of the site works considered necessary in the *member's* opinion to ascertain whether or not the work is in the general compliance with the *member's measures* and recommendations, and to verify that the *Streamside Protection and Enhancement Area* has been physically marked on site.

**Fish** (*from Riparian Areas Regulation*)

All life stages of

- (a) salmonids,
- (b) game fish, and
- (c) regionally significant fish

**Floodplain plant species** (*from Riparian Areas Regulation*)

Plant species that are typical of an area of inundated or saturated soil conditions and that are distinct from plant species on freely drained adjacent upland sites.

**HADD** (*described in 4 (2) of Riparian Areas Regulation*)

Harmful alteration, disruption, or destruction of *natural features, functions, and conditions* that support fish life processes.

Note: This definition pertains to the Riparian Areas Regulation and is not the same as similar terms used in the federal Fisheries Act or policies under that Act.

**High water mark** (*from Riparian Areas Regulation*)

The visible high water mark of a *stream* where the presence and action of the water are so common and usual, and so long continued in all ordinary years, as to mark on the soil of the bed of the *stream* a character distinct from that of its banks, in vegetation, as well as in the nature of the soil itself, and includes the *active floodplain*.

**Land Owner**

An individual or company identified as the owner on the title of the land registered in a Land Title Office.

**Local Government**

Incorporated communities, Regional Districts, First Nation governments or the Islands Trust that have enacted bylaws or policies to implement the Riparian Areas Regulation or have enacted bylaws or policies with similar riparian protection provisions.

**Measures**

A plan or course of action specified by a *Qualified Registered Professional* to protect the integrity of the *Streamside Enhancement and Protection Area* and prevent a *HADD* from occurring both at the time of *development* and also afterwards. For example, requiring designated no-work zones, work procedures, physical works such as tree or other vegetation treatments, and sediment control and erosion protection.

**Member**

A registered member or holder of limited licence in good standing with APEGBC, the College, ABCFP, BCIA, or ASTTBC.

**Natural features, functions and conditions** *(from Riparian Areas Regulation)*

Include but are not limited to the following:

- (a) large organic debris that falls into the *stream* or streamside area, including logs, snags and root wads;
- (b) areas for channel migration, including active floodplains;
- (c) side channels, intermittent *streams*, seasonally wetted contiguous areas and floodplains;
- (d) the multi-canopied forest and ground cover adjacent to *streams* that
  - (i) moderates water temperatures,
  - (ii) provides a source of food, nutrients and organic matter to *streams*,
  - (iii) establishes root matrices that stabilize soils and *stream* banks, thereby minimizing erosion, and
  - (iv) buffers *streams* from sedimentation and pollution in surface runoff;
- (e) a natural source of *stream* bed substrates;
- (f) permeable surfaces that permit infiltration to moderate water volume, timing and velocity and maintain sustained water flows in *streams*, especially during low flow periods.

**Permanent structure** *(from Riparian Areas Regulation)*

Any building or structure that was lawfully constructed, placed or erected on a secure and long lasting foundation on land in accordance with any local government bylaw or approval condition in effect at the time of construction, placement or erection.

For further clarification see Appendix E.

**Qualified Environmental Professional** *(from Riparian Areas Regulation)*

An applied scientist or technologist if

- (a) the individual is registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act, acting under that association's code of ethics and subject to disciplinary action by that association, and
- (b) the individual's area of expertise is recognized in the *assessment methods* as one that is acceptable for the purpose of providing all or part of an *assessment report* in respect of that development proposal, and
- (c) is acting within that individual's area of expertise.

For the purpose of these Guidelines, this definition applies to *members*.

**Ravine** (*from Riparian Areas Regulation with addition for clarity*)

A narrow, steep-sided valley that is commonly eroded by running water and has a slope grade greater than 3 (horizontal):1 (vertical).

**Riparian assessment**

An assessment completed by or under the direction of a *Qualified Environmental Professional* in accordance with these Guidelines to assess the potential impact of proposed *development* in a *riparian assessment area* and to designate the width of the *Streamside Protection and Enhancement Area*.

**Riparian assessment area** (*with reference to the Riparian Areas Regulation*)

The zone adjacent to a *stream* that provides essential functions for natural hydrologic processes, channel stability, slope stability and erosion resistance of adjacent banks, supply of large woody debris, and vegetation contributing to fish life processes.

The Riparian Areas Regulation defines *riparian assessment area* as follows, but this may vary in local government bylaws:

- (a) for a *stream*, the 30 meter strip on both sides of the *stream*, measured from the High Water Mark,
- (b) for a ravine less than 60 meters wide, a strip on both sides of the *stream* measured from the High Water Mark to a point that is 30 meters beyond the Top of Ravine Bank, and
- (c) for a ravine 60 meters wide or greater, a strip on both sides of the *stream* measured from the High Water Mark to a point that is 10 meters beyond the Top of Ravine Bank.

For further clarification see Appendix E.

**Serious harm to fish** (*from Fisheries Act*)

The death of fish or any permanent alteration to, or destruction of, fish habitat.

**Specialist**

An individual that has specialized training, certification, and experience in a particular occupation, practice or branch of learning. Such individuals include but are not limited to, other *members* with specialized expertise such as windthrow, forest health, slope stability, fluvial geomorphology, aquatic or riparian terrestrial habitats, erosion control, hydrology; or non-*members* such as surveyors, individuals with certification in specific skills such as danger tree assessment, arborists or certified fallers with expertise in topping, pruning or tree removal.

Only *members* listed in Appendix 2 of the *assessment methods* can be the primary *Qualified Environmental Professional* that takes responsibility for and submits the *riparian assessment report*. For further explanation see Section 4.5.1.



**Stream** (*from Riparian Areas Regulation*)

Any of the following that provides fish habitat:

- (a) a watercourse, whether it usually contains water or not;
- (b) a pond, lake, river, creek or brook;
- (c) a ditch, spring or wetland that is connected by surface flow to something referred to in paragraph (a) or (b);

In these Guidelines, where the term “*stream*” appears in italics it refers to the Riparian Areas Regulation definition. Where the term stream appears not in italics it refers to the normal meaning of a stream as a watercourse.

For further clarification see Appendix E.

**Streamside Protection and Enhancement Area** (*from Riparian Areas Regulation*)

An area adjacent to a *stream* that links aquatic to terrestrial ecosystems and includes both existing and potential riparian vegetation and existing and potential adjacent upland vegetation that exerts an influence on the *stream*; and the size of which is determined on the basis of an *assessment report* prepared by a *qualified environmental professional* in respect of a *development proposal*.

*From Riparian Areas Regulation, S 1 (2):*

For the purpose of defining the *Streamside Protection and Enhancement Area*, vegetation must be considered to be “potential” if there is a reasonable ability for regeneration either with assistance through enhancement or naturally, but an area covered by a *permanent structure* must be considered to be incapable of supporting potential vegetation.

**Top of the ravine bank** (*from Riparian Areas Regulation with minor addition for clarity*)

The first significant break in a ravine slope where the break occurs such that the grade beyond the break is flatter than 3 (horizontal) :1 (vertical) for a minimum distance of 15 meters measured perpendicularly from the break, and the break does not include a bench within the ravine that could be developed.

**Wetland** (*from Riparian Areas Regulation*)

Land that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, fens, estuaries and similar areas that are not part of the active floodplain of a *stream*.

For further clarification see Appendix E.

### 3.0 INTRODUCTION

Once the Riparian Areas Regulation is adopted in the form of policies or bylaws by a *local government*, a *riparian assessment* is required to be completed by a *Qualified Environmental Professional* and submitted to both MFLNRO and Fisheries and Oceans Canada (DFO) before a *local government* can approve a *development* project within a *riparian assessment* area. The *qualified environmental professional* assesses the site and determines the size of the *Streamside Protection and Enhancement Area* needed to protect *fish* habitat. In addition, the *Qualified Environmental Professional* prescribes *measures* to protect the *Streamside Protection and Enhancement Area*.

It is recognized that *riparian assessments* may be carried out for purposes other than for the Riparian Areas Regulation. While these Guidelines were not intended to address other such riparian assessments some of the information contained in these Guidelines may be relevant to the preparation of riparian assessments for other purposes.

#### 3.1 Purpose of Guidelines

This document provides Guidelines for professional practice of a *Qualified Environmental Professional* who carries out a *riparian assessment* in response to legislation in BC. Appendix B to these Guidelines provides an assurance statement which is to be submitted with a *riparian assessment* report, to a *client* and/or *Approving Authority* having jurisdiction in respect of permit conditions for various types of development activities regulated in BC (e.g., residential, commercial and industrial activities).

These Guidelines address project organization and responsibilities of the various participants; professional practices that should be provided; quality assurance/quality control; and professional registration and education, training and experience.

Specific objectives of these Guidelines are to:

1. Outline the professional services to be provided by *Qualified Environmental Professionals* conducting *riparian assessments*.
2. Describe the standards of practice to be expected of a *Qualified Environmental Professional* providing professional services under the Riparian Areas Regulation.
3. Specify the tasks to be performed by a *Qualified Environmental Professional* in order to meet an appropriate standard of care when carrying out *riparian assessments*, and that fulfills the *Qualified Environmental Professional's* obligations under the self-governing legislation regulating their practice. These obligations include the *Qualified Environmental Professional's* primary duty to protect the safety, health and welfare of the public and the environment;
4. Describe the roles and responsibilities of the various participants and stakeholders involved in *riparian assessments*. The document will assist in delineating the roles and responsibilities of the various participants and stakeholders;
5. Describe the quality management practices to be followed when carrying out *riparian assessments* so the *Qualified Environmental Professional* is meeting his/her respective professional obligations.

6. Provide consistency in *riparian assessment* reports and other documents prepared by *Qualified Environmental Professional* when providing professional services in this field of practice and;
7. Describe the appropriate knowledge, skill sets and experience that *Qualified Environmental Professionals* should have when providing professional services related to carrying out *riparian assessments*.

### **3.2 Scope of the Guidelines**

These Guidelines apply to *riparian assessments* prepared in response to the *Riparian Areas Regulation* (refer to Appendix C for a summary of the legislative framework criteria).

Although these Guidelines are not intended for assessments other than those done under the *Riparian Areas Regulation*, *members* may find the information in the Guidelines relevant when conducting *riparian assessments* for other purposes.

### **3.3 Applicability of the Guidelines**

These Guidelines establish a standard of care and level of due diligence recommended in order to meet the duty of care a professional has in law when carrying out *riparian assessments*. Notwithstanding the purpose and scope of these Guidelines, a *Qualified Environmental Professional's* decision not to follow one or more aspects of these Guidelines does not necessarily mean that he/she fails to meet his/her professional obligations. Such judgments and decisions depend upon weighing facts and circumstances to determine whether another reasonable and prudent *Qualified Environmental Professional*, in a similar situation, would have conducted himself/herself similarly.

A *riparian assessment* must be submitted to MFLNRO and DFO before an *Approving Authority* can allow or approve *development* in an area covered by the Regulation. The *Qualified Environmental Professional's client* is most commonly a *land owner* or party acting on behalf of the *land owner* who retains the *Qualified Environmental Professional* to undertake the *riparian assessment* as a condition of applying for a development permit. Following these Guidelines, however, does not ensure that the conclusions and recommendations contained within the *riparian assessment* report will be accepted by the *Approving Authority*, or that the development permit will be granted.

These Guidelines are influenced by current provincial legislation and its application by local government, provincial case law, advances in knowledge, and evolution of general professional practices in B.C. As such, they may require updating from time to time.

### **3.4 Legislative Framework**

At a federal level, the Fisheries Act is the overarching legislation for the protection of fish and fish habitat in Canada. Provincially, there are several statutes in British Columbia with provisions relating to protection of *streams*; only the *Riparian Areas Regulation* enacted in 2004 under the Fish Protection Act (SBC 1997) specifically requires professional assessments.

The Water Sustainability Act renames the Fish Protection Act to the *Riparian Areas Protection Act* and subsumes several sections of the Fish Protection Act. The regulatory regime under which these

guidelines falls is the Riparian Areas Regulation which is now under the authority of the Riparian Areas Protection Act.

The Water Sustainability Act also renames parts of the Water Act to the Water Users Communities Act and repeals many sections of the Water Act including those pertaining to changes in and about a stream. The Water Sustainability Regulation, enacted under the Water Sustainability Act, regulates activities for stream and aquatic ecosystem protection. The Act allows persons to carry out activities in and about a stream under the authority of an authorization, change approval, order or an authorized change under the Water Sustainability Regulation.

Other statutes with provisions pertaining to waterbodies or the adjacent riparian environment include:

- Local Government Act (RSBC 1996)
- Water Act (RSBC 1996) (replaced by the Water Sustainability Act)
- Drinking Water Protection Act (SBC 2001)
- Land Title Act (RSBC 1996)
- Environmental Management Act (SBC 2003)
- Community Charter Act (SBC 2003)

The framework is summarized in Appendix C. A *Qualified Environmental Professional* who either completes a *riparian assessment* or leads a team that completes a *riparian assessment* should be familiar with the relevant provisions of these statutes, and particularly with the Riparian Areas Regulation.

#### 3.4.1 Riparian Areas Regulation of the Riparian Areas Protection Act

This regulation has two primary purposes – to protect riparian areas from the effects of *development* so these areas can continue to support fish life processes; and to facilitate intergovernmental cooperation between federal, provincial and local government agencies in implementation of the regulation.

The Riparian Areas Regulation applies to the geographic areas of the province listed in the amendment to the Regulation dated May 19, 2006 (Order in Council No. 378). *Local government* enacts bylaws to apply the Regulation under Part 14 of the Local Government Act. Such policies or bylaws may vary among *local governments* and/or include changes to certain provisions of the Riparian Areas Regulation as they apply in the *local government's* jurisdiction; but implementation by the *local government* must meet or exceed the provisions of the Riparian Areas Regulation.

The regulation defines a specific *riparian assessment area* encompassing zones on both sides of a *stream*; and requires that a *Qualified Environmental Professional* complete an assessment for any *development* proposed within the *riparian assessment area*. The regulation defines a *Qualified Environmental Professional* as a member of a professional association constituted under an Act, acting under a code of ethics, and subject to disciplinary action by the professional association.

In the *riparian assessment*, the *Qualified Environmental Professional* is required to provide their professional opinion that either:

- (i) if the *development* is implemented as proposed there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes [HADD] in the riparian assessment area, or

(ii) if the *Streamside Protection and Enhancement Areas* identified in the report are protected from the *development* and the *measures* identified in the report as necessary to protect the integrity of those areas from the effects of the *development* are implemented by the developer, there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the *riparian assessment area*.

The *local government* may approve or allow *development* to proceed if:

- either of the above two conditions are met; or
- if neither is met, then the Minister of Fisheries and Oceans Canada or a regulation under the Fisheries Act (Canada) authorizes the harmful alteration, disruption or destruction of *natural features, functions and conditions* that support fish life processes in the *riparian assessment area* that would result from the implementation of the *development proposal*.

The Riparian Areas Regulation Section 7 also requires the *Qualified Environmental Professional* to provide an assessment report that reports on:

- (a) the width of the *Streamside Protection and Enhancement Area* which must be protected and
- (b) the *measures* necessary to protect the integrity of the *Streamside Protection and Enhancement Area*.

Some *local governments* have *Streamside Protection and Enhancement Areas* that were put in place and continue from the former Streamside Protection Regulation. Any variance to one of these *Streamside Protection and Enhancement Areas* requires a *riparian assessment* under the Riparian Areas Regulation. Some *local governments* do not allow any variances to the *Streamside Protection and Enhancement Areas* established under the Streamside Protection Regulation.

### 3.4.2 Exemptions from Riparian Areas Regulation

Section 3 (2) of the Riparian Areas Regulation provides the following exemption:

“This regulation does not apply to a development permit or development variance permit issued only for the purpose of enabling reconstruction or repair of a permanent structure described in Section 911 (8) of the Local Government Act if the structure remains on its existing foundation.”

Section 532 (1) of the Local Government Act allows for repair or reconstruction so long as damage or destruction to the building or other structure is less than 75% of its value above the foundation.

Where this is the case, no *riparian assessment* is required. **However, some *local governments* have enacted bylaws with different requirements for these grandparented structures; the *Qualified Environmental Professional* must check local bylaws.** The *Qualified Environmental Professional* should also be aware that some *local governments* have bylaws that are incomplete in their capture of requirements under the Riparian Areas Regulation. In all situations, the requirements of the Regulation must still be met.

The Riparian Areas Regulation defines “permanent structure” as follows:

“Any building or structure that was lawfully constructed, placed or erected on a secure and long lasting foundation on land in accordance with any local government bylaw or approval condition in effect at the time of construction, placement or erection.”

### **3.5 Professional Conduct**

These Guidelines have been formally endorsed by the Councils of ABCFP, APEGBC, BCIA, and the College and form part of their ongoing commitment to maintaining the quality of services *members* provide to their *clients* and the general public. *Members* are professionally accountable for their work under the respective legislation regulating the professional work of the *members* belonging to the above referenced professional associations.

A *Qualified Environmental Professional* must exercise professional judgment when providing professional services; as such, application of these Guidelines will vary depending on the circumstances. ABCFP, APEGBC, BCIA, the College and ASTTBC support the principle that a *member* should receive fair and adequate compensation for professional services, including services provided to comply with these Guidelines. An insufficient fee does not justify services that do not meet the intent of these Guidelines. These Guidelines may be used to assist in establishing the objectives, scope of *riparian assessment*, level of service and terms of reference of a *Qualified Environmental Professional's agreement* with the *client*.

By following these Guidelines a *Qualified Environmental Professional* will fulfill his/her professional obligations, especially with regard to the relevant Code of Ethics and duty to protect public safety and the environment. Failure of a *Qualified Environmental Professional* to meet the intent of these Guidelines could be evidence of unprofessional conduct and lead to disciplinary proceedings by the relevant professional regulatory body.

### **3.6 Acknowledgments**

These guidelines have been prepared by a working group of APEGBC and the College, with reviews by ABCFP, BCIA, ASTTBC, MFLNRO staff and members of the Associations who are practitioners in this field. The Associations acknowledge the funding, support and technical reviews by MFLNRO staff, the efforts of the working group members, and the time and effort of those who provided review comments including *members* of the Associations.

## 4.0 ROLES AND RESPONSIBILITIES

This section describes some of the typical responsibilities of a *client*, *Qualified Environmental Professional* and *Approving Authority*. Section 4.3 describes some of the typical responsibilities of a *Qualified Environmental Professional* when asked by an *Approving Authority* or *client* to review a *riparian assessment* report prepared by another *Qualified Environmental Professional*.

The *client* should be aware that the findings of the *Qualified Environmental Professional* could possibly result in the *development* requiring modification, the *Approving Authority* requiring *covenants* or the *development* being turned down. In this regard, it is useful if the *riparian assessment* is carried out early in the *development* planning process. The *Qualified Environmental Professional* should be aware that his/her report will ultimately be submitted to, and likely reviewed by, the *Approving Authority*.

### 4.1 The Client

The *client* is typically the *land owner* or a person or company hired by the *land owner*, but could also be a *local government*, First Nation government or the provincial government.

Prior to a *riparian assessment* it is helpful if the *client* is knowledgeable about, and can provide the *Qualified Environmental Professional* with, the following:

- process and procedures of subdivision approvals, development permits, building permits, and flood plain bylaw variance or exemption, as applicable
- any approving authority requirements for environmental monitoring during construction or post-development monitoring
- legal description of the property, as registered with Land Titles and Survey Authority, and a copy of the current land registration including *covenants*
- for subdivision, a copy of the existing survey plan of the property, or the need for a survey plan, and the location of the legal property boundary markers on the ground (this may require a British Columbia Land Surveyor (BCLS))
- for subdivision, proposed subdivision plan
- for *development*, plans of existing buildings or structures, and location of the proposed *development* on the ground
- for *development*, proposed *development* drawings
- for subdivision, in general terms, proposed and anticipated land use changes on and, if required, beyond the property
- recognition that the *riparian assessment* is based on the proposed *development* as provided to the *Qualified Environmental Professional* and changes to that development may require changes to, or invalidate, the *riparian assessment*
- relevant background information (written or otherwise) related to the property and the existing and proposed *development*, including previous reports conducted for the *client* or available to the *client*, and
- the *Qualified Environmental Professional* should have unrestricted access to and, if required, beyond the property.

With assistance from the *Qualified Environmental Professional*, the *client* should complete an *agreement* with the *Qualified Environmental Professional* confirming scope, schedule and compensation for the *riparian assessment*; need and scope of specialty services; and need for external peer review. It is

recommended that such an *agreement* include a clause that deals with potential disclosure issues due to the *Qualified Environmental Professional's* obligation under the Associations' respective Codes of Ethics that oblige *members* to protect the environment and the safety, health and welfare of the public. In certain circumstances the *Qualified Environmental Professional* may have to convey adverse findings to parties who may not be directly involved, but who have a compelling need to know (for example, slope stability or flood hazard identified during the course of the *riparian assessment*, spills, contaminants, etc.).

Following is suggested wording for such a clause:

"Subject to the following, the *Qualified Environmental Professional* will keep confidential all information, including documents, correspondence, reports and opinions, unless disclosure is authorized in writing by the *client*. However, in keeping with the [Association's respective Code of Ethics], if the *Qualified Environmental Professional* discovers or determines that there is a material risk to the environment, he/she shall notify the *client* as soon as practicable of this information and the need that it be disclosed to the appropriate parties. If the *client* does not take the necessary steps to notify the appropriate parties in a reasonable amount of time, the *Qualified Environmental Professional* shall have the right to disclose that information in order to fulfil his/her ethical duties and the *client* hereby agrees to that disclosure."

The *client* should be aware that the *Qualified Environmental Professional's* cost estimate may have to be amended during the assessment, to bring in appropriate specialists that would be subject to the clause above, depending on the *Qualified Environmental Professional's* findings and analysis. The cost estimate may need to include consideration of *approving authority* requirements for site monitoring or post-*development* reporting, both of which are becoming increasingly common at the *local government* level. The *client* should also be aware that a *riparian assessment* does not guarantee the results will be favourable for the proposed *development*. The cost estimate and likely results should be discussed with the *client* prior to the assignment.

During the *riparian assessment* it is helpful if the *client*:

- shows the *Qualified Environmental Professional* the locations of legal property boundary markers on the ground and location of the proposed *development*
- allows the *Qualified Environmental Professional* unrestricted access to the property, and
- obtains access, if required, to areas beyond the property.

After the *riparian assessment* it is helpful if the *client*:

- reviews the *riparian assessment* report, and understands the limitations and qualifications that apply;
- discusses the report with the *Qualified Environmental Professional* and, if necessary, seeks clarification;
- confirms to the *Qualified Environmental Professional* that the *Streamside Protection and Enhancement Area* and prescribed *measures* are understood and will be implemented;
- directs the *Qualified Environmental Professional* to complete a *Riparian Assessment Assurance Statement* (Appendix B), and provides the Statement and the *riparian assessment* report to the *Approving Authority*;
- notifies the *Qualified Environmental Professional* if land use or site *development* changes or varies from those described in the report;
- retains the *Qualified Environmental Professional* to carry out the necessary *field reviews* and/or *environmental monitoring* before any site work commences to confirm that the



- measures* prescribed in the *riparian assessment* report have been followed so that the *Qualified Environmental Professional* can sign a Statement of General Conformance (Appendix B) to that effect and if needed, prepare a post-development report; and
- provides verification that the required permits are in place and timely notice of site works to the *Qualified Environmental Professional* so that *field reviews* and *environmental monitoring* can be undertaken at the appropriate times.

The *Riparian Assessment Assurance Statement* and the *riparian assessment* report are the property of the *Qualified Environmental Professional* until outstanding invoices of the *Qualified Environmental Professional* are fully paid by the *client*.

#### **4.2 The Approving Authority**

MFLNRO and DFO are responsible for receiving *riparian assessment* reports, verifying that the regulatory requirements for training and registration of the *Qualified Environmental Professional* have been met, and for checking that the *riparian assessment* report is in conformance with the prescribed *assessment methods*.

*Local government* is the *Approving Authority* for approving or allowing *development* to proceed, after notification from MFLNRO and DFO that a *riparian assessment* report has been received and acknowledged to have covered the required content.

Before the *riparian assessment* is initiated it is helpful if the *local government*:

- informs the *client* why a *riparian assessment* is required;
- provides the *client* with relevant local bylaws pertaining to the *Riparian Areas Regulation*, and the jurisdiction's guidelines for carrying out a *riparian assessment*;
- advises the *client* of any other bylaws regarding protection of trees, nests or other environmental features.

After the *riparian assessment* it is helpful if MFLNRO and the *local government*:

- review the *Riparian Assessment Assurance Statements* and the *riparian assessment* report, and
- if necessary, discuss the statement and report with the *Qualified Environmental Professional* and seek clarification and amendment as required.

It is important that the *local government* understands the content of the *riparian assessment* report and the *measures* prescribed in the *riparian assessment* report when allowing or approving *development* and when carrying out enforcement of the bylaw(s). If the *local government* does not find that the direction in the *Qualified Environmental Professional's* report is sufficiently clear to enable it to be incorporated into permit conditions, then they should request clarification from the *Qualified Environmental Professional*, who has a duty to provide reports that are understandable to a non-specialist, as indicated in Section 4.5 below.

#### **4.3 Reviews of Riparian Assessment Reports**

A *Qualified Environmental Professional* may be engaged by an *Approving Authority* (either MFLNRO, DFO or *local government*) to carry out an independent external peer review of a *riparian assessment* report and *Riparian Assessment Assurance Statement* prepared by another *Qualified Environmental Professional*. Less frequently, a *client* may ask for such a review. This type of review is not the same as

an internal or external peer review carried out at the request of the *Qualified Environmental Professional* prior to submitting the report to his/her *client* and/or the *Approving Authority*.

In order for the reviewing *Qualified Environmental Professional* to carry out an appropriate review, it is helpful if the requesting *Approving Authority* or *client*:

- recognizes that the Associations' respective codes of ethics require that *members* follow respectful protocols when reviewing the work of other *members* and maintain confidentiality of the other *member's* work;
- provides the reviewing *Qualified Environmental Professional* with a copy of the *riparian assessment* report and *Riparian Assessment Assurance Statement*, necessary background information, and the reason for the review;
- examines the review letter or report, and if necessary, discusses the review letter or report with the reviewing *Qualified Environmental Professional* and seeks clarification.

The reviewing *Qualified Environmental Professional* should consider whether there may be a conflict of interest and act accordingly, and conduct himself/herself with fairness, courtesy and good faith towards colleagues and provide honest and fair comment.

The reviewing *Qualified Environmental Professional* should:

- if authorized to do so, inform the *Qualified Environmental Professional* who prepared the *riparian assessment* report and *Riparian Assessment Assurance Statement* of the review, and the reasons for the review, and document in writing that the *Qualified Environmental Professional* was so informed;
- in keeping with their code of ethics, maintain confidentiality of the other *member's* work
- ask the *Qualified Environmental Professional* who prepared the report if the reviewing *Qualified Environmental Professional* should know about unreported circumstances that may have limited or qualified the *riparian assessment*, the Statement and/or the report, and
- with the *client's* authorization, contact the *Qualified Environmental Professional* who prepared the report and Statement if the results of the review identify safety or environmental concerns, in order to allow the opportunity for the *Qualified Environmental Professional* to comment prior to further action.

The review should be appropriately documented in a letter or a report. The reviewing *Qualified Environmental Professional* should submit a signed, sealed and dated review letter or report including: limitations and qualifications with regards to the review, and results and/or recommendations arising from the review.

The reviewing *Qualified Environmental Professional* should clarify any questions the *Approving Authority* or *client* may have with regards to the review letter or report.

Occasionally, a *Qualified Environmental Professional* is retained to provide a second opinion. This role goes beyond that of reviewing the work of the original *Qualified Environmental Professional*. The second *Qualified Environmental Professional* should carry out sufficient pre-field work, field work, assessment and comparisons, as required, to accept full responsibility for his/her second opinion findings.

#### **4.4 Teamwork**

Depending on the complexity of a project, site characteristics and the required expertise, a *riparian assessment* may be completed by an individual *Qualified Environmental Professional* who has the necessary experience and expertise to complete all aspects of the *riparian assessment*; or by a team. A team consists of a primary *Qualified Environmental Professional* who is qualified to take professional responsibility for professional practice associated with the *riparian assessment*, plus one or more other individuals who may be required depending on the size and complexity of the project. The primary *Qualified Environmental Professional* would most commonly be a member of the College but could be a member of ABCFP, APEGBC, BCIA or ASTTBC. Only *members* meeting the requirements of Appendix 2 of the *assessment methods* can have the role of primary *Qualified Environmental Professional* that takes overall responsibility for and submits a *riparian assessment* report.

Other team members could include *specialists* that are *members* or non-professionals such as field assistants, arborists, surveyors, experts in removal of danger trees, or individuals with expertise in carrying out specific kinds of site work. See also Sections 4.5.1, 4.6 and 5.7.1.

#### **4.5 Responsibilities of the Qualified Environmental Professional**

The *Qualified Environmental Professional* is responsible for carrying out the *riparian assessment*, or taking responsibility for a *riparian assessment* done by a team; and, if required, making recommendations to avoid the occurrence of a *HADD*, or for habitat protection and regeneration of potential vegetation.

Local governments have adopted the Riparian Areas Regulation into their bylaws in different ways. It is the responsibility of the *Qualified Environmental Professional* to know how to access these bylaws, understand their application, and how they will influence the proposed *development* and/or property. The *Qualified Environmental Professional* often finds it necessary to explain these bylaws to *clients*, *land owners* or other involved parties. Some *local governments* have bylaws that are incomplete in their capture of requirements under the Riparian Areas Regulation; however, the requirements of the Regulation must still be met.

The *Qualified Environmental Professional* should not assume that the *client* is aware of restrictions imposed by *local government* bylaws; or that the proposed *development* has been designed to take the requirements of the Riparian Areas Regulation into account; or that the *client* has secured the appropriate permits for the proposed work.

Prior to carrying out a *riparian assessment* the *Qualified Environmental Professional* should:

- obtain the jurisdiction's current bylaws that apply to implementation of the *Riparian Areas Regulation*;
- be knowledgeable about the development application, approval processes, and timelines; procedures of subdivision approval, development permit, building permit and flood plain bylaw variance and exemption; and applicable legislation;
- confirm that he/she has appropriate training and experience to carry out a *riparian assessment* for the specific site conditions and, if not, involve the appropriate *specialists*;
- obtain a copy of the approving jurisdiction's policies or bylaws for defining the *riparian assessment area*;
- establish the scope of work with the *client* including the need for and roles of *specialists*, if applicable;
- confirm that the *client* has made application or obtained the necessary development permits;

- review the *client's* role and involvement as described in Section 4.1.

The *Qualified Environmental Professional* and *client* should complete an *agreement* confirming scope, schedule and compensation for the *riparian assessment*; need for and scope of specialty services; and need for an external peer review if anticipated. The *Qualified Environmental Professional's* cost estimate should indicate what services are included, and what circumstances may cause a change to the scope of work and associated costs.

The Associations encourage their *members* to disclose to the *client* whether or not professional liability insurance is held and covers the services to be undertaken by the *member*. In particular, a *Qualified Environmental Professional* who is a member of APEGBC must comply with the requirements of APEGBC Bylaw 17 regarding professional liability insurance.

During the *riparian assessment* the *Qualified Environmental Professional* should:

- if necessary, assist the *client* in obtaining relevant information such as listed in Section 4.1;
- make reasonable attempts to obtain from the *client* and others all relevant information related to the *stream* and its catchment area;
- prior to field work, review collected information;
- conduct field work within the limits of and, if necessary, beyond the property at an intensity appropriate to the method and scope of *riparian assessment* and to meet the requirements of existing jurisdictional guidelines;
- conduct the *riparian assessment* in compliance with the *assessment methods*;
- consider the consequences of the *development* on the *stream* condition and the riparian environment on or adjacent to and, if required, beyond the property;
- identify if aspects of the proposed development will conflict with the *Streamside Protection and Enhancement Area* and communicate in a timely fashion regarding redesign of the project;
- notify the *client* as soon as reasonably possible if specialty services or changes in scope of work are required, and of associated changes to the original cost estimate;
- communicate with representatives of the local government (e.g. planners), where appropriate.
- write the report clearly, concisely and completely and conform, where applicable, to jurisdictional guidelines for *riparian assessment* reports;
- incorporate *specialist* recommendations into the *riparian assessment*;
- ensure quality assurance and quality control of the assessment including having a draft of the report appropriately peer reviewed;
- submit to the *client* a signed, sealed and dated copy of the report including the applicable completed Riparian Assessment Assurance Statements and, if directed by the *client*, provide the Statement and the *riparian assessment* report to the *Approving Authorities*.

*Qualified Environmental Professionals* should make every effort to use simple language so that the direction provided in their reports is clear to a non-specialist, is understood by the *client*, and can be easily incorporated into a *local government's* permit conditions.

After the *riparian assessment* the *Qualified Environmental Professional* should:

- clarify questions the *client* and/or *Approving Authority* may have with regards to the *riparian assessment* report, and/or *Riparian Assessment Assurance Statement*
- if MFLNRO found gaps in the report submission review, or if a peer review or second opinion found omissions or deficiencies, then the *Qualified Environmental Professional* must consider

and address any omissions or deficiencies as required to meet these Guidelines and the *assessment methods*

- carry out follow up work if requested by the *client* or the *Approving Authority*, and if retained to do so
- conduct *field reviews* if these have been recommended and agreed to
- undertake *environmental monitoring* if required and agreed to
- prepare a Statement of General Conformance and/or a post-development report on the completed site works, if this has been requested and agreed to.

When hired to undertake *field reviews* and/or *environmental monitoring*, the *Qualified Environmental Professional* will need to verify that, if these duties are delegated to a subordinate, the person is qualified, and is on site in a timely fashion and during the required times. Before undertaking to supervise site works, or carry out *field reviews* or *environmental monitoring*, the *Qualified Environmental Professional* should confirm that the required permits are in place for the work.

If aspects of the *riparian assessment* are delegated to subordinates, they should only be carried out under direct supervision of the *Qualified Environmental Professional*. The *Qualified Environmental Professional* assumes full responsibility for all work delegated (refer to Section 4.5).

A *member* should clearly indicate to his/her *client* the possible consequences if recommendations are disregarded.

To fulfill a *member's* obligations under his/her code of ethics, if a *client* fails or refuses to accept the conclusions and recommendations of the report), the *Qualified Environmental Professional* should:

- advise the *client* in writing of the potential consequences of the *client's* actions or inactions, and
- consider whether the situation warrants notifying the *member's* professional association, the *land owner* (if different from the *client*) and/or appropriate authorities.

The above actions should be taken particularly if workplace safety or the environment is potentially jeopardized.

During the assessment process, the *Qualified Environmental Professional* is encouraged to inform and educate his/her *client* with respect to fish habitat characteristics and the role of the riparian zone in maintaining healthy aquatic systems.

#### 4.5.1 Use of subordinates and specialists

The primary *Qualified Environmental Professional* may delegate tasks to others who work under his/her direct supervision (Section 6.2); or may rely on the work of other *members* or non-professionals who have the skill sets necessary to complete a task and take responsibility for it. The primary *Qualified Environmental Professional* should provide sufficient direction to *specialists* or other team members commensurate with their level of expertise and the working relationships.

When seeking advice from a *specialist*, the primary *Qualified Environmental Professional* is responsible for checking that the *specialist* is qualified and competent to give that advice and the advice given makes sense based on the primary *Qualified Environmental Professional's* own personal knowledge.

The *Qualified Environmental Professional* should provide clear terms of reference to *specialists* as to the scope of the work; any insurance, certifications, or bonding requirements; the notes, reports, diagrams, documents or other records that are required to be submitted by the *specialist*; the statement of assurance that is expected to be submitted; and the intended use of the *specialist's* information.

See also Sections 4.6 and 5.7.1

#### 4.5.2 Retroactive assessments

Occasionally, a *Qualified Environmental Professional* may be asked to carry out a *riparian assessment* retroactively after site works are done. This type of retrospective assessment is considered to be a condition and impact assessment and should follow these Guidelines and the *assessment methods*. However, the *Qualified Environment Professional* should be aware, and should advise the *client*, that a retroactive assessment is not a *riparian assessment* under the Riparian Areas Regulation because the Regulation specifies a process to be followed, and a retroactive assessment is not consistent with that process.

### **4.6 Responsibilities of the Specialist**

*Specialists* are required when aspects of a *riparian assessment* are beyond the expertise of the *Qualified Environmental Professional* who has overall responsibility for the *riparian assessment*. *Specialists* may provide important input into a specific element of a *riparian assessment*. The *specialist* is responsible for:

- Clarifying the scope of the *specialist's* work with the lead *Qualified Environmental Professional*
- Informing the *Qualified Environmental Professional* of the project information required by the *specialist*
- On completion of the *specialist's* work, signing a Statement of Assurance for work done by the supporting *specialist*
- Where the *specialist* is a non-member:
  - verifying to the *Qualified Environmental Professional* that he/she has the necessary skills, training and experience to complete or contribute to the aspects of the *riparian assessment* that he/she is undertaking, including providing evidence of technical or safety certifications, bonding and/or insurance as applicable
  - providing records, notes, reports or other information on the aspect of the assessment completed as requested by the primary *Qualified Environmental Professional*.
- Where the *specialist* is a member:
  - verifying to the *Qualified Environmental Professional* that he/she has the necessary skills and professional qualifications to complete or contribute to the aspects of the *riparian assessment* that he/she is undertaking
  - conforming to all professional obligations associated with his/her work including completing the work to an acceptable professional standard; and signing, sealing and taking responsibility for professional work completed by him/her.

## 5.0 Professional Practice in Riparian Assessments

**Note:** The term *stream* in the Riparian Areas Regulation includes water bodies such as lakes, ponds, wetlands, ditches, springs as well as linear watercourses that are commonly called streams. In this document, the term *stream* in italics refers to this definition in the Riparian Areas Regulation. Where stream does not appear in italics, it refers to the common meaning of a stream as a linear watercourse.

*Members* are expected to use judgment in selecting appropriate methodologies, level of effort and scope of assessment. In these Guidelines it is recognized that at this time the *Qualified Environmental Professional* must use the *assessment methods* appended to the Regulation. However, depending on the extent of the proposed development, site characteristics, and local bylaw requirements, a higher level of effort may be required. The *Qualified Environmental Professional* should conduct such additional work as may be appropriate for the complexity of the site, which could include further assessments by other *specialists*, including assessments of conditions outside the *Streamside Protection and Enhancement Area* that could affect it, such as slope stability concerns. Appendix E provides supplementary information for the *assessment methods*.

The *Qualified Environmental Professional* must conduct sufficient site assessment to meet all of the criteria within the Riparian Areas Regulation and *local government* bylaws. This includes all *natural features, functions and conditions* (see Definitions) that support fish life processes, including potential vegetation, as they are relevant to the study area.

*Qualified Environmental Professionals* and *specialists* who are *members* are expected to be competent in field investigation and assessment techniques and to keep abreast of advancements in scientific knowledge applicable to their work. If the primary *Qualified Environmental Professional* delegates aspects of the work, such as field investigation, to subordinates who are not *members*, the *Qualified Environmental Professional* must satisfy himself/herself of the subordinate's skill level and provide sufficient instruction so that the work is carried out competently. Refer also to skill sets in Appendix 2 of the *assessment methods*.

While *riparian assessments* done under these Guidelines may identify floodplain areas and potentially unstable slopes next to entrenched streams, and may make recommendations for those areas pertinent to stream protection, *riparian assessments* are not landslide hazard assessments or flood hazard assessments for residential *development*. There are specific statutory requirements and professional guidelines for landslide and flood hazard assessments; these do not fall under the Riparian Areas Regulation. Nor does a *riparian assessment* address other possible natural hazards that may affect *development*. If in the course of a *riparian assessment*, a *Qualified Environmental Professional* identifies possible landslide, flood or other hazards that might affect the subject property or the property of others, the *Qualified Environmental Professional* has a professional responsibility to draw these hazards to the attention of the *client* and, if necessary, the authority having jurisdiction over land use as noted in Section 4.1.

### 5.1 Objectives

A *riparian assessment* is triggered when a proponent proposes commercial, residential or industrial *development* that is within a *riparian assessment area* as defined in local bylaws. Local government bylaws can include additional categories of *development* to those defined within the Riparian Areas

Regulation. *Development* can include different kinds of land clearing, such as tree removal; and also subdivision of a parcel or variances to existing restrictions (rezoning).

*Riparian assessments* under the Riparian Areas Regulation have the following objectives:

- To identify *Streamside Protection and Enhancement Areas* that must be protected from *development*
- To identify *measures* that prevent a *HADD* from occurring, including recognition of potential riparian vegetation at the subject site.
- To determine whether a *development proposal* as submitted is likely to cause a harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes (a *HADD*) within the *riparian assessment area*.

**Note:** The reference to a *HADD* is specific to the Riparian Areas Regulation and is not the same as similar terms used in regulations and policies under the current or former federal Fisheries Act.

## 5.2 Components of a Riparian Assessment

A *riparian assessment* project typically has the following phases; refer also to the flow chart in Appendix D:

- Initiation
- Collection and review of background information
- Field work
- Identification of a *Streamside Protection and Enhancement Area* and *measures* to prevent a *HADD*, if needed
- Submission of *riparian assessment* report and Riparian Assessment Assurance Statement
- *Field reviews* and *environmental monitoring* of site procedures
- Statement of General Conformance for confirmation of completed works, and possibly a post-*development* report.

## 5.3 Initiation

Project initiation typically involves the following steps:

1. Reviewing with the *client* the nature of the proposed *development* and whether or not a *riparian assessment* is required under the Riparian Areas Regulation. Often the *client* will have been advised by an *Approving Authority* that under local bylaws a *riparian assessment* may be needed; but the need for an assessment under the Riparian Areas Regulation should be confirmed as to the specific details of the *development proposal* and proximity to the *stream*. This step should include a review of the *development* permitting process and how the *riparian assessment* fits into that process.
2. Identifying the extent of the study area and the scope of the project. These will depend on the particular circumstances of the *development* and the site. For example, the study area and scope will be very different for a *development* that is a small addition to an individual dwelling, than for subdivision of a large tract of land that borders or encompasses a waterbody. Review with the *client* the possible need to extend the study area beyond the limits of the subject property. Consider also whether notifications or approvals may be needed under other legislation if, for example, instream works are proposed.



3. Arranging an agreement for services with the *client* with respect to scope of the assessment, schedule, fees, possible need and terms for specialty services and/or external peer review. For APEGBC members this step must include notifying the client of the *Qualified Environmental Professional's* liability insurance and whether that insurance is applicable to the professional services provided.
4. Informing the *client* of any particular limitations or special circumstances that may affect the *riparian assessment* results (for example, site access, snow cover, reliability of background information).

### **5.3.1 Study Area and Scope of Assessment**

The study area will depend on the nature and scale of the *development proposal*. The definition of “*development*” in the Riparian Areas Regulation covers a wide range of activities; and as such, *development proposals* can vary widely in scope and scale, from a small addition on an existing structure that does not require the removal of any trees; to subdivision development of large land tracts; or construction of buildings, structures, roads, flood protection works, utility corridors, municipal services, and so on. For larger projects, the proposed works may be separated into several components, each requiring separate permits. The *Qualified Environmental Professional* should ensure that they are aware of all aspects of the project that could have implications under the Riparian Areas Regulation.

The study area and scope of assessment should be appropriate for the nature of the *development proposal* and the potential scale of impacts to the *stream*. Note that *local government* bylaws may establish a *riparian assessment area* different from the *riparian assessment area* defined in the Riparian Areas Regulation.

### **5.4 Background information**

Before undertaking field work, the *Qualified Environmental Professional* should compile and review available existing information associated with the study area. Typically, this could include, as available and relevant to the site:

- Boundaries of watershed units
- *Stream* and floodplain mapping
- Information on fish populations and fish use of waterbodies associated with the *riparian assessment area* and waterbodies connected to them
- Imagery, especially the most recent
- Best available topographic mapping
- Information from the client pertaining to the proposed development as indicated in Section 4.1
- Existing reports such as fish studies or fish habitat assessments in the watershed, *stream* classification, riparian assessments for sites nearby, channel modifications, fish habitat enhancement, watershed assessments, hydrological assessments
- Climate, precipitation and streamflow data; and flood hazard mapping if available
- Water licences in the watershed unit containing the subject waterbody

The *Qualified Environmental Professional* should consider the reliability and accuracy of the background information and the potential effects that unreliable or inaccurate information could have on the

*riparian assessment*. If information is found to be unreliable or inaccurate, the *Qualified Environmental Professional* may have to complete further field work.

#### 5.4.1 Hydrology of watershed units

The subject site should be put into the context of the watershed unit in which it is contained. Watershed hydrological characteristics should be described, at least at an overview level; for example, regional climate and hydrological dynamics (high and low flows), biogeoclimatic zone, relief, features that may influence *stream* flows such as lakes, ponds, wetlands, artificial flow controls, diversions, stormwater systems or water extraction should be noted. The extent of existing land use modification (residential, commercial, industrial, agricultural) throughout the watershed unit should be indicated, for example, on imagery. It is helpful to include a map delineating approximate boundaries of the watershed unit.

The intent of considering *stream* systems at the scale of the watershed unit is to understand the relative importance of the subject site, even if it is a small site; and to identify whether factors outside the *riparian assessment area* could have an impact on the *Streamside Protection and Enhancement Area*. For example, in a watershed unit that has been extensively modified by urban, industrial or residential development, small intact *stream* reaches may have a disproportionate importance for fish habitat.

For larger scale or more complex projects, more in-depth discussion of watershed processes may be needed to properly assess the significance of potential impacts to the waterbodies of interest. These may not affect the determination of a *Streamside Protection and Enhancement Area*, but may affect the *measures* required to protect the integrity of the *Streamside Protection and Enhancement Area*. Further, large *developments* may span watershed divides, and the possibility of altering watershed drainage processes may need to be considered.

Developments occurring on large floodplains and alluvial fans can result in requests for diking, bank revetment and stream channelization, all of which can negatively affect the proper functioning condition of the riparian ecosystem. In assessing the potential for a *HADD* and in identifying *Streamside Protection and Enhancement Areas* for these sites the *Qualified Environmental Professional* should involve the appropriate *specialists* with expertise in river morphology and hydrology.

This part of a *riparian assessment* refers to the hydrological regime as it affects fish habitat. This is not a flood study for *development*. If the *development* could be affected by flooding, a separate assessment may be needed, done to the applicable professional standard and by the appropriate *specialist*.

#### 5.4.2 Implications of climate change

*Members* are expected to keep themselves informed about the changing climate, and to consider the implications of climate change impacts in their professional assessments by referring to recent qualified reports on climate change or retaining a *specialist* to render an opinion on the matter. In addition, the *member* should refer to climate change position statements and climate change content made available by his/her regulatory body and established tools to assist the member in accessing information as it relates to their field of practice.

The *Qualified Environmental Professional* should consider the implications of current regional climate change projections<sup>1</sup> as they could affect hydrological processes associated with the *streams* in the study area; and whether, and on what time scale, the *Streamside Protection and Enhancement Area* could be affected by the projected changes. For example, this could affect determination of the *high water mark*. For clarification on how this might be applied in a *riparian assessment*, see Appendix E.

The *Qualified Environmental Professional* should also indicate the uncertainties and unknowns associated with his/her judgment on this.

## ***5.5 Elements to be considered and level of effort of field investigation***

All waterbodies that contain fish or are connected to fish habitat, contribute to the success and productivity of fish populations either directly or indirectly by providing habitat for various life cycles, sustaining water flows, providing nutrients, maintaining temperatures and other functions. Negative impacts to water quality, water quantity, or riparian function may reduce the productivity of the waterbody and could ultimately impact fish populations.<sup>2</sup> Not all *streams* under the Riparian Areas Regulation will be highly productive fish habitat or contain fish, but they may still contribute to the survival and productivity of fish populations.

### **5.5.1 Characterizing the riparian environment**

The elements listed below should be evaluated as appropriate for the nature of the waterbodies, the type of *development* and the scope of the *riparian assessment*. Not all elements may be relevant or applicable to all assessments. Other *specialists* may need to be involved in some cases to properly evaluate the elements.

Refer to Appendix E for guidance on field assessments.

The *Qualified Registered Professional* should consider and assess each of the following elements as it may be applicable or relevant to the site:

- Characteristics of the waterbodies and connectivity or significance to fish habitat, including waterbodies that have the potential to become fish habitat. Aspects to consider include:
  - Types and sensitivities of stream channels and/or other aquatic habitat as applicable
  - Stream energy and transport capability
  - The role of large woody debris for habitat elements and/or channel morphology, and whether it is applicable in that biogeoclimatic zone and for that channel or waterbody type
  - Peak and low flow conditions
  - The presence of an *active floodplain*, and if present, the flooding potential and ecological condition of the *active floodplain*

**Note:** Some *local government* bylaws include waterbodies that are not included in the Riparian Areas Regulation, e.g., those that are non-fish habitat that are not connected to fish habitat as well as those that are fish habitat.

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<sup>1</sup> Regional climate change projections are available on the Pacific Climate Impacts Consortium website.

<sup>2</sup> Fish-Stream Crossing Guidebook. Page 10

- Stability of adjacent escarpments or of ravine slopes, if present, with respect to sediment introduction to the *stream* or as stability could be affected by *development*, and consequently affect the *stream* condition. Note: This is not a landslide hazard or risk assessment for the *development proposal*. If slope stability could affect or be affected by the *development*, then a separate landslide risk assessment may be needed, done to the applicable standard and by the appropriate professional.
- Soil erosion of channel banks or of adjacent terrain that could affect the *waterbody*, both during site works for the *development* and subsequent to the site works being completed
- Existing type of riparian vegetation and its suitability for riparian and fish habitat functions
- Windthrow and/or possibly danger tree assessment, if large trees are present
- Influences or land use outside the *riparian assessment area* that could impact the *Streamside Protection and Enhancement Area*, if prescribed
- Requirements for maintenance of the *Streamside Protection and Enhancement Area*, if prescribed, over the longer term after site works for *development* are completed
- Aquatic habitat condition: the functions and values of the existing aquatic habitat as they pertain to fish and fish health.
  - Documenting the *stream* characteristics and condition of fish habitat prior to *development* provides a point of comparison for a post-development assessment, and to determine if a *HADD* has occurred as a consequence of the *development*.
  - It is also important to illustrate areas where fish habitat could be improved upon.
- Terrestrial habitat condition: the health, composition and stability of the existing riparian community as it exerts an influence on the waterbody and supports aquatic habitat
  - The Riparian Areas Regulation requires that the *Qualified Environmental Professional* consider both existing and **potential** riparian and upland vegetation, and whether there is a reasonable ability for regeneration either naturally or through enhancement. This leads to the evaluation of the functionality of the riparian area and its current and potential ability to provide quality fish habitat.
  - Consider ecological linkages between upland and riparian vegetation

#### 5.5.1.1 Dikes

Where the *development* is separated from a stream by a dike, there are a number of factors that the *Qualified Environmental Professional* must consider when determining a *Streamside Protection and Enhancement Area* or prescribing *measures*:

- Whether riparian vegetation landward of the dike crest is contributing to *the natural features, functions and conditions* of the *stream*. This will depend on the size and extent of the dike and its distance from the *stream*.
- Whether the dike is owned by the *land owner* or by some other agency with responsibility for maintenance and operation of flood protection works.
- Whether there may be restrictions on vegetation or other *measures* that could compromise the integrity of the dike (for example tree roots).

If the dike is owned or operated by an agency other than the *land owner*, the *Qualified Environmental Professional* must contact the agency before prescribing *measures* that could potentially affect the function or integrity of the dike. The *Qualified Environmental Professional* should involve the appropriate specialists to assess the effects of proposed measures on the dike integrity, stability and hydrologic function.

### 5.5.2 Evaluating whether the development as proposed will cause a HADD

Under the Riparian Areas Regulation an *assessment report* must make one of two determinations:

- if the *development* is implemented as proposed there will be no harmful alteration, disruption or destruction of *natural features, functions and conditions* that support fish life processes [HADD] in the riparian assessment area;; OR
- if the *Streamside Protection and Enhancement Areas* identified in the report are protected from the *development* and the *measures* identified in the report as necessary to protect the integrity of those areas from the effects of the *development* are implemented by the developer, there will be no harmful alteration, disruption or destruction of *natural features, functions and conditions* that support fish life processes in the *riparian assessment area*.

In evaluating whether or not the *development* as proposed is likely to cause a HADD (bearing in mind the specific definition of a HADD in the Riparian Areas Regulation), the *Qualified Environmental Professional* should consider the following:

- What is the importance of the fish habitat at this site relative to the watershed as a whole; for example, is it disproportionately important to fish populations?
- What are the sources of food, water, shade, cover, and temperature control and will the proposed *development* diminish any of these?
- Have the *natural features, functions, and conditions* already been compromised by alteration such that fish habitat conditions are already in decline, and *measures* are needed to provide for recovery of the functionality so that the *Streamside Protection and Enhancement Area* width is sufficient to protect fish habitat?
- Will the *development* prevent the recovery of potential vegetation in the *Streamside Protection and Enhancement Area*?
- Has former fish access to the *stream* been prevented by introduced barriers?
- Will the *development* cause any alteration of a channel that will destroy or diminish important habitat features, e.g. such as sources of large wood debris, or bank vegetation important to limit erosion or maintain stability?
- Could the *development* have long term impacts that will cause deterioration of fish habitat quality over time?
- Could the *development* result in the introduction of deleterious material, spills or sediment into fish habitat, either directly or by subsequent seepage or fluvial transport?
- Could the *development* result in increased runoff or disturbances to hydrology that might damage the *Streamside Protection and Enhancement Area* or *stream* channel (for example, by the connection of storm drainage to the *stream*?)
- Are there effects from upstream activities that are beyond the ability to manage at this site? If so, the *Qualified Environmental Professional* should document this and describe the effects that are being caused by upstream activities that are beyond the control of the *client* or *developer*.

### 5.5.3 Considerations in determining width of Streamside Protection and Enhancement Areas

The intent of a *Streamside Protection and Enhancement Area* is to maintain a healthy functioning riparian area in order to prevent a HADD. The *Qualified Environmental Professional* assesses the current and potential functionality of the existing riparian area in order to establish the *Streamside Protection and Enhancement Area* within the subject property required to protect *natural features, functions and conditions*.

The spatial extent of a *Streamside Protection and Enhancement Area* may vary depending on the characteristics of the waterbody, topography of the adjacent terrain, the physical location of the subject property, and existing *development* adjacent to the subject property. Depending on the specific site considerations, a *Streamside Protection and Enhancement Area* could have a uniform width around or adjacent to the waterbody; or could vary. Some examples are:

- Increased width for portions of the waterbody that are on the south shoreline, where increased protection may be warranted for shade
- Connectivity of *Streamside Protection and Enhancement Areas* for several different types of waterbodies, such as a ditch connecting to a wetland
- Encompassing local sensitive zones of different physical extents
- Establishing a *Streamside Protection and Enhancement Area* width greater than the calculated width due to decreased existing functionality. The increased width allows for some flexibility in varying the width (so long as it is not less than the calculated *Streamside Protection and Enhancement Area* width) in order to prevent a HADD and to accommodate certain aspects of the *development*. When varying sections of a *Streamside Protection and Enhancement Area* in this manner, care should be taken not to compromise the overall ability of the resulting area to provide for *natural features, functions and conditions*. Enhancement activities may also be recommended to increase riparian functionality of the reduced sections.

#### 5.5.4 Measures to protect the Streamside Protection and Enhancement Area

Under Section 7 of the Riparian Areas Regulation, the *Qualified Environmental Professional* must report on *measures* to protect the integrity of the *Streamside Protection and Enhancement Area* and to prevent a HADD. Some kinds of actions outside the *Streamside Protection and Enhancement Area* could threaten or diminish the potential functionality of the setback area. For this reason, *measures* may be applied throughout the entire *riparian assessment area* within the subject property, and not confined to regions immediately adjacent to the *Streamside Protection and Enhancement Area*. The *measures* may include limitations, prohibitions, or procedures that would apply before or during site works, or after the *development* is completed. The *Qualified Environmental Professional* must be clear in his/her *riparian assessment* report with respect to *measures* that are essential for preventing a HADD and those that are recommended to improve and maintain long term functionality of the riparian area. If a HADD is not preventable, then the *Qualified Environmental Professional's assessment report* must state that; and either the appropriate authorizations must be sought or the *development proposal* must be revised.

**The *assessment report* is intended to give direction to the *client* and should be clear and sufficiently detailed so that the *measures* can be implemented as intended.**

*Measures* for all of the following categories must be evaluated; however, depending on the individual site characteristics, the nature of the existing riparian vegetation, and the nature of the proposed *development*, not all may be applicable. The report should note any that are not applicable to the site.

- danger trees
- windthrow
- slope stability
- tree protection during construction
- encroachment (including restrictions on activities such as burn piles)
- stormwater management
- sediment and erosion control
- Floodplains.

The *Qualified Environmental Professional's* report should be clear and specific about *measures* that must be implemented to protect the *Streamside Protection and Enhancement Area*. The *Qualified Environmental Professional* should make clear the *measures* that are essential and those that are desirable.

*Measures* may also address other site features that could negatively impact fish habitat, for example:

- Prohibiting the planting of noxious weeds or invasive species in the *Streamside Protection and Enhancement Area*, and restricting planting to native species in that area.
- Restricting the dumping of compost, yard waste or lawn clippings in or adjacent to the *Streamside Protection and Enhancement Area*.

Additionally, the *Qualified Environmental Professional* may prescribe protection, restrictions or modifications to activities, works or features adjacent to the *Streamside Protection and Enhancement Area* boundary or adjacent areas. Examples are:

- Aquatic habitat not included in the Riparian Areas Regulation definition of *stream* but that is integral to the system; for example, springs or wetlands that connect by subsurface flow.
- A *Streamside Protection and Enhancement Area* that terminates mid-slope on a steep slope where additional *measures* are prescribed to address erosion and slope stability. *Measures* could include, for example:
  - Extending the *Streamside Protection and Enhancement Area* to or beyond the crest of the slope.
  - Restricting vegetation removal or requiring planting or seeding
  - Restrict the type of construction on the slope or prohibiting any building on the slope to protect the integrity of the slope and ultimately the *Streamside Protection and Enhancement Area*.
- A proposed subdivision may have limitations on placement of buildings, stormwater structures, trails or activities near the *Streamside Protection and Enhancement Area* boundary; for example:
  - location of associated structures that might influence the soils or groundwater entering the *Streamside Protection and Enhancement Area*,
  - location of trails to avoid compressing tree and shrub roots within the *Streamside Protection and Enhancement Area* or along its boundary.
  - Existing covenants on the property.
  - Alteration of proposed lot boundaries, limitation of development types or limitation of activities along the *Streamside Protection and Enhancement Area* boundary to accommodate additional vegetation buffers (for example, the establishment of a windfirm boundary outside the *Streamside Protection and Enhancement Area*, to protect trees within the *Streamside Protection and Enhancement Area* that are susceptible to windthrow).
- If the riparian area is not functioning (see Section 2.0 definition of *natural features, functions, and conditions*), then the *Streamside Protection and Enhancement Area* may need to be widened and/or may benefit by removal of invasive species, and/or planting of native riparian species in order for it to become functional and support fish life processes.

*Local governments* have varying standards as to what is permitted for restoration and enhancement activities, and this sometimes includes requiring the supervision of a *Qualified*

*Environmental Professional* to oversee the activity. *Qualified Environmental Professionals* should check *local government* requirements when specifying *measures* of this type.

- Surface erosion and sediment management plans both during the site works and for longer term after the site works are completed.

A stormwater management plan is often required as part of a subdivision *development*. It is not normally within the scope of a *riparian assessment* to provide design recommendations for site drainage works such as ditches, stormwater systems or municipal drainage works; these are usually required as part of a subdivision plan prepared by the subdivision design firm. However, a riparian assessment may recommend limitations (e.g., for a subdivision) on placement of stormwater structures, surface drainage ditches, settling ponds etc. in order to avoid increased discharge, erosion or sediment introduction to *streams* or into the *Streamside Protection and Enhancement Area*. It is not generally permitted (and would require approval from regulatory authorities) to use a *Streamside Protection and Enhancement Area* for stormwater management; or to use a natural waterbody for storing or filtering stormwater.

For projects at the subdivision stage where detailed site plans do not yet exist it may not be practicable to provide specific advice on *measures*. In these instances the *Qualified Environmental Professional* should provide advice on what environmental monitoring and *measures* should be put in place during such activities as land clearing, road building or installation of infrastructure; and also on when another *riparian assessment* needs to be undertaken at a subsequent stage if *development* is proposed in the *riparian assessment area*. It should be recognized that the *riparian assessment* at the subdivision stage provides a *Streamside Protection and Enhancement Area* width and that the *measures* specified in this first *riparian assessment* may place additional restrictions on the *development* at the next approval stage (for example, residential development). ***Measures put in place at the subdivision stage should not be undermined by later development applications.***

## **5.6 Supporting rationale**

*Members* must have documented rationale to support their professional assessments. The *Qualified Environmental Professional* must provide rationale to support his/her conclusions and recommendations, in particular for aspects of a *riparian assessment* that are qualitative or subjective based on observed conditions. The rationale explains the reasoning behind the professional judgment and recommendations. Rationale can include direct field observations (for example, abundance of fish, physical condition of *stream* and riparian vegetation), references to findings in scientific literature, studies, research results, etc. in relation to the condition of the subject site; putting the subject site into the context of the *stream* system as a whole with respect to type and scale of effects; the potential for harm to result from the proposed development and the degree of harm; and other reasoning.

Examples of statements of supporting rationale might be:

- It is my opinion that there will not be a *HADD* because the proposed *development* will not occur in the *Streamside Protection and Enhancement Area* nor will there be any removal of existing or potential riparian vegetation that currently contributes to stream channel stability, water quality or temperature; or food sources that support fish life.
- Planting of native plant species as prescribed in the *measures* will compensate for vegetation removal that has occurred in the past within the *Streamside Protection and Enhancement Area*. If the prescribed *measures* are implemented, the riparian vegetation will over time be improved over the existing condition, to create shade and provide food to support fish life processes.



- The proposed *development* does not worsen the existing riparian condition; and the recommended *measures* provide for improvement in the riparian condition over the long term. As the existing riparian vegetation has poor functionality, the *measures* prescribe a wider *Streamside Protection and Enhancement Area* in order to provide for increased water infiltration and sediment control within the riparian area.
- Due to the placement of a water main, the proposed *development* will remove riparian vegetation along some stream sections; this will be compensated for by wider *Streamside Protection and Enhancement Areas* along other stream sections together with plantings and with windthrow treatments to minimize tree loss from windthrow, so that there will be no significant reduction in riparian functions that are essential to support fish life processes.

**None of these rationales should be used to support any encroachment into a *Streamside Protection and Enhancement Area*.**

### 5.7 Riparian assessment reports

A *riparian assessment report* comprises the following:

- Summary of project information
- Summary of *Qualified Environmental Professional's* qualifications
- *Qualified Environmental Professional* riparian assessment assurance statement
- Specialist assurance statements if specialists have been involved in the assessment (one to be signed by each specialist)
- The professional assessment (see example report format, Appendix H) and its maps and appendices.

**Note:** Regardless of the submission requirements in the *assessment methods*, the *Qualified Environmental Professional* and any *specialists* who are also *members* (secondary *Qualified Environmental Professionals* in the *assessment methods*) must meet professional standards for their work, including meeting the quality management standards of their Association, and signing and sealing their own reports.

The *riparian assessment* report content will vary depending on the objective, scope of assessment, complexity of the site and level of effort. Some *local governments* have specific requirements for *riparian assessment* reports. Where this is the case, the *Qualified Environmental Professional* must meet the *local government* requirements for the *riparian assessment* report as well as the requirements in these Guidelines and its appendices. The *member* must adequately address all aspects required for professional work. Adherence to a prescribed report format is not justification for inadequate report content. The *Qualified Environmental Professional* should consider reviewing the format and contents of the *riparian assessment* report with the *client* and the *Approving Authority* prior to finalizing the report.

A *riparian assessment* report normally includes the following. If any of the following are not applicable, the report should indicate why not.

- legal description of the property;
- location map or description of property relative to well-known geographic features;
- objectives, scope of study area, and level of effort;
- list of background information available, collected and reviewed, and its relevance;
- physical description of the study area;

- description of the existing and potential fisheries resources.
- map or plan of the property including topography, natural features, existing structures, roads, infrastructure and surface drainage;
- maps or images at an appropriate scale showing all *streams* that were included in the assessment and their associated *riparian assessment areas*.
- description of proposed *development*;
- methods and intensity of field work;
- results of field assessment;
- conclusions, accompanied by supporting rationale;
- identification of the *Streamside Protection and Enhancement Area*;
- recommendations and prescribed *measures* to protect and maintain the integrity of the *Streamside Protection and Enhancement Area*;
- recommendations and prescribed *measures*, if required, to avoid the occurrence of a *HADD*;
- If measures are recommended to avoid a *HADD*, recommendations for when *field reviews* and/or *environmental monitoring* should be done;
- definitions of qualitative terms, technical terms and concepts;
- other information as specified in the *agreement* with the *client*, or as required in jurisdictional guidelines;
- references, including maps and airphotos;
- limitations and qualifications of the *riparian assessment* and report, assumptions, and uncertainties.

The *riparian assessment* report should clearly state the activity to which the report applies and the condition of the site at the time of the field investigation.

All reports should be accompanied by drawings, figures, sketches, photographs, and/or other supporting information suitable for the scale and scope of the assessment. Maps or plans should delineate the areas of *Streamside Protection and Enhancement Areas* in relation to existing and proposed *development*. Maps should show the entire study area, connectivity to fish habitat, any zones of sensitivity, *Streamside Protection and Enhancement Area(s)*, and specific features of interest (e.g., danger trees).

A good photographic record both during the assessment phase and after completion of the *development* works is especially informative.

If *measures* for slope stabilization, or bank erosion protection other than by vegetative means (for example, armouring or engineered log jams) are proposed, then the *Qualified Environmental Professional* should involve the appropriate *specialist* and incorporate their recommendations or reports as needed.

The report should be clearly written with sufficient detail to allow the *client*, *Approving Authority* and others reviewing the report to understand the methods, information used and supporting rationale for conclusions and recommendations, without necessarily visiting the property or site. *Riparian assessment* reports could be included as part of a *covenant* on the property title, and should be written accordingly.

Although words such as ‘certify’ and ‘guarantee’ are used in everyday language, they have specific legal meanings and *Qualified Environmental Professionals* should avoid the use of such words. The

Associations consider that when a *Qualified Environmental Professional* signs, seals and dates a document he/she is certifying that document.

A peer review of the *riparian assessment* report, prior to its submission to the *client* and *Approving Authority*, is strongly encouraged as part of the quality assurance/quality control program (refer to Section 5), especially for large-scale *development* or in complex or highly sensitive areas.

#### 5.7.1 *Incorporating the work of specialists in a riparian assessment report*

The *Qualified Environmental Professional* would typically include the *specialist's* report and accompanying statement of assurance as an appendix to the *riparian assessment* report, and incorporate the *specialist's* information, appropriately referenced, in the *Qualified Environmental Professional's* findings and conclusions, prescribed measures, diagrams, etc.

The *Qualified Environmental Professional* should be aware of, and make known in the *riparian assessment* report, any limitations that may have affected the *specialist's* scope of work or findings.

### **5.8 Limitations and qualifications of a riparian assessment**

The report should specify the limitations of the *riparian assessment* and report. Examples of items typically addressed under limitations include:

- the standard of care followed while carrying out the *riparian assessment*;
- factors which may have limited the assessment, such as restricted access, quality of background information, terrain or weather conditions at the time of the field work; and
- restriction of the use of the report to the *client* for its intended purpose.

Some aspects of a *riparian assessment* are qualitative and subjective based on observed conditions. Conclusions and recommendations are based on the assumption that the *measures* prescribed will be implemented to an acceptable standard. Substandard practices may render the conclusions and recommendations invalid.

A *riparian assessment* cannot be relied on in perpetuity. Although the *Qualified Environmental Professional* should attempt to anticipate reasonable changes that could affect the results of the *riparian assessment*, the “shelf life” of the assessment depends on changes that could occur naturally with time; or on other changes in land use or site development not anticipated in the assessment. The *Qualified Environmental Professional* should indicate over what time frame and under what conditions the *riparian assessment* will apply.

**The report should state that any changes to either the proposed activity or to the site conditions may make the report not representative of the site condition; and that, if the *development proposal* changes, then the *riparian assessment* may need to be updated or reassessed.**

The *Qualified Environmental Professional* should also note that, while the developer's start and end date are required to be reported when the *riparian assessment* report is submitted to MFLNRO, the *Qualified Environmental Professional* does not have control over either the project scheduling, or whether the *development* will proceed.

### **5.9 Field reviews, environmental monitoring, and post-development assessment**

The Associations consider *field reviews* and *environmental monitoring* to be important aspects of quality control of a *member's* practice. For example, as part of a professional engineer's, professional geoscientist's or license holder's quality assurance and due diligence, APEGBC's Quality Management Bylaw 14(b)(3) requires *field reviews* on projects that are implemented or constructed, to verify that the implementation or construction is in general compliance with the professional documents prepared by the *member*. Under the *Forester's Act*, section (c) (i) of the definition of practice of professional forestry includes "assessing the impact of professional forestry activities to ... verify that those activities have been carried out as planned, directed or advised". As directed by Principle 3 of the Code of Ethics, College members must ensure a professional standard of care by practicing applied biology with attention, caution, prudence and due diligence. College members achieve and demonstrate the required rigor by being well-organized, thorough and deliberate.

The purpose of *field reviews* is to verify conformance with the *member's* recommendations or prescribed *measures*. The purpose of *environmental monitoring* is to ensure that work procedures do not cause undue effects on fish or fish habitat during or following the course of the site work.

Typical activities of an environmental monitor may be to catch and relocate fish to remove them from an active in-*stream* work area; to check that construction procedures are appropriate to minimize the potential for *stream* disturbance or introduction of deleterious material into the channel; to check the effectiveness of sediment control *measures* used to minimize muddy runoff entering the waterbody; to check that construction activities follow appropriate shutdown procedures when weather or *stream* flow conditions are likely to result in sedimentation; and similar actions.

*Field reviews* and *environmental monitoring* could be carried out by the same individual, if suitably qualified for both activities, or by different individuals. The *Qualified Environmental Professional* may delegate *field reviews* or *environmental monitoring* to another individual that acts under his/her direct supervision (Section 6.2). *Field reviews* and *environmental monitoring* should be documented; and if delegated to a subordinate, the *Qualified Environmental Professional* should provide direction to the subordinate for documentation content. The *Qualified Environmental Professional* should also establish a communication protocol with the subordinate for reporting during the site works.

The need for *field reviews* or *environmental monitoring* is based on the professional judgment of the *Qualified Environmental Professional*. The extent to which *field reviews* for conformance, or *environmental monitoring* during site activities are recommended by the *Qualified Environmental Professional* depends on the complexity of the recommendations and the complexity or sensitivity of the site.

Where a *field review* has been recommended by the *Qualified Environmental Professional*, he/she should inform the *client* that in order to meet the intent of the above requirements defined in professional legislation and for the *Qualified Environmental Professional* to be accountable for the completed work, then the *client* needs to provide adequate opportunity for *field reviews*. The *Qualified Environmental Professional* should clarify the expectation around *field reviews* with the *client*, and make sure that the *client* understands that the *Qualified Environmental Professional* may be unable to take responsibility for the outcome or to sign a Statement of General Conformance if there is insufficient *field review*.

#### 5.9.1 Post-development assessment

A post-*development* assessment could be a condition of a *development* permit, could be requested by a *client* to document compliance with conditions of a permit, could be initiated to check compliance under statutes such as the Fisheries Act or Water Sustainability Act; or for other reasons. For example, a post-*development* assessment might be requested for the following:

- Where an authorization was issued for the works, such as under the Water Act (now the Water Sustainability Act), and documentation of work site procedures, environmental monitoring, field reviews and completed works is required under the authorization.
- To determine if a *HADD* occurred during the site works; or has or is likely to occur as a consequence of development (for example, where a *Qualified Environmental Professional* was not retained to carry out *field reviews* or *environmental monitoring* during the site works)
- To evaluate the performance of *measures* that were prescribed by a *Qualified Environmental Professional* or other *specialist*, such as:
  - Windthrow treatments or danger tree threats
  - Arborist treatments or tree protection
  - Erosion and sediment control plans
  - Vegetation treatments (planting, removal of invasives etc.)
- To evaluate the possible effects of changes made to the *development* that were not contemplated at the time of the *riparian assessment*
- To check that stormwater management systems or other structures built for the *development* are not having a harmful effect on the *Streamside Protection and Enhancement Area*
- To check that permanent field markings are in place that define the limit of the *Streamside Protection and Enhancement Area*

The *Qualified Environmental Professional* for a post-*development* assessment may be the same *Qualified Environmental Professional* that completed the original *riparian assessment* or may be a different individual.

## 5.10 Specialty Services

For some *riparian assessments*, specialty services may be required. *Specialists* are required when aspects of a *riparian assessment* are beyond the expertise of the *Qualified Environmental Professional* responsible for the activity. A *specialist* may be a *member* in a specialized discipline or one with special knowledge or expertise in a particular subject area (such as a terrain specialist or windthrow specialist); or could be a non-*member* with special skills (such as an arborist).

Such services could include:

- Arboriculture
- Terrain stability
- Danger tree assessment
- Windthrow assessment
- Watershed assessment (hydrology, sediment routing, physical watershed processes)
- Fluvial geomorphology
- Biotechnical remediation
- Erosion and scour, sediment management
- Forest health
- Surveying

## 6.0 Quality Management and Quality Assurance

Quality management for *members* requires the implementation of suitable protocols to ensure the completion of appropriate quality assurance and quality control reviews. The purpose for completing quality management is to ensure that the work completed is technically correct and complies with applicable codes, standards and regulatory requirements. Quality management is required on all professional work related to *riparian assessments* completed by *members*.

### 6.1 Quality management requirements

The Associations expect *members* to follow good quality management practices in the conduct of *riparian assessments*. The College member's practice is directed by the Code of Ethics which states members must:

- provide objective, science-based opinion, advice and reports
- undertake assignments and offer opinions only in areas in which members are competent through training and experience
- provide services grounded in knowledge and objective professional judgement free of conflict of interest or bias
- identify limitations of data, concepts, conclusions, understandings and recommendations
- ensure that, where a member takes responsibility for the work of another, the work meets the appropriate standard
- ensure the practice due diligence by making certain, that at a minimum, members:
  - retain or advise of the necessity to retain the services of others, where additional expertise is required
  - background information is collected and incorporated
  - data have been collected to ensure proper assessment or risks and outcomes
  - conclusions, uncertainties and recommendations are stated in a clear, understandable manner
  - all applicable legal requirements are met
  - appropriate documents, and files are maintained
- ensure that the client is aware of potentially adverse consequences if the member's professional recommendations are not followed
- uphold the principles of stewardship of aquatic and terrestrial ecosystems and biological resources.

The College protects the public interest by ensuring a high degree of competence and accountability of its members in the practice of applied biology. The College professionals who work under the Riparian Areas Regulation must meet stringent entrance requirements and are held to a continued high standard through yearly professional development requirements to ensure continuing competence.

For *APEGBC members* and holders of non-resident or limited licenses a QA/QC program must, as a minimum, satisfy the requirements of *APEGBC* Quality Management Bylaws 14(b) (1), (2), (3) and (4) with regards to:

- retention of complete project documentation for a minimum of 10 years;
- documented checks of engineering and geoscience work;
- documented independent reviews of the designs of structural protective works that require the engagement of a professional engineer having the appropriate training and experience; and

- documented *field reviews* of the constructed work at the *riparian assessment* project site considered necessary, in the *member's* opinion, to ascertain whether or not the significant aspects of the work are considered in general compliance with the plans and supporting documents.

For ABCFP registered *members* and special permit holders or certificate holders entitled to practice in this area; the Standards of Professional Practice contain competence and due diligence direction to ensure quality of professional work. Competence requires professional practice to include three essential elements, knowledge, completeness and correctness, and professional care (ABCFP Bylaw 12.2). ABCFP *members* exercise due diligence in professional practice by being prudent and doing all work with constant and careful attention. An ABCFP *member* can exercise due diligence in professional practice by satisfying himself or herself of the following:

(ABCFP Bylaw 12.5)

- all relevant legal requirements have been met;
- the *member* has a clear understanding of *client* objectives and how they relate to other values or interests which are relevant to the work or may impact it;
- the *member* is personally familiar with all relevant characteristics of the area affected by the work;
- all appropriate background information has been gathered and incorporated;
- the *member* has consulted with all appropriate experts or *specialists* for those areas for which the *member* is not qualified to practice or express an opinion;
- when external advice is sought from a *specialist*, that *specialist* is qualified and competent to give that advice and the advice given makes sense based on the *member's* own personal knowledge;
- when data is collected by another person, that person is qualified and competent to collect that data and the data collected makes sense based on the *member's* own personal knowledge;
- sufficient data was collected as per required standards; and
- the *member* has made a proper assessment of risks and outcomes.

## 6.2 Supervision of subordinates and field reviews

The Associations expect *members* to provide direction to and take responsibility for the work of a subordinate. In particular, for APEGBC *members*, “direct supervision” means control and conduct of the work of a subordinate<sup>3</sup>. In providing direction to a subordinate, the *Qualified Environmental Professional* having overall responsibility should consider:

- complexity of the terrain and level of geomorphic hazards and risks (which can include hazards and risk associated with fluvial processes or terrain stability);
- scope of the development;
- which aspects of the *riparian assessment*, and how much of those aspects, should be delegated;
- training and experience of individuals to whom work is delegated; and
- amount of instruction, supervision and review required.

Field work and its timing are critical aspects of a *riparian assessment*. Therefore, careful consideration must be given to delegating field work. Care must be taken to ensure that delegated work meets the standard expected by the *Qualified Professional*. Such supervision could typically take the form of specific instructions on what to observe, check, confirm, test, record and report back to the *Qualified Environmental Professional*. The *Qualified Environmental Professional* should exercise judgment when

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<sup>3</sup> Engineers and Geoscientists Act Section 1.1

relying on delegated field observations by conducting a sufficient level of review to be satisfied with the quality and accuracy of those field observations.

### **6.3 Internal and external peer review**

The Associations consider peer reviews to be an important part of quality management of professional practice. In particular, APEGBC bylaws require its *members* to have regular documented checks of engineering and geoscience work.

Where the *member* considers it appropriate, the quality management program should include an independent peer review of those aspects of the *riparian assessment* that are considered complex and/or for sites of particular sensitivity. The peer review should occur before the final determination of the *Streamside Protection and Enhancement Area* and prescribed *measures* are completed.

The reviewer should be independent of the project team having not been involved in the development of any stages of the original assessment. Independent peer reviews can be performed by *members* within the same firm that generated the original plan provided that an independent perspective is maintained.

The level of peer review should be based on the professional judgment of the *member*. Considerations should include the stability and complexity of the terrain for ravine systems; sensitivity of the habitat elements; scope of the proposed *development*; availability, quality and reliability of background information and field data; and the *member's* training and experience.

The independent peer review process should be appropriately documented and as a minimum include a signed/sealed letter or report that includes the following:

- limitations and qualifications with regards to the review, and
- results of the review.

For both internal and external peer reviews, the name of the reviewing *member* should be identified in his/her report.



## 7.0 Professional Registration, Education, Training, and Experience

### 7.1 Professional registration

The following are the professional registration requirements for *riparian assessments* under the Riparian Areas Regulation:

“Qualified environmental professional” means an applied scientist or technologist, if

- (a) the individual is registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act, acting under that association’s code of ethics and subject to disciplinary action by that association, and
- (b) the individual’s area of expertise is recognized in the *assessment methods* as one that is acceptable for the purpose of providing all or part of an assessment report in respect of that development proposal, and
- (c) the individual is acting within that individual’s area of expertise.”

**Note:** *Members* should not rely on the skill sets and designations indicated in Appendix 2 of the *assessment methods* for assurance that they would meet their Association’s standards for competency. These are listed as “likely designations” but do not imply that all *members* necessarily will have the skills required to undertake the work.

### 7.2 Education, training and experience

The *member* must adhere to his/her Association’s respective Code of Ethics and have appropriate education, training and experience consistent with the services provided. *Members* that undertake professional work without sufficient skills may be subject to their Association’s disciplinary action.

Professional competence in a subject area is gained from:

- formal study such as university courses, post-secondary training courses, or equivalent knowledge gained from short courses, workshops and self-study;
- work experience, usually with mentoring by a senior professional with relevant expertise; and
- continuing professional development – keeping abreast of emerging literature, research and studies, attending conferences, workshops, seminars and technical talks, reading new texts and periodical, searching the web; and participating in field trips.

A *member* undertaking a *riparian assessment* for the purpose of the Riparian Areas Regulation would be expected to have a professional level of knowledge of fish biology and habitats, aquatic and riparian terrestrial ecosystems, plant taxonomy and ecology, stream fluvial processes, airphoto interpretation, field investigation, field mapping and inventory techniques. In some cases, in-depth knowledge of watershed processes, fluvial geomorphology, hydrology, terrain stability, soil erosion, forest science or windthrow may be necessary. Where a higher level of knowledge of these fields is required for a particular *riparian assessment*, *members* should retain specialty services through an appropriate registered professional to provide an opinion on the matter.

A professional level of knowledge means a combination of the equivalent of university-level courses plus sufficient work experience to have gained professional competence, as would be judged by other competent professionals undertaking the same work. This level of training can be acquired through

formal university or college courses or through continuing professional development; and typically a minimum of 3 years of work experience in this field of practice working under the supervision or mentoring of a senior professional. With respect to formal education, there may be some overlap in courses and specific courses may not correlate to specific skill sets.

Where a *member* in the role of a *Qualified Environmental Professional* does not have the full skill set for a particular *riparian assessment*, the required skills can be met through a team approach.

A *member* who offers specialty services requires specific education, training and experience in the area of specialty and must keep abreast of new knowledge and developments in his/her area of specialization.

## 8.0 References

There is a large body of scientific literature, technical manuals and guidebooks on fish habitat and riparian ecology. The following are common references pertinent to these Guidelines but this list is not meant to be a comprehensive bibliography of the subject matter.

B.C. Fisheries Information Services Branch. 2001. *Reconnaissance (1:20,000) fish and fish habitat inventory: standards and procedures*. Prepared for the B.C. Resources Inventory Committee.  
Web (December 2014): <http://www.for.gov.bc.ca/hts/risc/pubs/aquatic/recon/index.htm>

B.C. Ministry of Forests. 2001. *Gully assessment procedure guidebook*. 4th ed., Version 4.1. Forest Practices Branch, Ministry of Forests, Victoria, B.C. Forest Practices Code of British Columbia Guidebook.

B.C. Ministry of Forests. 2001. *Watershed assessment procedure guidebook*. 2nd ed., Version 2.1. Forest Practices Branch, Ministry of Forests, Victoria, B.C. Forest Practices Code of British Columbia Guidebook.

B.C. Ministry of Forests. 1998. *Fish-stream identification guidebook*. 2nd ed., Version 2.1. Forest Practices Branch, Ministry of Forests, Victoria, B.C. Forest Practices Code of British Columbia Guidebook.  
Web (December 2014): <https://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/FISH/FishStream.pdf>

B.C. Ministry of Forests and B.C. Ministry of Environment. 1996. *Channel assessment procedure guidebook*. Forest Practices Branch, Ministry of Forests, Victoria, B.C. Forest Practices Code of British Columbia Guidebook.

B.C. Ministry of Forests and B.C. Ministry of Environment. 1996. *Channel assessment procedure field guidebook*. Forest Practices Branch, Ministry of Forests, Victoria, B.C. Forest Practices Code of British Columbia Guidebook.

B.C. Ministry of Forests. 1995. *Riparian management area guidebook*. Forest Practices Branch, Ministry of Forests, Victoria, B.C. Forest Practices Code of British Columbia Guidebook.

B.C. Ministry of Forests, Lands and Natural Resource Operations, B.C. Ministry of Environment, and Fisheries and Oceans Canada. 2012. *Fish-stream crossing guidebook*. Rev. ed. Forest Practices and Investigations Branch, Victoria, B.C.

B.C. Ministry of Sustainable Resource Management, Aquatic Branch. 2004. *Stream survey toolkit*. Prepared for the B.C. Resources Information Standards Committee.  
Web (December 2014): [http://www.env.gov.bc.ca/fish/pdf/non\\_recce\\_stream\\_survey.pdf](http://www.env.gov.bc.ca/fish/pdf/non_recce_stream_survey.pdf)

B.C. Ministry of Water, Land and Air Protection (MWLAP). 2006. *Schedule: Riparian Areas Regulation Assessment Methods v 3.3*. Note: document does not indicate author or date, these were determined from file names.

B.C. Ministry of Water, Land and Air Protection (MWLAP). 2014. RAR Methodology: Permanent Structures and the Simple Assessment. Memo dated Oct 2014.  
Web (January 2015): [http://www2.gov.bc.ca/gov/DownloadAsset?assetId=DEE3F5738E444A9F986D25E4F9CEA96C&filename=rar\\_permanent\\_structures\\_oct\\_2014.pdf](http://www2.gov.bc.ca/gov/DownloadAsset?assetId=DEE3F5738E444A9F986D25E4F9CEA96C&filename=rar_permanent_structures_oct_2014.pdf)

Church, M. and B. Eaton. 2001. *Hydrological effects of forest harvest in the Pacific Northwest*. Riparian Decision Tool, Technical Report #3. Report to Coast Information Team. Unpublished.

ClimateBC/WNA/NA. University of British Columbia program to generate high-resolution climate data for climate change studies and applications in British Columbia and western North America. Available at: <http://cfcg.forestry.ubc.ca/projects/climate-data/climatebcwna/>

Intergovernmental Panel on Climate Change. Available at: <http://www.ipcc.ch/>

Johnston, N.T. and P. A. Slaney. 1996. *Fish habitat assessment procedures*. Watershed Restoration Technical Circular No. 8, Watershed Restoration Program, B.C. Ministry of Environment Lands and Parks and B.C. Ministry of Forests.

Web (December 2014):

[http://www.friendsofkootenaylake.ca/wp-content/uploads/2012/12/fishHabitatassessmentprocedures\\_1996.pdf](http://www.friendsofkootenaylake.ca/wp-content/uploads/2012/12/fishHabitatassessmentprocedures_1996.pdf)

Koning, C.W. [ed.]. 1999. *Riparian assessment and prescription procedures*. Watershed Restoration Technical Circular No. 6, Watershed Restoration Program, B.C. Ministry of Environment Lands and Parks.

Web (December 2014): [http://www.env.gov.bc.ca/wld/documents/wrp/wrtc\\_6.pdf](http://www.env.gov.bc.ca/wld/documents/wrp/wrtc_6.pdf)

MacKenzie, W. H. and Moran, J. R. 2004. *Wetlands of British Columbia: a guide to identification*. Land Management Handbook No. 52.

BC Ministry of Forests, Research Branch, Victoria, BC Millard, T. 2000. *Channel disturbance and logging slash in S5 and S6 streams: An examination of streams in the Nitinat Lake area, southwest Vancouver Island*. Technical Report TR-005. Vancouver Forest Region, Research Section, B.C. Ministry of Forests, Victoria, B.C.

Millard, T. 2001. *Transport of logging slash and sediment in S5 and S6 streams near Boston Bar, Chilliwack Forest District*. Technical Report TR-012. Vancouver Forest Region, Research Section, B.C. Ministry of Forests, Victoria, B.C.

Pacific Climate Impacts Consortium. University of Victoria. A regional climate service centre that provides information on the physical impacts of climate variability and change in the Pacific and Yukon Region of Canada. Available at: <https://www.pacificclimate.org/>

For further information on working near water see the following:

Fisheries and Oceans Canada's website (as of December 2014):

<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>

B.C. Ministry of Forests, Lands, and Natural Resources Operations' *Resource Stewardship* website (as of December 2014):

[http://www.env.gov.bc.ca/wsd/water\\_rights/licence\\_application/section9/](http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/)



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## **APPENDIX B:    *ASSURANCE AND CONFORMANCE STATEMENTS***

This appendix contains the following documents:

- Riparian assessment assurance statement – Qualified Environmental Professional
- Riparian assessment assurance statement – Supporting Specialist – Registered Professional
- Riparian assessment assurance statement – Supporting Specialist other than Registered Professional
- Conformance statement – Qualified Environmental Professional

## ***RIPARIAN ASSESSMENT ASSURANCE STATEMENT – Qualified Environmental Professional***

Note: This Statement is to be read and completed in conjunction with the Professional Practice Guidelines – Legislated Riparian Assessments and the “Riparian Areas Regulation 2004 OIC 837” and is to be provided for *riparian assessments* (not landslides, floods or flood controls) for the purposes of the Riparian Areas Regulation. Italicized words are defined in the Guidelines.

To: The Approving Authority

Date: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Jurisdiction and address

With reference to the Riparian Areas Regulation for the Property:

\_\_\_\_\_  
Legal description or PID and civic address of the Property

The undersigned hereby gives assurance that he/she is a *Qualified Environmental Professional*:

Name of *Qualified Environmental Professional*: \_\_\_\_\_

Professional designation: \_\_\_\_\_

Professional association: \_\_\_\_\_

I have signed, sealed and dated, and thereby certified, the attached *riparian assessment* report on the Property in accordance with the Professional Practice guidelines – Legislated Riparian Assessments and with the *assessment methods*. That report must be read in conjunction with this Statement. In preparing that report I have:

Check to the left of applicable items. If any items are not checked, the reasons should be explained in the *Qualified Environmental Professional's riparian assessment* report.

- \_\_\_ 1. Collected and reviewed appropriate background information
- \_\_\_ 2. Reviewed the *development proposal* on the Property
- \_\_\_ 3. Conducted field work on and, if required, beyond the Property
- \_\_\_ 4. Reported on the results of the field work on and, if required, beyond the Property
- \_\_\_ 5. Incorporated recommendations or assessment results from other *Specialists*
- \_\_\_ 6. Prescribed *measures* to protect and maintain the integrity of the SPEA
- \_\_\_ 7. Prescribed *measures* to avoid the occurrence of a *HADD*\*
- \_\_\_ 8. Reported on the requirements for *field reviews* or *environmental monitoring* of the Property during or following site works for the proposed *development* and recommended who should conduct those *field reviews* or *environmental monitoring*
- \_\_\_ 9. Reviewed the *riparian assessment* report with the *client* and explained the content and the *measures* required to be implemented.



*\*HADD – harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes*

I hereby confirm that in my professional opinion, based on the conditions contained in the attached *riparian assessment* report, as required by the Riparian Areas Regulation (Section 4):

Check one

☐ If the *development* is implemented as proposed there will be no harmful alteration, disruption or destruction of *natural features, functions and conditions* that support fish life processes in the *riparian assessment area*.

☐ If the *streamside protection and enhancement areas* identified in the report are protected from the *development* and the *measures* prescribed in the report as necessary to protect the integrity of those areas from the effects of the *development* are implemented by the *developer*, there will be no harmful alteration, disruption or destruction of *natural features, functions and conditions* that support fish life processes in the *riparian assessment area*.

Check one

☐ with one or more recommended registered covenants.

☐ without any registered covenant.

Signature, seal and date

***RIPARIAN ASSESSMENT ASSURANCE STATEMENT – Supporting specialist – Registered Professional***

Note: This Statement is to be read and completed in conjunction with the Professional Practice Guidelines – Legislated Riparian Assessments and the “Riparian Areas Regulation 2004 OIC 837” and is to be provided for *riparian assessments* (not landslides, floods or flood controls) for the purposes of the Riparian Areas Regulation. Italicized words are defined in the Guidelines.

To: The *Qualified Environmental Professional*

Date: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Name and professional designation

With reference to the *riparian assessment* for the Property:

\_\_\_\_\_  
Legal description or PID and civic address of the Property

The undersigned hereby gives assurance that he/she is a Registered Professional:

Name of specialist: \_\_\_\_\_

Professional designation: \_\_\_\_\_

Professional association: \_\_\_\_\_

This is to advise that I have completed the following work in support of the *riparian assessment* noted above, and have submitted signed and sealed documents to the *Qualified Environmental Professional* in respect of the work completed by me:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

I confirm that I have liaised as required with the *Qualified Environmental Professional* for the purposes of my services.

I hereby give my assurance that I am a Registered Professional and that the work undertaken on this project by me falls within my area of professional expertise.

Signature, seal and date

Note: This Statement is to be read and completed in conjunction with the Professional Practice Guidelines – Legislated Riparian Assessments and the “Riparian Areas Regulation 2004 OIC 837” and is to be provided for *riparian assessments* (not landslides, floods or flood controls) for the purposes of the Riparian Areas Regulation. Italicized words are defined in the Guidelines.

Date: \_\_\_\_\_

With reference to the *riparian assessment* for the Property:

The undersigned hereby gives assurance that he/she has the following qualifications for the work undertaken:

Area of specialization: \_\_\_\_\_

*Include relevant certifications or technical memberships, if applicable. Attach additional documents if needed.*

---

I hereby give my assurance that I am qualified and competent to carry out the work I have undertaken on this project.

--

Signature and date

### **CONFORMANCE STATEMENT – Qualified Environmental Professional**

To be completed by the *Qualified Environmental Professional* on completion of site works for the development, where the *Qualified Environmental Professional* has prescribed *measures* to avoid harmful alteration, disruption or destruction of *natural features, functions and conditions* that support fish life processes in the riparian assessment area; and/or *measures* to protect the integrity of the *streamside protection and enhancement area*.

To: The Approving Authority

Date: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Jurisdiction and address

With reference to the Riparian Areas Regulation for the Property:

\_\_\_\_\_  
Legal description or PID and civic address of the Property

I confirm that:

- *field reviews*\* of this *development* have been conducted by me or under my direct supervision; AND,
- the completed works are in general conformance with

☐ the *measures* prescribed in the report dated \_\_\_\_\_ OR

☐ the *measures* with amendments approved by me and described in Schedule A attached.

☐ the limits of the *Streamside Protection and Enhancement Area* have been marked on site.

Name of *Qualified Environmental Professional*: \_\_\_\_\_

Professional designation: \_\_\_\_\_

Signature, seal and date

\**Field reviews* means such reviews of the *development*, in the *member's* opinion, to ascertain whether or not the significant aspects of the works are considered in general compliance with the measures recommended

by the member.

## Appendix C: Legislative and regulatory frameworks

This appendix summarizes the legal framework; the actual legislation should be referred to for details. These Guidelines were prepared between November 2014 and May 2016, and the statutes or policy statements discussed in this section may have changed thereafter. Relevant sections of the following legislation and regulation are noted below.

- Riparian Areas Protection Act (SBC 1997)
- Riparian Areas Regulation (OIC 837 2004)
- Local Government Act (RSBC 2015 Chapter 1)
- Fisheries Act
- Water Sustainability Act (SBC 2014 Chapter 15)
- Drinking Water Protection Act (SBC 2001)
- Land Title Act (RSBC 1996)
- Environmental Management Act (SBC 2003)
- Community Charter Act (SBC 2003)

### ***Riparian Areas Protection Act (SBC 1997)***

The Riparian Areas Regulation was originally made under the authority of the Fish Protection Act (SBC 1997). The Water Sustainability Act (SBC 2014), brought into force on January 29, 2016, repealed several sections of the Fish Protection Act and renamed it to the Riparian Areas Protection Act. The Riparian Areas Regulation continues under the Riparian Areas Protection Act.

The Riparian Areas Protection Act provides the following authorities:

#### **Provincial directives on streamside protection**

12 (1) Subject to subsection (2), the Lieutenant Governor in Council may, by regulation, establish directives regarding the protection and enhancement of riparian areas that the Lieutenant Governor in Council considers may be subject to residential, commercial or industrial development.

(2) Directives under subsection (1) may only be established after consultation by the minister with representatives of the Union of British Columbia Municipalities.

(3) Directives under subsection (1) may be different for different parts of British Columbia and in relation to different local government powers and different circumstances as established by the directives.

(4) If a directive under subsection (1) applies, a local government must

(a) include in its zoning and land use bylaws riparian area protection provisions in accordance with the directive, or

(b) ensure that its bylaws and permits under Part 14 of the *Local Government Act* or Part XXVII of the *Vancouver Charter*, as applicable, provide a level of protection that, in the opinion of the local government, is comparable to or exceeds that established by the directive.

(5) For the purpose of transition, a directive under subsection (1) may establish a time period during which a local government to which the directive applies must review and, if necessary,

amend its bylaws in order that they meet the requirements of subsection (4) by the end of the period.

(6) On request by a local government, the minister may extend a time period under subsection (5).

### **Regulation-making authority**

**13** (1) The Lieutenant Governor in Council may make regulations referred to in section 41 of the *Interpretation Act*.

(2) Without limiting subsection (1), the Lieutenant Governor in Council may make regulations respecting the directives established under section 12, including, without limitation, the following regulations:

- (a) providing that a local government must not approve or allow a residential, commercial or industrial development to proceed in an area wholly or partially within all or a prescribed portion of a riparian area unless the prescribed requirements are met;
- (b) providing that a prescribed requirement referred to in paragraph (a) may include either or both of the following:
  - (i) that the government of British Columbia or Canada has been notified of the development and provided with studies, assessments, reports or opinions regarding the impact of the proposed development on the natural features, functions and conditions that support fish life processes in the riparian area;
  - (ii) that any serious harm to fish, as described in section 2 (2) of the *Fisheries Act* (Canada), that results from the proposed development is authorized under that Act;
- (c) requiring a local government to impose as a condition of an approval of a development that the developer comply with any measures recommended in a report or opinion of a person with prescribed qualifications;
- (d) requiring the engagement of a person with prescribed qualifications to perform studies and assessments, make reports and provide opinions in relation to a prescribed requirement referred to in paragraph (a);
- (e) establishing criteria for the studies, assessments including methods of assessment, reports and opinions referred to in paragraph (d);
- (f) authorizing a prescribed person, on application in a particular case, to vary criteria established under paragraph (e) on prescribed conditions or in prescribed circumstances;
- (g) requiring a local government to cooperate in developing strategies with the government of British Columbia or Canada in relation to
  - (i) monitoring and reporting on the effect of developments on riparian areas,
  - (ii) public education respecting protection of riparian areas, and
  - (iii) implementation and compliance with recommendations in a report or opinion of a person with prescribed qualifications;
- (h) defining words or phrases used but not defined in this Act.

### ***Riparian Areas Regulation (OIC 837 2004)***

This regulation applies to the exercise of local government powers. The regulation has two primary purposes – to protect riparian areas from development so these areas can continue to support fish life processes; and to facilitate intergovernmental cooperation between federal, provincial and local government agencies in implementation of the regulation.

It defines a specific riparian assessment area encompassing zones on both sides of a *stream*; and requires that a *Qualified Environmental Professional* complete an assessment for any development proposed within the assessment area. A *Qualified Environmental Professional* is defined as a member of a professional association constituted under an Act, acting under a code of ethics, and subject to disciplinary action by the professional association.

In the riparian assessment, the *Qualified Environmental Professional* is required to provide their professional opinion that either:

(i) if the *development* is implemented as proposed there will be no harmful alteration, disruption or destruction of *natural features, functions and conditions* that support fish life processes [HADD] in the *riparian assessment area*, or

(ii) if the *Streamside Protection and Enhancement Areas* identified in the report are protected from the *development* and the *measures* identified in the report as necessary to protect the integrity of those areas from the effects of the *development* are implemented by the *developer*, there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the *riparian assessment area*.

A local government may allow development to proceed if either of the above two conditions are met, or if neither is met, if Fisheries and Oceans Canada authorize a HADD.

### ***Local Government Act (RSBC 2015 Chapter 1)***

Part 14 of the Local Government Act pertains to authorities with respect to planning and land use management. Several Divisions under this part have requirements and provisions for protection of the natural environment, including requirements for information prior to development, and conditions pertaining to development permits. Division 4 of Part 14 describes the purpose, specifies required content and gives authority for bylaws pertaining to Official Community Plans. Division 6 gives requirements for development approval information, and Division 7 gives requirements and exemptions for development permits.

Under Division 4:

#### **Policy statements that may be included**

**474** (1) An official community plan may include the following:

(d) policies of the local government relating to the preservation, protection, restoration and enhancement of the natural environment, its ecosystems and biological diversity.

Under Division 6:

#### **Development Approval Information**

**484** For the purposes of this Division, "**development approval information**" means information on the anticipated impact of a proposed activity or development on the community, including, without limiting this, information regarding impact on such matters as the following:

(e) the natural environment of the area affected.

#### **Development approval information areas or circumstances**

**485** (1) An official community plan may do one or more of the following for the purposes of this Division:

- (a) specify circumstances in which development approval information may be required under this Division;
- (b) designate areas for which development approval information may be required under this Division;
- (c) designate areas for which, in specified circumstances, development approval information may be required under this Division.

#### Under Division 7

##### **Designation of development permit areas**

**488** (1) An official community plan may designate development permit areas for one or more of the following purposes:

- (a) protection of the natural environment, its ecosystems and biological diversity

##### **Activities that require a development permit**

**489** If an official community plan designates areas under section 488 (1), the following prohibitions apply unless an exemption under section 488 (4) applies or the owner first obtains a development permit under this Division:

- (a) land within the area must not be subdivided;
- (b) construction of, addition to or alteration of a building or other structure must not be started;
- (c) land within an area designated under section 488 (1) (a) or (b) [*natural environment, hazardous conditions*] must not be altered

##### **Development permits: specific authorities**

**491** (1) For land within a development permit area designated under section 488 (1) (a) [*protection of natural environment*], a development permit may do one or more of the following:

- (a) specify areas of land that must remain free of development, except in accordance with any conditions contained in the permit;
- (b) require specified natural features or areas to be preserved, protected, restored or enhanced in accordance with the permit;
- (c) require natural water courses to be dedicated;
- (d) require works to be constructed to preserve, protect, restore or enhance natural water courses or other specified natural features of the environment;
- (e) require protection measures, including that vegetation or trees be planted or retained in order to
  - (i) preserve, protect, restore or enhance fish habitat or riparian areas,
  - (ii) control drainage, or
  - (iii) control erosion or protect banks.

#### **Fisheries Act**

The federal Fisheries Act prohibits “any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery”. Fisheries and Oceans Canada’s October 2013 policy statement interprets “serious harm” to include the death of fish, permanent alteration to fish habitat or the destruction of fish habitat; and provides guidance as to how this should be considered in practice.



### ***Water Sustainability Act (SBC 2014 Chapter 15)***

Authorizations for changes in and about a stream (formerly issued under Section 9 of the Water Act) are issued under Section 11 of the Water Sustainability Act by the Comptroller of Water Rights, or by persons designated by the minister as a water manager or an engineer for the purposes of the Act. A person designated as an engineer for the purposes of the Act must be a member of APEGBC or holder of a limited licence.

The Water Sustainability Act defines "changes in and about a stream" to mean:

- (a) any modification to the nature of a stream, including any modification to the land, vegetation and natural environment of a stream or the flow of water in a stream, or
- (b) any activity or construction within a stream channel that has or may have an impact on a stream or a stream channel;

### ***Drinking Water Protection Act (SBC 2001)***

This act and regulations applies to waterbodies that are drinking water sources. Part 4, Section 23 (1) prohibits the introduction of anything that could be a drinking water health hazard into a water body used for domestic water supply.

### ***Land Title Act (RSBC 1996)***

Section 86 (1) (c) (vi):

This section gives an approving officer the authority to refuse approval of a subdivision plan if, after due consideration of all available environmental impact and planning studies, the approving officer considers that anticipated development of the subdivision would adversely affect the natural environment to an unacceptable level. An approving officer under the Land Title Act could be an officer of provincial, local or First Nation government.

### ***Environmental Management Act (SBC 2003)***

This act is mainly to do with pollution prevention and mitigation. Section 85 provides general authority to the minister:

- 85 (1) The Minister may declare that an existing or proposed work, undertaking, product use or resource use has, or potentially has, a detrimental environmental impact.

Under this act, the minister may issue orders directing that mitigative actions be taken or that environmental management plans be prepared.

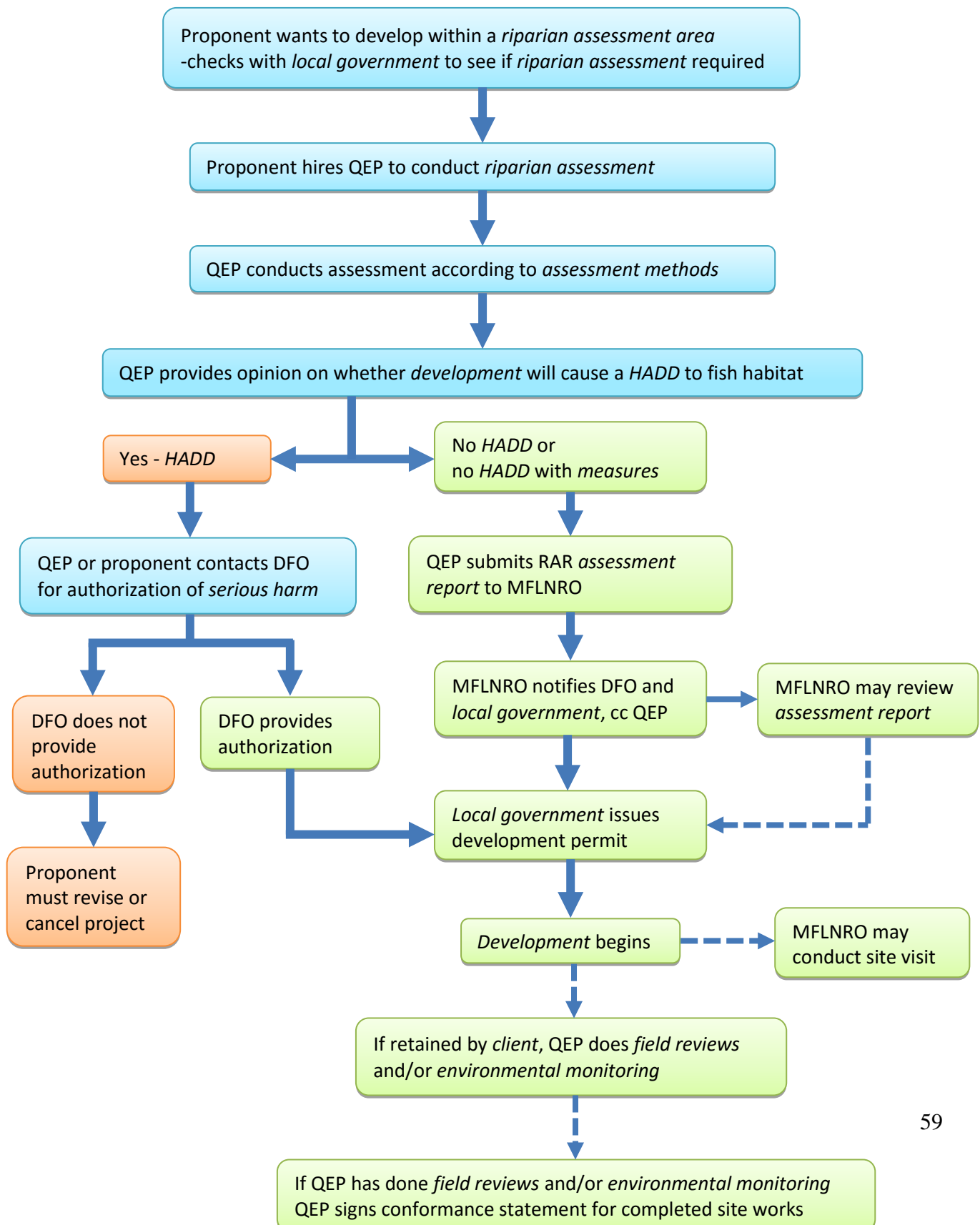
### ***Community Charter Act (SBC 2003)***

Section 8 (1) (c) of this act gives municipalities the authority to regulate the protection of trees.



## Appendix D: Development Process under Riparian Areas Regulation

Adapted from Appendix 1 of: Office of the Ombudsperson, *Striking a Balance: The Challenges of Using a Professional Reliance Model in Environmental Protection – British Columbia's Riparian Areas Regulation*, Public Report No. 50, British Columbia: Legislative Assembly, March 2014. Used with permission.



# Appendix E: Guidance on field procedures

## 1. Overview

This appendix provides guidance on the field assessment methods typically used for *riparian assessments* conducted for the purpose of the Riparian Areas Regulation. It draws on MWLAP 2006, on other scientific references, and on experience gained from conducting *riparian assessments* under the Riparian Areas Regulation. This appendix must be read and followed in conjunction with the full text of the Guidelines.

The *Qualified Environmental Professional* should record how all measurements are taken; for example, by tape measure, hip chain, range finder, GPS waypoints, handheld inclinometer, etc.; and describe any uncertainties or limitations in the field investigations. Field measurements should be of sufficient number and accuracy that another *Qualified Environmental Professional* independently investigating the same site would come up with a substantially similar result.

Terms in italics are defined in Section 2 of the Guidelines.

The *Streamside Protection and Enhancement Area* is established within the subject property, although the *riparian assessment area* and *study area* often extend beyond the limits of the subject property. After the *riparian assessment* is done, the *Streamside Protection and Enhancement Area* is marked on the ground before site work commences to allow for protection and monitoring during the site work; and also after site work is finished to prevent future encroachments into the *Streamside Protection and Enhancement Area*. The *Approving Authority* may require the limits of *Streamside Protection and Enhancement Areas* to be marked by a BC Land Surveyor.

## 2. Assessment Options

Two assessment options are presented here. Note that *local governments* may have bylaws that specify or limit the assessment method to be used and/or minimum *Streamside Protection and Enhancement Area* widths; the *Qualified Environmental Professional* must check local bylaws before proceeding with a *riparian assessment*.

It is acknowledged that these are prescriptive methodologies; and that they assume commonly encountered conditions. The purpose of these methodologies is to provide sufficient detail and direction so that the *Qualified Environmental Professional* understands what is expected with respect to the level of effort intended by the Riparian Areas Regulation. The premise of these methods is that in most cases, the *Streamside Protection and Enhancement Areas* delineated by these procedures will provide an essential level of protection for fish habitat. The *Qualified Environmental Professional* is expected to judge whether or not these methods are sufficient to achieve the protection intended by the Riparian Areas Regulation and if they are not, to do such additional work and prescribe such further measures as may be needed.

### 2.1 Simple Assessment Method

The Simple Assessment is best used for large parcels, subdivisions, re-zoning, or properties in the planning stages of development. This method considers the following factors in determining the *Streamside Protection and Enhancement Area* width:

- The width of existing and potential streamside vegetation
- Whether the *stream* is fish-bearing
- The duration of *stream* flows for *streams* where fish absence is confirmed but the *streams* are connected to fish habitat.

The Simple Assessment typically results in more conservative *Streamside Protection and Enhancement Area* widths; and therefore *measures* to protect the *Streamside Protection and Enhancement Area* determined by this method are usually simpler. In this method, a *stream* with confirmed fish absence is distinguished from fish-bearing *streams*. If the fish-absent *stream* is connected to fish habitat, then both are considered *streams* under the Riparian Areas Regulation. However, the fish-absent *stream* has less value for fish and therefore results in a narrower *Streamside Protection and Enhancement Area*. For fish-absent *streams*, the duration of flow is considered in determining the *Streamside Protection and Enhancement Area*. An example of where this might apply would be a road ditch that intermittently flows into a fish *stream* but has a barrier such as an extremely long culvert (e.g., 100m) discharging into the fish *stream* that prevents fish access into the ditch.

**Field checks:** Field checking the full extent of the *riparian assessment area* is particularly important where imagery or maps may be out of date because land uses have changed, or where structures and clearings are difficult to interpret.

## 2.2 Detailed Assessment Method

The Detailed Assessment is best used for individual lots, brownfield sites or small parcels. This method determines the following in order to identify zones of sensitivity:

- reach breaks
- *stream* width
- *stream* gradient
- channel type
- potential vegetation type.

The minimum *Streamside Protection and Enhancement Area* width is determined from the outer limits of the greatest zone of sensitivity. This method also assesses *measures* to protect the integrity of the *Streamside Protection and Enhancement Area*.

For all *riparian assessments*, any potential safety concerns identified must be indicated in the *assessment report* and must be drawn to the attention of the *Client*.

## 3. Determining the Study Area and the Riparian Assessment Area

### 3.1. Study area

The extent of the study area should be selected so as to adequately assess the elements listed in Section 5.5.1 of the Guidelines; and will often be significantly larger than the *riparian assessment area* defined in the Riparian Areas Regulation. The study area should be large enough to determine connectivity of the

*stream* at the subject site to fish habitat, including potentially unmapped *streams* that may connect to the subject site. Be aware that local mapping is frequently out of date or missing small tributaries, wetlands and ditches.

**The study area should be of sufficient extent to determine the current and potential functionality of the riparian area, the current and potential associated fish habitat; and the effects of both existing modification and the proposed *development* on fish habitat.**

The subject site should be put into context in the watershed unit that contains it, at least at an overview level, in order to evaluate its relative importance as **existing or potential fish habitat**.

### 3.2 *Riparian assessment area*

The *riparian assessment area* is defined in the Riparian Areas Regulation as follows:

- For a *stream* that is not in a ravine: a 30 meter strip on both sides of the *stream*, measured from the high water mark on each side.
- For a ravine less than 60 m wide: a strip on both sides of the *stream* measured from the high water mark to a point that is 30 m beyond the top of the ravine bank.
- For a ravine 60 m wide or greater: a strip on both sides of the *stream* measured from the high water mark to a point that is 10 m beyond the top of the ravine bank.

**All distances indicated are measured as horizontal distances, not slope distances and are made perpendicularly from the shoreline of the *stream*.**

The following describes and illustrates each of these settings.

#### 3.2.1 *Riparian Assessment Areas for Streams not in a Ravine*

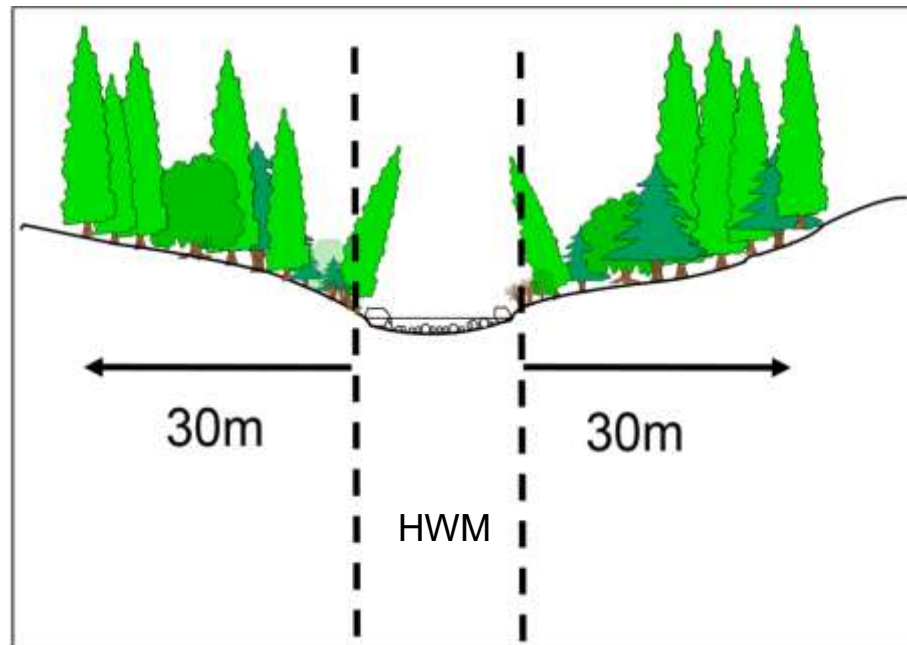
For *streams* with flanking floodplains, the *high water mark* on each side of the *stream* is at the outer edge of the *active floodplain* (See Section 3.7.1 below).

For *streams* with no flanking floodplain, that is, where the *stream* banks are not in alluvial deposits (material deposited by the *stream*), the *high water mark* is the visible edge of the seasonally flooded channel, often referred to as the bankfull channel (See Section 3.3.1 below).

Where the margins of *streams* are distinct, identifying the *high water mark* may be fairly easy. In flatter terrain the edge of an *active floodplain* may be subtle or may have been obscured by land use alterations. If the edge of the *active floodplain* cannot be identified with confidence, then it is suggested to use the following to establish the *high water mark*:

- The point closest to the edge of the main *stream* shoreline where the slope of the land breaks to steeper than 33% for a minimum horizontal distance of 15 meters measured perpendicularly from the shoreline.

**Case 1** (Figure F-1): *Stream not in a ravine*. The width of the *riparian assessment area* is a strip 30 m (horizontal distance) on each side of the *stream*, measured from the *high water mark*.



**Figure E-1.** *Riparian assessment area for stream not in a ravine*<sup>4</sup>

### 3.2.2 Riparian Assessment Areas for Streams within Ravines

A “ravine” is a narrow step-sided valley with sideslopes greater than 3H:1V (horizontal:vertical). The “top of ravine bank” is the point at which the ravine sideslope becomes flatter than 3H:1V for a distance of at least 15 m. Note that 3H:1V is a slope of 33%.

Thus, the *riparian assessment area* in a ravine is the region that includes the *stream* width between the high water marks, the sideslopes of the ravine, and the 30 m or 10 m additional horizontal width beyond the top of the ravine bank on each side.

**Case 2** (Figure F-2): a *stream* (most commonly a linear watercourse) in a *ravine*.

- For a *ravine* less than 60 m wide, the *riparian assessment area* is a strip on each side of the *stream*, measured from the *high water mark* to a point 30 m (horizontal distance) beyond the top of the *ravine* bank.
- For a *ravine* 60 m wide or greater, the *riparian assessment area* is a strip on each side of the *stream*, measured from the *high water mark* to a point 10 m beyond the top of the *ravine* bank.

<sup>4</sup> RAR Assessment Methods. 2006.

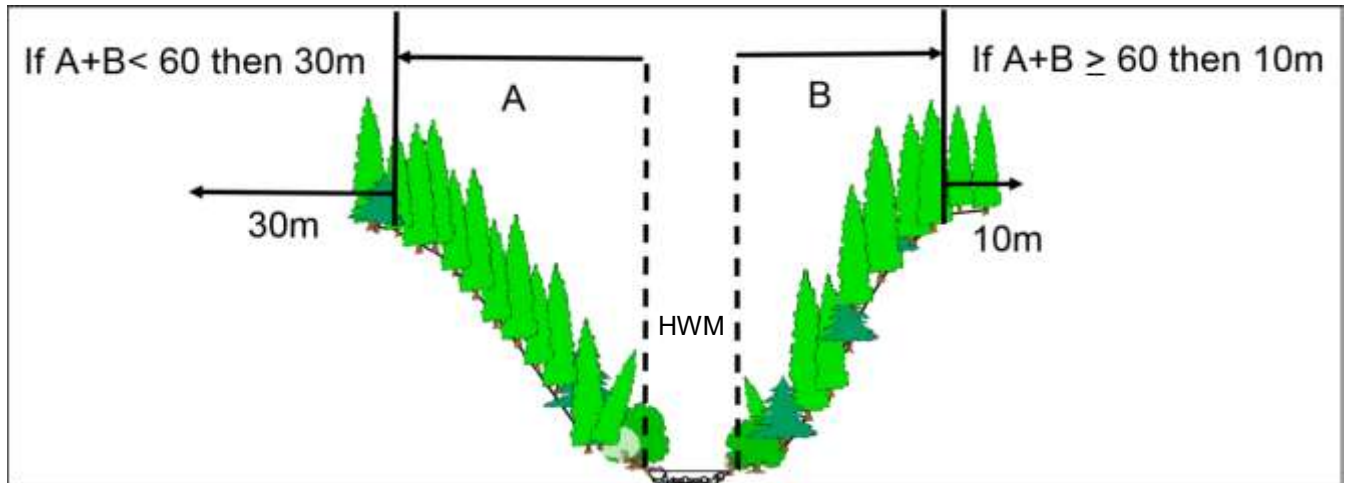


Figure E-2. *Riparian assessment area for stream in a ravine.*<sup>5</sup>

### 3.2.3 Riparian Assessment Areas for Streams with one steep slope

The Riparian Areas Regulation does not speak to the situation where only one side of the *stream* has a slope steeper than 3H:1V. In areas with only one steep side, the following *riparian assessment area* would be consistent with the intent of the regulation:

- On the side steeper than 3H:1V: width of riparian assessment area to extend 30 metres (horizontal distance) beyond the top of bank
- On the side flatter than 3H:1V: width of *riparian assessment area* to extend 30 metres (horizontal distance) beyond the high water mark of the *stream*.

#### Case 3 (Figure F-3-new)

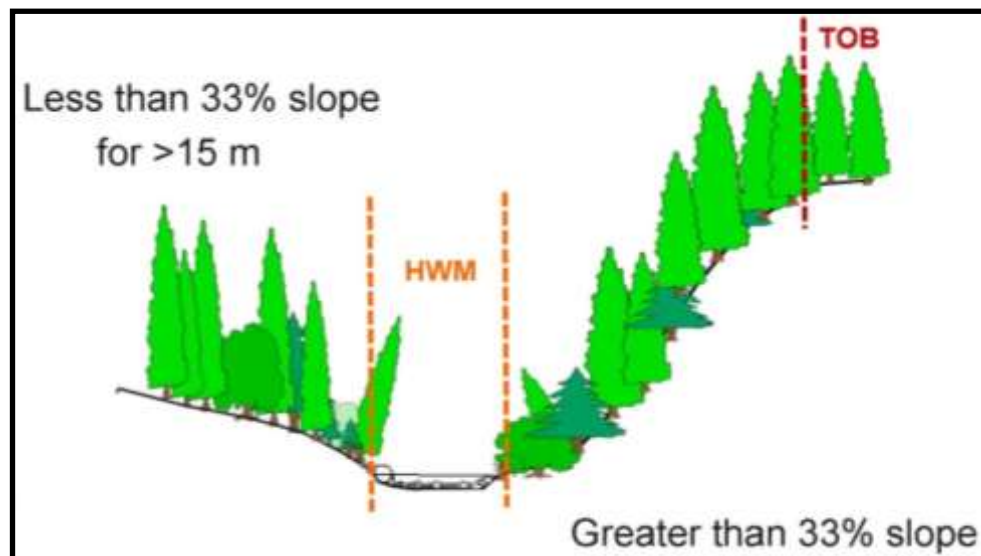
This case is not defined in the Riparian Areas Regulation but is considered to meet the intent of the regulation for the purpose of this Assessment Methodology.

- Where the terrain is variable such that one side of the *stream* has a slope steeper than 3H:1V and the other side has a slope less than 3H:1V
- Measurements on the steep side should be as for a *ravine*, and measurements on the flatter side should be as for a *stream* not in a *ravine*.

For the purpose of this assessment methodology, in this Case 3 situation, these positions are referred to as “top of bank”. That is, on the side with the steep slope, the “top of bank” is the point at which the slope breaks to flatter than 3H:1V for a minimum horizontal distance of 15 m; and on the side with the flatter slope, the “top of bank” is the *high water mark*.

<sup>5</sup> RAR Assessment Methods. 2006.





**Figure E-3. Riparian assessment area for stream with one steep bank and one gentle bank**

### 3.2.4 Riparian Assessment Areas in Variable Terrain

Where landforms are variable, the width of the *riparian assessment area* may also vary. For example, the practitioner may be using high water mark then top of bank then high water mark to determine the assessment area boundaries as the adjacent slopes vary from low gradients to steeper gradients to lower gradients. Locations determined in the field should also be accurately shown on a map in order to avoid confusion when delineating the *Streamside Protection and Enhancement Area* both on site and in the *Qualified Environmental Professional's* report.

### 3.2.5 Riparian Assessment Area Lengths

The length of the *riparian assessment area* differs for each assessment methodology (Simple or Detailed). For the Simple Assessment, the Potential and Existing Vegetation Type is assessed the length of the *riparian assessment area* is a minimum of 400 m total length or the full length of the subject property along the channel bank or shoreline, whichever is greater. If the subject site is less than 400 m in total length, then this zone is measured 200 m upstream and downstream from the midpoint of the stream within the subject property.

For the Detailed Assessment, the *riparian assessment area* is a minimum of 100 m total length or the full length of the subject property along the channel bank or shoreline, whichever is greater. The intent is that the *stream* assessment will be done along the full length of the *stream* along the property but for a distance not less than 100 m. On a large property, this may extend for a length considerably greater

than 100 m. On a small property, which may be only a few tens of metres in width, the *stream* assessment may extend well beyond the limits of the property.

### **3.3      *Field Measurements***

The *Qualified Environmental Professional* should ensure that sufficient field measurements of channel widths, *stream* gradients, riparian communities, bank slopes and lengths, channel bed material, vegetation communities, tree sizes and other data required to support the assessment and conclusions are obtained and carried out to an appropriate professional standard. If additional methods beyond the Riparian Areas Regulation Methods are used, the *Qualified Environmental Professional* should indicate the specific methodologies or references that were followed, the field procedures, and the means of measurement (for instance, hand-held inclinometer, range-finder, tape measure, etc). In particular, points and measurements referred to in the Riparian Areas Regulation should be recorded, depicted on maps of suitable scales, and flagged in the field as applicable to and suitable for the site. These include:

- *High water mark*
- Limits of *active floodplain*, if present
- Widths, side slopes and top of *ravine* bank for *ravines* or *gullies*, if present
- Limits of the *Streamside Protection and Enhancement Area* delineated in the *riparian assessment*

#### **3.3.1      *Bankfull Channel Width (Detailed Assessment Methodology)***

Within the Detailed Assessment Methodology, the “average channel width” is determined for streams but not for lakes and wetlands. It must be determined for all reaches within the subject parcel.

For the purpose of consistency in carrying out field assessments for this Assessment Methodology, measurement of the “average channel width” should follow accepted methods of measurement for “channel bankfull width”. Bankfull width is not defined in the Riparian Areas Regulation but is widely used in channel assessments, fish *stream* inventories and fish habitat assessments; and is considered to meet the intention of the Riparian Areas Regulation for conducting riparian assessments.

Method of measuring bankfull channel width is described in the 2001 RIC document: Reconnaissance (1:20,000) fish and fish habitat inventory: Standards and procedures, and in various other manuals and guidebooks. The *Qualified Environmental Professional* should document the references and methods used for conducting field measurements and determining bankfull width.

The average width of the stream reach is usually calculated by taking measurements spaced 10 m apart. For a 100 m reach, this is a total of eleven separate width measurements. The starting point for the measurements is the center of the reach within the subject parcel. For small lots, the 100 m stream section is likely to extend beyond the property boundaries. In larger parcels, spacing of the bankfull channel widths should be spread out to assess the entire stream within the subject property. See Section 3.2.5 above regarding length of assessment.

#### **3.3.2      *High Water Mark along Wetlands***

*High water mark for wetlands* is not as easily determined as for streams. Not all wetland classes<sup>6</sup> are *streams* under the Riparian Areas Regulation, as some wetlands may not have surface water long enough to support fish habitat within the wetland or contain surface water to contribute to connected fish habitat. Understanding the nature of wetlands, their hydrology, their connectivity to fish habitat, and their contributions to fish habitat will need to be considered during *riparian assessments*. The *high water mark for wetlands* will need to be determined using the Riparian Areas Regulation definition for the purpose of establishing *Streamside Protection and Enhancement Areas* bordering these waterbodies.

### 3.4 *Stream reaches*

If the *streams* that are the subject of the *riparian assessment area* include linear watercourses (as distinct from lakes or wetlands), then channel types and relative sensitivity would typically be described for the reaches within the *riparian assessment area*, and depending on the scope of the *riparian assessment*, within the possibly larger study area.

The *Qualified Environmental Professional* will need to define the reaches within the *riparian assessment area*. Guidance for defining reaches and establishing reach breaks can be found in several references including the Fish-Stream Identification Guidebook and the Riparian Management Area Guidebook (see reference list in Section 8). *Qualified Environmental Professionals* should note that culverts and other artificial features that have become barriers to fish passage are not necessarily reach breaks; it is important to consider whether the channel features change upstream and downstream of the feature. Each reach must be given a unique number on the site plan. Within the Detailed Assessment methodology, the minimum reach length is 100 meters or the full length of the subject property, whichever is longer as described in Section 3.2.5 above.

*Streamside Protection and Enhancement Area* widths are typically determined for each stream reach in the *riparian assessment area*. Thus some components of a *riparian assessment* are completed for each reach.

### 3.5 *Characteristics of fish habitat*

Field work would typically investigate and describe the following:

- Types of fish habitat present (e.g. spawning, rearing, over-wintering, or migration) and the fish species and life stages they support
- Connectivity to downstream habitats
- Physical features of the *stream* including:
  - Physical size: width, depth, wetted area and gradient
  - If linear, direction and flow, including peak and low flow descriptions
  - If linear, stream transport energy (e.g., using Millard 2000, Millard 2001)
  - If linear, bed morphology (for example: riffle-pool, cascade-pool, step-pool.)
  - Substrate (for example: bedrock controlled, uniform sand/silt/clay bed, etc.)
  - Streambed material (for example: fines, gravels, cobbles, boulders, etc.)
- Channel description (i.e. slope, depth, stability, meandering/channelized)
  - Whether the *stream* is confined by non-alluvial banks, entrenched (as in a gully or *ravine*), or has a flanking floodplain in alluvial deposits

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<sup>6</sup> MacKenzie, W. H. and Moran, J. R. 2004. *Wetlands of British Columbia: a guide to identification*. Land Management Handbook No. 52

- If alluvial, where on the floodplain the active channel is located, e.g. mid floodplain with both banks in alluvial deposits; or on one side or the other with one bank in non-alluvial deposits
- Current condition of the channel (i.e. disturbance or modification, such as straightening, armouring, ditching, diversion, loss or removal of large wood debris, loss of sources of substrate material, culverting through storm drains for long distances, etc.)
- Bank descriptions and evidence of erosion, undercutting or slope instability
- Sources of shade
- Cover; including large woody debris, aquatic vegetation, and instream habitat
  - For that *stream*, size and biogeoclimatic zone, whether large wood debris would normally (in a pre-disturbance condition) have a function in channel morphology.
- Structures such as pipes/effluent, culverts, weirs, bank armouring, retaining walls, channel diversions or realignments
- Any off-channel habitat
- Any barriers (natural or artificial) to fish movement
- Values of areas tenuously connected to fish habitat, including times when connections are limited.
- Value for fish of food and nutrients derived from the *stream*

### 3.6 ***Characteristics of the riparian area***

A *riparian assessment* is required to consider both the present vegetation and the vegetation that could be established on the site over the longer term to contribute to the quality of fish habitat (potential vegetation). The *Qualified Environmental Professional* is responsible for assessing the existing functionality and its potential to support fish habitat.

Field work in the riparian area would typically investigate and describe the following:

- Width of the current riparian area
- Types of vegetation present, including native, exotic or invasive plant species
- Age of trees and general health of vegetation
- Sources of large woody debris
- General topography of the site
- General soil description
- Any artificial modifications such as retaining walls, landscaping features, trails (especially for vehicle access), etc.

### 3.7 ***Identifying sensitive zones***

Typically, sites that encompass *natural features, functions and conditions* (see Section 2.0 Definitions in the Guidelines) would be identified as zones of sensitivity in the field. Depending on the site, these could include:

- *Active floodplains* including side channels and channel migration zones
- Connected wetlands, intermittent streams, or springs
- Sources of large wood debris
- Riparian vegetation that filters sediment; provides shade, cover, food, nutrients, or organic matter to *streams*; and/or has root matrices that resist erosion and bank instability
- Natural sources of *stream* bed substrates

- Permeable surfaces that permit infiltration and may contribute to moderating flows or sustaining low flows
- Potentially unstable gully or *ravine* sidewalls

### 3.7.1 The active floodplain

The Riparian Areas Regulation defines the *high water mark* to include the *active floodplain*, where one is present. The *active floodplain* defined in the Riparian Area Regulation is further explained as that part of the contemporary floodplain subject to occupation by standing or flowing water more frequently than once in five years, on average (Church and Eaton 2001). Practically speaking, it is usually the area where visible evidence can be found of flooding or water flows; for example, eroded side channels or overflow channels, rafted debris, water or sediment lines on trees, fine silt caught in bark or moss on trees or stumps, fresh sediment on the ground surface, thin duff of less than a few inches over mineral soil. Note that evidence of this kind reflects the last flood event and might not reflect a low return period (5 years or less) if there has been a recent extreme flood. In previously harvested forests, stumps may be absent (indicating that they have been eroded away) or confined to locally higher microsites (indicating that the floodplain has eroded around them); or there may be old cutbanks with undercut leaning trees indicating that the channel has shifted away from that position.

When the *Qualified Environmental Professional* is determining the outer limits of the *active floodplain* and the position of the *high water mark*, he/she should consider local climate change projections and whether predicted increased peak flows and flood levels would affect the position of the *high water mark*.

*Floodplain plant species* typical of inundated or saturated soil conditions can include water-tolerant species such as cottonwood trees, salmonberry, red-osier dogwood or willow; or predominantly alder stands indicating past site disturbance. Vegetation may be variable, possibly containing facultative or obligate wetland species or plants tolerant of lengthy dry periods.

While there is uncertainty in estimating a low return period using the physical evidence described above, it is usually the best means of identifying the active floodplain unless flood stages have been determined by survey and analysis. Moreover, physical evidence is often sought as a means of validating flood frequency analyses.

The presence of a flanking floodplain is characteristic of alluvial *streams*. Other streams, those with confining banks in non-alluvial deposits, do not have a floodplain beyond the seasonally flooded channel.

### 3.7.2 Slope or bank stability

Slope and bank stability in the *riparian assessment* is assessed with respect to its influence on the *stream*. This is not a landslide hazard or risk assessment for the proposed *development*. Appropriate slope stability *measures* should be prescribed so that the *development* does not destabilize the slope and put the integrity of the *Streamside Protection and Enhancement Area* at risk. If slope stability could affect or be affected by the *development*, then a separate landslide risk assessment may be needed, done to the applicable standard and by the appropriate professional.

If the *stream* is entrenched in a gully or *ravine*; or if the *riparian assessment area* includes a slope adjacent to a *stream*, the condition of the slopes would typically be described with respect to slope stability, for example:

- Bank material, slope angle and slope height
- Are the slopes in a natural condition or have they been modified by excavation, fill placement, site grading, retaining structures, etc.
- Are the banks undercut by stream erosion or by excavation
- Is there instability evident which may be introducing sediment to the *stream*
- What is the current vegetation condition on the slope and is it adequate for maintaining slope stability
- Is there drainage onto the slope from adjacent development that could affect stability (such as roof drains, septic fields, storm drains, ponds or pools at the slope crest, etc.)

The *Qualified Environmental Professional* may need to involve a terrain specialist to evaluate stability considerations with gully or *ravine* sidewalls.

In flat or very low gradient systems, *specialists* may not be required on site (for example, a residential lot with a groomed lawn and 2% slope, does not require a *specialist*). This will be at the discretion of the primary *Qualified Environmental Professional*.

### 3.7.3 Soil erosion of banks and adjacent terrain

The material type and relative erodibility of banks or slopes adjacent to streams should be described in relation to the potential erosive energy, and any active erosion noted. Examples might include *stream* bank erosion or wave erosion on a lakeshore. Current vegetation type and extent should be described and, where stream banks are in erodible deposits relative to the stream energy, the effectiveness of existing vegetation to control bank erosion should be noted.

The *Qualified Environmental Professional* may need to involve additional *specialists* to assess erosion potential or to recommend suitable erosion and sediment control *measures* both during the site work and for the longer term *development*, to avoid causing erosion or introducing sediment to *streams* or to the *Streamside Protection and Enhancement Area*.

### 3.7.4 Windthrow and Danger Trees in and adjacent to the Streamside Protection and Enhancement Area

For treed areas within and/or adjacent to the *Streamside Protection and Enhancement Area*, the *Qualified Environmental Professional* should consider whether there could be a hazard of windthrow to the people or structures as a result of the *development* or from other site modification nearby. Removal of trees or erection of new structures can alter wind patterns and expose trees to wind forces that they have not previously experienced. The *Qualified Environmental Professional* may need to involve a *specialist* to evaluate the windthrow hazard and to recommend windthrow treatments; or alternatively may recommend in the *riparian assessment* report that the *Client* retain a windthrow *specialist* when implementing the recommended *Measures*. A disadvantage of leaving it to the *Client* to arrange at a later date is that windthrow management strategies recommended by the windthrow *specialist* may require changes to the *Measures* recommended in the *riparian assessment* report.

Similarly, a *Qualified Environmental Professional* may need to involve a *specialist* to assess potential Danger Trees and recommend safe modification or removal measures; or recommend to the *Client* that a Danger Tree *specialist* be retained closer to the time of development or after each winter season. If trees are felled, the tree should be left in the *Streamside Protection and Enhancement Area* as coarse woody debris and another tree should be planted to replace the fallen one.

### **3.8 Stormwater Management**

The *Qualified Environmental Professional* should take note of existing stormwater management systems in the study area and whether there is discharge toward the *riparian assessment area* or a *stream*. For subdivisions, the *development* plans should be reviewed to check whether there is likely to be any effect on *waterbodies* or the *riparian assessment area* from proposed stormwater systems. It should be noted whether existing stormwater management systems divert water into or out of watersheds and whether this has affected *waterbodies* at the subject site. In watershed boundary sites, *development* should avoid changing hydrology patterns as much as possible and drainage should be maintained into the respective watersheds.

### **3.9 Other considerations**

The *Qualified Environmental Professional* should investigate aspects of the *development* or other alterations in the watershed unit that may or may not be within the *riparian assessment area* but could affect habitat within the *Streamside Protection and Enhancement Area* (for example, windthrow from nearby land clearing, sediment from gravel roads, increased surface runoff, increased flows from drainage control systems entering the watercourse upstream, etc.). There are several resources that can provide information and direction. These include:

- Fisheries and Oceans Measures to Avoid Causing Harm to Fish and Fish Habitat website: <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html>
- BC Ministry of Environment Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia. Available at: <http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/>

### **3.10 Determining the Streamside Protection and Enhancement Area**

The *Streamside Protection and Enhancement Area* is determined differently in the two Assessment Methods. However, both methods will result in meeting the intent of the regulation that of protecting and preventing any harm to areas that provide fish habitat. The following describes points that should be considered when determining a *Streamside Protection and Enhancement Area*.

#### **3.10.1 SPEA determination using the Simple Assessment Method**

The Simple Assessment method uses two definitions of “permanent structure”. The first definition is used to determine the status of the Existing and Potential Vegetation. The second definition is used for *Streamside Protection and Enhancement Area* determination when prior development has occurred within the *assessment area*.

##### **3.10.1.1 Existing and Potential Vegetation**

The status of the Existing and Potential Vegetation is determined by creating 30m long transects within the *riparian assessment area*. An air photo can be used to undertake this task providing it is of a scale and resolution sufficient to determine the type of structures and the *Qualified Environmental*

*Professional* confirms by a site visit that no changes have occurred to the area since the date that the air photo was taken. Most commonly a suitable scale to use is 1:3,000. Where adequate air photo coverage is unavailable, then another base map supplemented with photographs could be used, or the assessment could be accomplished from ground transects if permission to access upstream and downstream properties can be obtained.

For each transect, measure the distance from the *high water mark*, the *top of ravine bank*, or the “top of bank” to the “permanent structure”. For this exercise, “permanent structure” is defined as the first building with foundation encountered along the transect. Measurements must be taken at right angles from the *high water mark*, the *top of ravine bank*, or the “top of bank”, and all distances are measured horizontally.

**Field checks:** Field checking the full extent of the *riparian assessment area* is particularly important where imagery or maps may be out of date because land uses have changed, or where structures and clearings are difficult to interpret.

### **3.10.1.2 Adjusting for permanent structures in Streamside Protection and Enhancement Areas**

The definition of *Streamside Protection and Enhancement Areas* in the Riparian Areas Regulation includes:

“existing and potential riparian vegetation and existing and potential adjacent upland vegetation that exerts an influence on the *stream*”.

Section 1 (2) of the Riparian Areas Regulation provides further clarity:

“For the purposes of the definition of “streamside protection and enhancement area,” vegetation must be considered to be “potential” if there is a reasonable ability for regeneration either with assistance through enhancement or naturally, but an area covered by a permanent structure must be considered to be incapable of supporting potential vegetation.”

For the purpose of applying Section 1 (2) of the regulation, “permanent structures” in the Simple Assessment are considered to include other facilities and infrastructure that are not necessarily “constructed, placed or erected on a secure and long lasting foundation” but that reason would dictate are not expected to be removed or substantially altered in order to re-establish riparian vegetation. Table 2-3 in the RAR methods provides guidance on what structures, facilities or infrastructure are considered “permanent” for the purpose of determining *Streamside Protection and Enhancement Area* widths and prescribing riparian vegetation measures for vegetation potential.

### **3.10.2 SPEA determination using the Detailed Assessment Method**

The width of the *Streamside Protection and Enhancement Area* calculated by this method is a minimum. The *Qualified Environmental Professional* should evaluate whether the calculated width is sufficient to provide for the *natural features, functions and conditions* or whether additional width is needed. This might be the case, for example, where the existing riparian vegetation is not functioning and additional width is advisable in order to develop functioning riparian vegetation over time.



### 3.11 Establishing and Delineating the Streamside Protection and Enhancement Area

*Streamside Protection and Enhancement Areas* are delineated to encompass the sensitive zones identified in the *riparian assessment area*, and to accommodate other considerations as described above and in Section 5.5.1 of the Guidelines.

The *Streamside Protection and Enhancement Area* is defined in the Riparian Areas Regulation to be an area that is “adjacent to a *stream* that links aquatic to terrestrial ecosystems and includes both existing and **potential** riparian vegetation and existing and **potential** adjacent upland vegetation that exerts an influence on the *stream*”. Therefore, vegetation must be considered to be “**potential**” if there is a reasonable ability for regeneration either with assistance through enhancement or naturally. An area covered by a permanent structure is considered incapable of supporting potential vegetation.

The *Streamside Protection and Enhancement Area* is measured as horizontal distance as follows. See Section 3.2 above for definition and illustration of the three cases.

Case 1 – measured from *high water mark*

Case 2 – measured from *top of ravine bank*

Case 3 – measured from top of bank

The *Qualified Environmental Professional* determines how well the site functions with respect to supporting fish habitat. The minimum *Streamside Protection and Enhancement Area* width is determined using either the Detailed or Simple assessment methodology. However, it is up to the *Qualified Environmental Professional* to judge if the *Streamside Protection and Enhancement Area* is sufficient based on the intention of the regulation and to support that judgment with rationale. There may be instances where a calculated *Streamside Protection and Enhancement Area* will need to be increased in size based on the judgement of the *Qualified Environmental Professional*.

If the riparian area is not functioning, then the *Qualified Environmental Professional* should consider both the extent of a *Streamside Protection and Enhancement Area* that is needed to provide for functional riparian vegetation in future, the measures that are needed to achieve functional riparian vegetation; and the expected time frame required to achieve improved riparian function. For example, such measures could include vegetation treatments to remove invasive or foreign species and plant native riparian species; erosion and sediment control; placement of large wood pieces to straddle *stream* banks; or similar.

Lastly, a local government may have bylaws specifying minimum *Streamside Protection and Enhancement Areas* that exceed the calculated or minimum widths given in MWLAP 2006. The *Qualified Environmental Professional* should check for specific requirements in local government by-laws.

The limits of the final *Streamside Protection and Enhancement Area* should be marked in the field. Depending on the requirements of the local government, the *Streamside Protection and Enhancement Area* may be established in the field by a qualified BC Land Surveyor or by the *Qualified Environmental Professional*. Additional field marking, such as the high water mark, top of bank, or top of ravine bank, may also be required by local government or other government agencies.

#### 3.11.1 Encroachment

The *Streamside Protection and Enhancement Area* should be marked in the field prior to any land disturbing activities to prevent encroachment into the *Streamside Protection and Enhancement Area* during *development*. The markings should be rechecked during *field reviews* and replaced if needed.

By the end of *development*, the *Streamside Protection and Enhancement Area* should be permanently marked in the field in some way to prevent encroachment over time. The *Qualified Environmental Professional* should discuss with the *Client* the best means of doing this. Some local governments have requirements as to the types of structures, plantings, or fencing that should occur along the *Streamside Protection and Enhancement Area* boundary.

## Appendix F: Qualified Environmental Professional Report Submission Review

### REPORT SUBMISSION REVIEW RIPARIAN AREA REGULATION RIPARIAN ASSESSMENT REPORT

*Note: This checklist is for the purpose of identifying whether a QEP has addressed the required content of a riparian assessment report, and if needed, to seek clarification. It does not constitute a peer review. If a peer review of a QEP's report is intended, then the peer review must be carried out by a Qualified Environmental Professional that meets the qualifications in Section 7 of the Guidelines, and must follow the protocols of the Guidelines and of the applicable professional association.*

RAR assessment no.	<i>MFLNRO or DFO reference no.</i>	Date received	<i>Date here</i>		
MFLNRO review	Name of reviewer				
	Date of review				
DFO review	Name of reviewer				
	Date of review				
Report title:	<i>Title of QEP report</i>				
Report author (Primary QEP):	<i>name</i>	Report date:	<i>Date here</i>		
Initial report:					<i>Yes or no</i>
Amendment or revision:					<i>Yes or no</i>
Re-evaluation of revised development proposal:					<i>Yes or no</i>
<i>Report components (a complete assessment report should include all of the following)</i>					Yes No n/a
Summary of project information ( <i>MFLNRO form. Note –some information on this form is beyond the control of the QEP, therefore the accuracy and reliability of it cannot be assured by the QEP, e.g., the start and end date of the proposed development site works.</i> )					
QEP qualifications summary sheet					
QEP assurance statement					
Specialist assurance statements ( <i>if specialists other than primary QEP involved in assessment</i> )					
QEP assessment ( <i>main body of assessment report with appendices and attachments</i> )					
<i>Assessment (individual QEP reports may present the information under different headings or in a different order)</i>					
Introduction					
QEP's client ( <i>who commissioned the assessment</i> )					
Physical property location and legal description					
Names of waterbodies and watershed units					
Local government who is the approving authority for development					

Purpose and scope of assessment			
Proposed development			
Size of subject property			
Length of frontage along waterbody			
Physical description of subject property, surrounding area, existing land uses			
Nature and physical extent of proposed development			
Extent of study area and assessment area			
Assessment team			
Primary author and signing QEP			
Other team members and their roles			
List of specialist reports if prepared			
Peer reviewers if applicable			
Information used in the assessment			
List of information ( <i>eg, could include imagery, spatial data, climate/hydromet information, fish data, topographic mapping, relevant inventories, previous reports or studies, surveys by others, etc</i> )			
Information provided by client re details of proposed development			
Source, data and scale of information given, especially for information pertaining to proposed development			
Methods			
Simple method			
Detailed method			
Modified or other method with justification			
Other guidelines, handbooks, technical bulletins etc., followed for specific aspects of the assessment			
Methods of analysis, if undertaken			
Limitations affecting the assessment ( <i>e.g., access to private property of others, physical barriers, snow cover, high stream flows, etc.</i> )			
Watershed overview			
General description ( <i>e.g., size, topography, relief</i> )			
General climatic/hydrologic environment			
Major waterbodies ( <i>lakes, streams, etc</i> )			
Artificial flow controls or diversions, water extraction, intakes			
Existing land uses			
Indicate subject site in context of watershed			
Fish resources - watershed			
Fish species present in watershed			
Fish distribution in watershed			
Known barriers			
Study area at subject site			
Riparian assessment area and broader study area if applicable			
Topography			
Nature of waterbodies – ponds, streams, lake, wetlands, floodplains, channels			
Fish bearing			

Fish species present at the subject site (known or assumed)			
Non-fish bearing			
Connectivity of waterbodies to downstream fish-bearing waterbodies			
Summary of field assessment ( <i>field data may lend itself to a tabular presentation</i> )			
Date of field work and conditions at time of assessment			
Verification of waterbodies and identification of any unmapped waterbodies			
Current vegetation condition – length and width			
Channel type, width, gradient and condition by reach			
Other conditions potentially affecting fish habitat ( <i>e.g., existing channel or floodplain alteration, armouring, diversions, channel constrictions, instream structures, pipes/effluent, culverts, weirs, etc.</i> )			
Barriers to fish movement within study area			
Conclusions			
Existing condition of waterbody and riparian vegetation with respect to features, functions and conditions supporting fish life processes			
Has a HADD already occurred from previous land use activities ( <i>if applicable to site</i> )			
Will there be a need for DFO authorization for a HADD to occur as a result of the proposed development			
Will there be a need for notification and/or authorization under the Water Act/Water Sustainability Act			
What existing or potential impacts can be addressed with measures at the subject property			
What existing or potential impacts are not possible to address with measures at the subject property ( <i>e.g., those that may be originating outside the subject property</i> )			
Streamside Protection and Enhancement Area (SPEA)			
Physical limits of SPEA			
Measures to protect and maintain SPEA			
Danger trees			
Windthrow			
Slope stability			
Protection of trees			
Encroachment			
Sediment and erosion control			
Stormwater management			
Floodplain concerns			
Potential vegetation			
Special techniques or conditions needed to implement measures			
Field markings needed to delineate SPEA and/or implement measures			
Safety			
Safety concerns identified			
Means of addressing safety concerns			
Rationales			

<i>Rationales for judgments, conclusions and recommendations may be in the report sections where these statements are made or may be in a separate report section.</i>			
Field reviews and environmental monitoring			
Field reviews recommended			
Environmental monitoring recommended			
Timing and notice required for field reviews and/or environmental monitoring			
Consequences if client does not retain QEP for field reviews/environmental monitoring			
Statement of limitations			
Restriction of report to client for its intended purpose			
Factors which may have limited the assessment			
Conditions relied upon for success of measures ( <i>e.g., diligent work practices and construction methods</i> )			
Over what time frame and under what conditions the assessment report will apply and under what circumstances will it no longer be valid			
Possible existing or future impacts to fish that cannot be addressed by measures at the subject property			
<i>Figures, maps and tables – these will vary depending on the type of development, the method chosen, nature of the site and measures prescribed. The following are examples; not all may be applicable in all assessments. *It may not be practical to display some items on maps or figures depending on the size of the site and scale of the figures. Some may be better described in report text.</i>			
Maps			
Location map showing subject property relative to watershed boundaries and other important features			
Field maps or images			
Extent of study area if different than riparian assessment area			
Points referenced in the Riparian Area Regulation			
Limits of riparian assessment area			
Width, side slopes and top of ravine bank for ravines or gullies if present*			
Limits of the active floodplain*			
High water mark*			
Boundaries of the Streamside Protection and Enhancement Area			
Extent of proposed development			
Waterbodies and confirmed or inferred connectivity to fish-bearing waterbodies			
Stream reaches			
Locations of field measurements*			
Vegetation polygons			
Zones of sensitivity			
Tables summarizing field data for stream reaches, vegetation types, zones of sensitivity ( <i>may be in an Appendix</i> )			
Drawings, sketches or images detailing measures			
Photographs ( <i>may be in a separate Appendix</i> )			

Appendices – <i>could include the following</i>			
Photographs			
Field data and maps			
Reports by specialists carrying out a specific aspect of the assessment			
Supplementary information for measures ( <i>e.g., suggested planting lists, detailed plans</i> )			
Notifications, authorization applications, relevant correspondence			
Reviewer comments			
<i>e.g., any aspects of QEP report that require clarification?</i>			

## Appendix G: Example format for riparian assessment reports

### EXAMPLE REPORT FORMAT

This is a summary outline only; in preparing a riparian *assessment report* the Qualified Environmental Professional (QEP) must consider the full scope of the Guidelines. As well, consulting firms may have standard report sections specific to their organization to include.

### Executive Summary

- Key findings of *riparian assessment*
- Summary of *Streamside Protection and Enhancement Area* extent
- Summary of *measures* prescribed to protect *Streamside Protection and Enhancement Area*
- Summary of recommended *field reviews* and *environmental monitoring* during site work

### Introduction

- QEP's *client* (who commissioned the assessment)
- Physical property location and legal description
- Names of *streams* and watershed units
- *Local government* who is the *Approving Authority* for *development*
- Purpose and scope of assessment

### Proposed development

- Size of subject property and length of frontage along *stream*
- Physical description of subject property, surrounding area, existing land uses
- Nature and physical extent of proposed *development*
- Extent of study area and *riparian assessment area*

### Assessment team

- Primary author and signing QEP
- Other team members and their roles including a list of other *specialist* reports if prepared (surveyor, hydrologist, forester, terrain specialist, fluvial geomorphologist, arbourist, field assistants, etc, as applicable)
- Peer reviewers (if applicable)

### Information used in the assessment

- Imagery, spatial data, climate/hydromet information, fish data, topographic mapping, inventories (watersheds/streams/soils/vegetation/terrain/fish/etc), previous reports or studies, surveys by others, etc.
- Include source, date and scale of information.
- Information provided by *client* as to details of proposed *development* (include date of information)

### Methods

- Whether Simple or Detailed *assessment method*



- Consistency with riparian assessment Guidelines and any additions to *assessment methods*
- Other guidelines, handbooks, technical bulletins, standards or protocols that were followed with respect to specific aspects of the assessment
- Methods of field measurements and field mapping of *streams*; extent of field investigation; dates of field work
- Methods of analysis, if undertaken
- Any limitations that affected the assessment (e.g., access to private property of others, physical barriers, snow cover, high stream flows, etc)

## Watershed overview

- Size, topography, relief, general climatic/hydrologic environment, existing land uses, waterbodies (streams, lakes, wetlands, ponds), artificial flow controls or diversions, water extraction (wells), etc.
- Indicate subject site in context of watershed

## Fish resources

- Fish species present, fish distribution in watershed, known barriers

## Study area at subject site

- Riparian assessment area and broader study area if applicable
- Physical character – topography; nature of streams, floodplains, channels; vegetation
- Fish species at subject site, spatial and temporal connectivity of *streams* to downstream fish-bearing *streams*

## Summary of field assessment

Field data may lend itself to a tabular presentation in conjunction with maps showing locations of key features and measurements.

- Date of field work and conditions at time of assessment
- Verification of streams and identification of any unmapped streams
- Current vegetation condition including length and width within *riparian assessment area*
- Channel type and condition by reach
- Other conditions potentially affecting fish habitat (e.g., existing channel or floodplain alteration, armouring, diversions, channel constrictions, instream structures, pipes/effluent, culverts/weirs, etc)
- Barriers to fish movements and whether these might reasonably be removed (e.g. culvert replacement)

## Conclusions

- Existing condition of *stream* and riparian vegetation with respect to *natural features, functions and conditions* supporting fish life processes
- Whether or not a *HADD* has already occurred from previous land use activities; or is likely to occur as a result of the proposed *development*
- What existing or potential impacts/modifications are possible to address with appropriate *measures* at the subject property including potential vegetation
- What existing or potential impacts/modifications are not possible to address with *measures* at the subject property (e.g., those that may be originating outside the subject property).

## Streamside Protection and Enhancement Area

- Indicate the extent of the *Streamside Protection and Enhancement Areas* within the subject property arising out of the field assessments for each *stream*
- Indicate if field markings have been set out on the site; and what field markings should be put in place on completion of the site works to prevent future encroachment into the *Streamside Protection and Enhancement Areas*

## Measures to protect Streamside Protection and Enhancement Area

- Describe *measures* necessary to protect and/or maintain the *Streamside Protection and Enhancement Area* (danger trees, windthrow, slope stability, protection of trees, encroachment, sediment and erosion control, stormwater management, floodplain concerns, potential vegetation, etc.)
- Indicate any special techniques or conditions needed to implement the *measures*
- Note any field markings that should be put in place in order to implement the *measures*

## Safety

- Identify any safety issues noted during the assessment and indicate how they are to be addressed both during and following the site work.
- If addressing the safety concern is beyond the expertise of the *Qualified Environmental Professional*, recommend to the *client* that the appropriate *specialist* be retained to address it.

## Rationale

- Rationales for judgments, conclusions and recommendations may be included in the report sections where these statements are made, or may be provided in a separate report section.

## Field Reviews and Environmental Monitoring

- Indicate at what times during the site works *field reviews* and/or *environmental monitoring* should be done in order to check that site works are completed as prescribed; that field markings are replaced as needed; and that work procedures do not cause a *HADD*.
- Indicate the notice required in order for the *Qualified Environmental Professional* or his/her delegate to be able to carry out *field reviews* and/or *environmental monitoring* at the appropriate times
- Indicate the consequences if the *client* chooses not to retain a *Qualified Environmental Professional* for these functions

## Statement of limitations

- Standard of care followed while carrying out the *riparian assessment*
- Factors which may have limited the assessment
- Success of the *measures* prescribed assumes diligent work practices and construction methods during the site work
- If the *Qualified Environmental Professional* is not retained to carry out *field reviews* and *environmental monitoring* then the *Qualified Environmental Professional* may not be able to provide assurance that the work site procedures were done appropriately or the work completed to an acceptable standards, or to sign a Conformance Statement

- Possible existing or future impacts to fish in the subject *streams* which cannot be addressed by *measures* at the subject property
- Restriction of the use of the report to the *client* for its intended purpose
- Over what time frame and under what the conditions the *riparian assessment* will apply; and under what circumstances may it no longer be valid

## Figures, maps and tables

These would typically include:

- A location map showing the subject property relative to watershed boundaries and other important features
- Tables summarizing field data for stream reaches, vegetation types, zones of sensitivity
- Field maps indicating the extent of the study area and *riparian assessment area*; *streams* and confirmed or inferred connectivity to fish-bearing *streams*; stream reaches; the locations of field measurements; and zones of sensitivity (if applicable)
- Detailed images or maps of the study area and *riparian assessment area*, supplemented with photographs and sketches as needed to clearly indicate the proposed *development*; the extent of the *Streamside Protection and Enhancement Areas*; and any *measures* prescribed to protect or maintain the *Streamside Protection and Enhancement Area*

## Appendices

Could include the following:

- Reports by *specialists* carrying out a specific aspect of the *riparian assessment*
- Field data and maps
- Photographs
- Supplementary information for *measures* prescribed such as suggested planting lists or detailed plans
- Notifications, authorization applications or relevant correspondence
- Other relevant information

## Attachments

The *riparian assessment report* must be accompanied by the following:

- Summary of project information (MFLNRO form)
- *Qualified Environmental Professional* qualifications – summary sheet (*this is the lead author responsible for the assessment*)
- *Qualified Environmental Professional* Riparian Assessment Assurance Statement
- Specialist Assurance Statements if *specialists* have been involved in the assessment (one to be signed by each *specialist*)

## Appendix H: Summary sheet – Qualified Environmental Professional qualifications

### SUMMARY OF QUALIFICATIONS QUALIFIED ENVIRONMENTAL PROFESSIONAL RIPARIAN ASSESSMENTS FOR THE RIPARIAN AREAS REGULATION

Date:	
Name of Qualified Environmental Professional:	<i>In the Assessment Methods this is the primary or lead QEP submitting the riparian assessment report.</i>
Professional designation:	
Professional association:	
Registration number:	
<b>Training in RAR Assessment Methods</b>	
Organization or agency delivery training:	
Name of trainer:	
Date of training session:	
Certificate number:	
<b>Other relevant education, training or experience</b>	<i>This would be professional development training relevant to riparian assessments beyond the QEP's education that qualified the QEP for professional registration. For example, seminars, workshops, short courses, certifications, etc.</i>
<b>Riparian assessments completed or contributed to (add lines or pages as needed)</b>	<i>A QEP may choose to use this form to maintain an on-going log of his/her riparian assessments by adding pages as needed; or to list some recent ones. The QEP should always list the most recent riparian assessment.</i>
Report title	
Report date	
As lead Qualified Environmental Professional (Y or N)	
As supporting specialist (Y or N)	<i>This is a secondary QEP under the assessment methods</i>
Report title	
Report date	
As lead Qualified Environmental Professional (Y or N)	
As supporting specialist (Y or N)	
Report title	
Report date	
As lead Qualified Environmental Professional (Y or N)	
As supporting specialist (Y or N)	
Report title	
Report date	
As lead Qualified Environmental Professional (Y or N)	
As supporting specialist (Y or N)	

Report title	
Report date	
As lead Qualified Environmental Professional (Y or N)	
As supporting specialist (Y or N)	

\_\_\_\_\_  
QEP Signature

\_\_\_\_\_  
Date

# **APEGBC Professional Practice Guidelines - Developing Climate Change Resilient Designs for Highway Infrastructure in British Columbia (Interim)**



**Interim Guideline for Use  
August 2016**

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This Version V1 dated August 2016 is the current version of these guidelines. (APEGBC DOCS #98605)

Final Draft

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Final Draft

## FOREWORD

These interim guidelines apply to highway infrastructure owned by *the BC Ministry of Transportation and Infrastructure (BCMoTI)*. After an interim period of one year to allow for adoption and uptake, it is expected that the finalized version of these guidelines will be released, at which point they may be adopted by other infrastructure owners within BC and elsewhere.

## 1 PREFACE

These APEGBC Professional Practice Guidelines address climate change and extreme weather event factors in the designs for *BCMoTI* highway infrastructure in British Columbia in order to promote climate resilience and have been developed with support and partial funding from *BCMoTI*. The Guidelines identify the standard of care to be followed when carrying out climate change resilient design of *highway infrastructure* under the authority of *BCMoTI*. This will ensure functionality and reliability of public highway assets in BC.

In addition to offering guidance on the standard of practice to be followed, the APEGBC guidelines also provide examples from practicing professionals in BC which have been included in an Appendix, to demonstrate the use of climate projections along with engineering judgment in decision-making. Therefore, ensuring climate change resilience is considered and incorporated in the design of *highway infrastructure* projects as identified in the *BCMoTI* Technical Circular (T-06/15).

. The APEGBC professional practice guidelines were developed in response to this Technical Circular: (T-06/15) titled “Climate Change and Extreme Weather Preparedness and Resilience in Engineering Infrastructure Design” (June 22, 2015). The circular can be viewed at the following web address:

<http://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/technical-circulars/2015/t06-15.pdf>

These guidelines will complement the existing APEGBC Professional Practice Guidelines – *Legislated Flood Assessment Guidelines in a Changing Climate in BC*.

The context for these sets of guidelines was informed by a National-level guidance document by Engineers Canada titled “Principles of Climate Change Adaptation for Engineers” consisting of nine principles and establishing the scope of professional engineering practice in carrying out climate change adaptation work.

The guidance offered by these APEGBC documents is consistent with one of the primary objectives of APEGBC which is to establish, maintain and enforce standards for the professional practice of engineers and geoscientists in BC.

It is recognized that some of the information contained in these guidelines may be relevant to carrying out climate change resilient design for infrastructure projects that are not under the ownership of *BCMoTI*. The guidelines are not, in and of themselves, requirements, nor do they supersede provisions specified by local governments or other approving agencies.

## **Process and Outcomes**

The processes and outcomes contained in the APEGBC practice guidelines provide detailed guidance supporting the directive expounded in the *BCMoTI* Technical Circular, which requires design adaptation to climate change including documentation for Ministry projects.

*The BCMoTI* technical circular requires the following work to be completed to ensure infrastructure designed for the Ministry is resilient to changing climate for the lifespan of projects:

1. Climate and infrastructure component vulnerability analysis for the design life of components
2. BCMoTI Design Criteria Sheet summarizing parameter changes due to climate change

Correspondingly, the APEGBC guidelines refer to these documents:

1. *Climate Change Vulnerability Risk Assessment (risk assessment)*
  - a) Screening Level Risk Assessment
  - b) *Risk Assessment*
  - c) *Engineering Analysis (if required)*
2. *Highway Infrastructure Climate Change Resilient Design Report*
3. *Assurance Statement*

The Relationship of output documents referenced in the APEGBC Guidelines and the BCMoTI Technical Circular are described below:

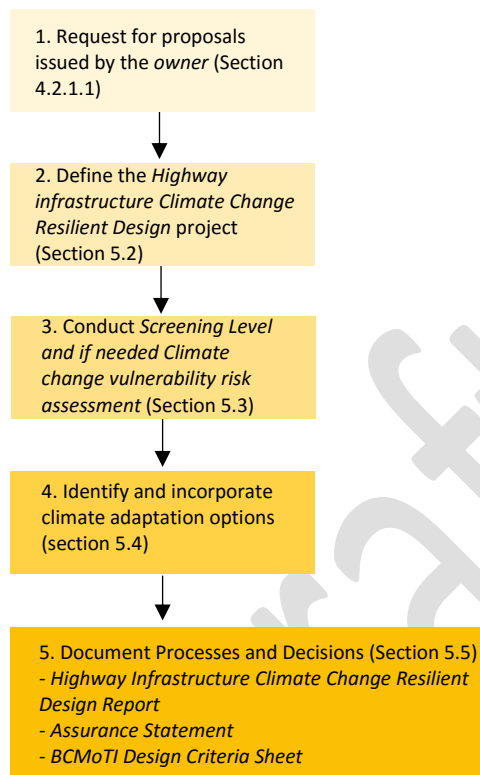
- The *climate and infrastructure component vulnerability analysis* in the BCMoTI Technical-Circular is the same as the APEGBC *Climate Change Vulnerability Risk Assessment (risk assessment)* in these guidelines.
- The *Highway Infrastructure Climate Change Resilient Design Report* must be prepared when a *screening level risk assessment* or *climate vulnerability risk assessment* is carried out and the report must contain:
  - Details of the *screening-level risk assessment* conducted and the results from the assessment

- If a *climate vulnerability risk assessment* was conducted, the results from the assessment
- Details of the infrastructure component and climate parameter interactions considered, and identified risks; as well as sources of climate data used in the assessment
- How changes to design criteria were developed as will also be summarized in the *BCMoTI Design Criteria Sheet*
- Brief discussion of adaptation to climate change considering changes to design criteria and recommendations for operations and maintenance of the infrastructure

The minimum set of deliverables for every *BCMoTI* highway infrastructure design projects are:

1. *Highway Infrastructure Climate Change Resilient Design Report*
2. *Assurance Statement (to assure that the appropriate standard of care has been followed in completing the climate change vulnerability risk assessment)*
3. *BCMoTI Design Criteria Sheet*

The following flowchart (Figure 1) summarizes the major steps to follow as outlined in the guidelines for developing climate change resilient designs for *highway infrastructure*. Further details about conducting climate change vulnerability *Risk Assessments* and preparing the *Highway Infrastructure Climate Change Resilient Design Report* and the *Assurance Statement* are provided in the guidelines.



**Figure 1:** Flow chart process for climate change resilient design of *highway infrastructure in BC*

The Appendices contained in this document provide further information to support practice manual guidance and include:

- A – Assurance Statement
- B – BCMoTI Design Process and Design Criteria Sheet
- C – Adaptation Examples from Practicing Professionals
- D – Overview of Climate Change
- E – Tools and Resources for Climate Change Adaptation
- F – Authors and Reviewers

## 2 DEFINITIONS

The following definitions are provided within the context of *highway infrastructure* design and climate change.

### **ACEC**

The Association of Consulting Engineering Companies of Canada

### **Adaptation Measures**

Actions that reduce the vulnerability of *highway infrastructure* to the impacts of climate change by reducing the likelihood and/or consequences of failure. These may also include other infrastructure designed to reduce or deflect loads on the primary infrastructure, policies or infrastructure designed to reduce the consequences of failure, increased monitoring, and increased or different maintenance procedures.

### **Agreement**

A formal written or verbal contract or terms of engagement between the *client* and the *engineer of record*, or their company, for carrying out climate change resilient design of *highway infrastructure*. This may also refer to a formal written or verbal contract or terms of engagement between the *qualified professional* or their company and the *engineer of record* or the *client*, for conducting a *climate change vulnerability risk assessment* of new or existing *highway infrastructure*.

### **APEGBC**

The Association of Professional Engineers and Geoscientists of British Columbia.

### **BCMoTI**

Refers to British Columbia Ministry of Transportation and Infrastructure.

### **BCMoTI Design Criteria Sheet for Climate Change Resilience (BCMoTI Design Criteria Sheet)**

A form that engineers working on *highway infrastructure* design projects under the ownership of *BCMoTI* are required to complete. This form documents how the engineer has used their engineering judgment to incorporate a consideration of climate change into the appropriate design components of the *highway infrastructure*. The *BCMoTI Design Criteria Sheet* is usually completed by the professional overseeing the design of the *highway infrastructure*, who, in these guidelines is referred to as the *engineer of record*, or for large projects with multiple *engineers of record*, the *coordinating engineer of record*.

### **Client**

An individual or company who engages an *engineer of record* to carry out *resilient design* of new or existing *highway infrastructure*. In some cases, the *client* may also engage a *qualified professional* to conduct a *climate change vulnerability risk assessment*. The *client*

is typically the owner of the *highway infrastructure* or a third party who has been contracted to maintain or design the *highway infrastructure* on behalf of the *owner*.

### ***Climate Change Information Portal***

The *Climate Change Information Portal* is an APEGBC online resource (available at [www.apeg.bc.ca/climateportal](http://www.apeg.bc.ca/climateportal)) with links to a range of tools and resources to support *professional engineers* and *professional geoscientists* to incorporate climate change adaptation into their practice.

### ***Climate Resilience***

Climate Resilience is defined as the approach of facilitating modification, renewal or renovation of infrastructure over time to address changing climatic conditions as they become apparent. Climate resilience often includes flexible design strategies, which do not limit options available in the future for addressing changing conditions by committing to a specific course of action, or fully building for future conditions in the present. Examples include securing sufficient right-of-way to allow for future dyke rising when necessary, or increasing the size of a culvert to allow extreme precipitation events to pass through the infrastructure without damaging it. As some infrastructure may require periodic renewal or replacement of components in any case, climate resilience can be relatively easily included as a measure to address climate change for these projects.

### ***Climate Specialist***

A *climate specialist* studies long term weather patterns and the processes that cause them. They use long-term meteorological data to study trends in weather patterns, understanding their causes and make predictions. In the context of these guidelines, a *climate specialist* is a professional who assists the *qualified professional* in conducting the *climate change vulnerability risk assessment* by providing them with projections of future climate for the region under consideration. Climate specialists may also assist the *qualified professional* in understanding what climate parameters need to be considered and some of the likely impacts of future climate conditions on the *highway infrastructure* under consideration.

### ***Climate Change Vulnerability Risk Assessment (Risk Assessment)***

A *climate change vulnerability risk assessment (risk assessment)* involves investigations to find the risk to the infrastructure under consideration due to climate change, supported with an appropriate level of analysis and professional engineering/geoscience interpretation. The *risk assessment* is conducted by the *qualified professional* however it may also be conducted by an *engineer of record* if the individual has the appropriate expertise. Engineers Canada's PIEVC Protocol ([www.pievc.ca](http://www.pievc.ca)) is a *risk assessment* method that has been successfully applied to a wide range of public infrastructure projects in Canada and internationally. Alternatively, a *risk assessment* may be carried out in accordance with the generally accepted practices characterized by the technical resources referenced in the *Climate Change Information Portal*.



### ***Climate Change Vulnerability Risk Assessment Assurance Statement (Assurance Statement)***

A *statement* (Appendix A) sealed by the *qualified professional* or the *engineer of record* that provides assurance that they have applied the appropriate standard of care in completing the *climate change vulnerability risk assessment*. The *qualified professional* or the *engineer of record* prepares the *assurance statement* and provides this to the owner.

### ***Climate Risk***

The level of a negative impact due to a change in climate. In these guidelines *risk* is a function of the probability of the climate event and the severity of its consequence. In the *climate change vulnerability risk assessment*, risk is a measure of the level of vulnerability of the infrastructure to the effects of climate change.

### ***Coordinating Engineer of Record (CEOR)***

For large projects where there are multiple *engineers of record* responsible for different aspects of the project these professionals may be overseen by a *coordinating engineer of record* who is responsible for the overall design of the project.

### ***Engineer of Record (EOR)***

The *engineer of record* is a professional within a design firm who oversees the project and establishes the overall concept, sizing, risk analysis, design, costing, project management and documentation and assume professional responsibility for the project. If the individual has the appropriate expertise, the *engineer of record* may also act in the capacity of the *qualified professional* and take responsibility for the *climate change vulnerability risk assessment*.

### ***Flexible Design***

*Highway infrastructure* with *flexible design* has the capacity for components of the design to be changed in the future. *Flexible design* may include redundant systems or the ability for the size or functions of design components to be changed in the future. *Adaptive design* may be used synonymously with *flexible design*.

### ***Highway Infrastructure***

For the purpose of these guidelines, *highway infrastructure* refers to infrastructure under the ownership of BCMoTI.

### ***Highway Infrastructure Climate Change Resilient Design Report (Report)***

A document that includes the details of the *screening level risk assessment*, *climate vulnerability risk assessment*, the engineering analysis, details of the development of climate resilient design criteria, conclusions and recommendations provided by the *qualified professional* with regards to designing for climate adaptation. The *report* has to

be provided to the owner in conjunction with the *assurance statement* contained in Appendix A.

**Member(s)**

*Professional Engineer or Professional Geoscientist* who is a member of APEGBC.

**Mitigation**

Measures that reduce the emissions of GHGs that drive climate change. This area involves improved energy efficiency, reduced energy use or reductions in embedded energy in materials or products.

**Owner**

Refers to the BC Ministry of Transportation and Infrastructure (BCMoTI). For most *highway infrastructure* projects, the *owner* is the *client* (see definition of *client*).

**Professional Engineer**

An engineer who is a *member* or licensee in good standing with APEGBC and is typically registered in the disciplines of civil (geotechnical, structural, hydro-technical), mechanical or electrical engineering, or other disciplines with scopes of practice that contribute to infrastructure design.

**Professional Geoscientist**

A geoscientist who is *member* or licensee in good standing with APEGBC and is typically registered in the disciplines of geology or environmental geoscience, or other disciplines with scopes of practice that contribute to infrastructure design.

**Qualified Professional (QP)**

A *professional engineer* or *professional geoscientist* registered with APEGBC who has the appropriate knowledge and experience to allow them to carry out a *climate change vulnerability risk assessment*. The *qualified professional* should have knowledge of climate science as it relates to the practice of professional engineering/geoscience to allow them to carry out appropriately comprehensive *climate change vulnerability risk assessments*. This knowledge should include familiarity with climate models, tools and resources that are appropriate for their project and the ability to carry out design changes in consideration of the *risk assessment* completed by them. The *qualified professional* is not expected to have similar competencies to a *climate specialist* however they should understand what information they need to obtain from a *climate specialist* to carry out a *climate change vulnerability risk assessment* when required. If the *engineer of record* has the necessary experience; they may fulfil the role of the *qualified professional* by conducting the *climate change vulnerability risk assessment*.

### ***Representative Concentration Pathway (RCP)***

As defined in the Fifth Assessment Report from the Intergovernmental Panel on Climate Change, there are four *RCPs* (RCP 2.6, RCP 4.5, RCP 6 and RCP 8.5) which are defined by their total radiative forcing pathway and level by 2100.

### ***Resilient Design***

For the purposes of these guidelines, *resilient design* refers to the process of incorporating measures into the design of *highway infrastructure* that address potential negative impacts of climate change over its full life span.

### ***Robust Design***

*Robust design* is an approach that affords the ability of *highway infrastructure* to reasonably withstand future climate and weather extremes across a range of future scenarios. The decision to develop and implement a robust design may be due to one or more factors - low incremental cost to increase climate resilience compared to a high cost of incremental upgrades, low owner risk-tolerance, political or societal influence, and/or limited post-construction opportunities to implement additional *adaptation measures*.

### ***Risk Tolerance***

The level of climate change related risk that the *owner* is willing to accept in consideration of a given infrastructure. It is typically dependent on the functions and design life of the infrastructure.

### ***Screening-level Risk Assessment***

A *Screening-level risk assessment* (*screening risk assessment*) is the first step of a *climate vulnerability risk assessment* conducted to help the *QP* determine if a more comprehensive *climate vulnerability risk assessment* is required. One possible result of the screening level assessment is the determination that no further work is required at this time if no vulnerabilities were found that require more detailed assessment. It follows the same procedure as a comprehensive *risk assessment*; the only difference between the two is the level of effort expended.

### ***Status-Quo Design***

Status-quo design recognizes that implementing no explicit adaptation measures is a valid response, provided that the *qualified professional* documents the reason or reasons that this is done. Examples of situations where *status-quo* may be a valid design method include when the *risk assessment* shows that the infrastructure is at no or low risk due to climate change or when the service life of the infrastructure is very short and plans are made to re-consider adaptation measures when the infrastructure is replaced.

### ***Uncertainty***

Within the scope of these guidelines, the term “uncertainty” generally refers to all of the factors that affect how well climate data and related information, selected for assessment and design, will ultimately reflect reality. *Climate Specialists* also use the term “uncertainty”, but with a different and more specific definition – see Section A.3.5. The guidelines will use the term “range of values” or “range of potential values” when referring to uncertainty associated with climate projections. An antonym of uncertainty is “confidence”, and within the context of these guidelines, the practicing professional is looking for confidence that the values used adequately reflect real-world conditions that the infrastructure will be exposed to, and under which it is designed function. The less confidence (more uncertainty) that the practicing professional has in the available information, the greater the perceived risk. Greater risk demands more resilient designs.

### ***Vulnerability***

The inability of *highway infrastructure* to withstand negative effects and benefit from any positive effects of changes in climate. In these guidelines vulnerability is a function of the magnitude of the changes in the climate, the sensitivity of the infrastructure to those changes and the adaptive capacity of the infrastructure.

### 3 INTRODUCTION

#### Introduction to the Guidelines

With these guidelines APEGBC develops professional practice processes in response to potential impacts of climate change regarding infrastructure designs, and provides a framework in which APEGBC professionals can provide services while meeting an established standard of care in addressing climate change.

Due to strong evidence of climate changes, APEGBC released a position paper titled “A Changing Climate in British Columbia” (APEGBC, 2014) that includes the following statements:

- A. APEGBC recognizes that the climate is changing and commits to raising awareness about the potential impacts of the changing climate as they relate to professional engineering and geoscience practice, and to provide information and assistance to APEGBC registrants in managing implications for their own professional practice.
- B. APEGBC registrants (professional engineers, professional geoscientists, provisional members, licensees, limited licensees, engineers-in-training and geoscientists-in-training) are expected to keep themselves informed about the changing climate, and consider potential impacts on their professional activities.

Historically, infrastructure has been designed in accordance with the relevant codes and standards based on assumptions of constancy in climate i.e., past climate being a good predictor of future climate. But various indications<sup>1</sup> and recent experiences with changes in extreme weather conditions indicate that historical climate cannot be relied upon for designing infrastructure expected to withstand the forces of a climate that is changing significantly. Climate modelling has become more proficient in providing future climate scenarios, however, there is uncertainty in the projected form and magnitude of estimated future climate conditions. The three main sources of uncertainty are due to natural variability of the climate, a simplified representation of climatic processes and uncertainty in future emissions of greenhouse gases. Thus, in using climate modelling output for engineering design, substantial engineering judgment on the part of the APEGBC members may be required.

Tools and resources to enable practitioners to incorporate climate change and extreme weather resilience in *highway infrastructure* design are evolving. This document aims to introduce concepts relating to climate change resilience and to provide a structured approach to decision making and record keeping. It does not list all the tools and

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<sup>1</sup>Indicators of Climate Change for British Columbia 2015 Update (BC Ministry of Environment). <http://www2.gov.bc.ca/assets/gov/environment/climate-change/policy-legislation-and-responses/adaptation/climatechangeindicators-2015update.pdf>. Date Accessed: March 2016  
Climate Change 2014 Synthesis Report (IPCC). [https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5\\_SYR\\_FINAL\\_All\\_Topics.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_All_Topics.pdf). Date Accessed: March 2016  
Milly et al. 2008: Stationarity is dead: Whither water management?, *Science*, 319(5863), 573–574.

resources available to practicing professionals. To help members and registrants stay current with the science of climate change and to provide tools and resources for incorporation of climate adaptation in design, APEGBC, has developed a *Climate Change Information Portal* which can be accessed by visiting the following link:

[www.apeg.bc.ca/climateportal](http://www.apeg.bc.ca/climateportal). More information on climate science as it relates to professional practice is provided in Appendix A.

The fields of civil engineering and geoscience and to an extent, other allied fields are evolving in response to a changing climate. While adaptation to a changing climate is imperative, more guidance is required on what constitutes good professional practice in order to incorporate a changing climate in the designs and services provided in *BCMOTI highway infrastructure* projects.

Many have indicated that the tools and resources for climate adaptation require more refinement to enable mass uptake. It has been suggested by various sources (Engineers Canada<sup>2</sup>, FHWA<sup>3</sup>) that a multi-stakeholder approach that includes building on existing efforts and knowledge from across different sectors and professions is required to make adaptation efforts successful.

In addition, it is recognized that the uniform implementation of a suggested standard of care (see section 5.3) along with an established quality management process providing climate change resilience services would enable clients, stakeholders and various levels of government to work together for the protection of public safety and the environment. APEGBC recognizes that development of this initial version of practice guidelines is the first of many iterations. As more information becomes available and experience with climate change and adaptation is gained, these guidelines will be revised and updated.

The 2013 APEGBC Sustainability Guidelines outlined many ways in which APEGBC professionals could contribute towards the development of a sustainable society through their professional practice. Designing *highway infrastructure* to increase its resilience to the impacts of future climate conditions is one of the ways professionals can contribute to making it more sustainable.

These guidelines have been prepared in consultation with a steering committee consisting of members from the Association of Consulting Engineers of Canada's Subcommittee for Engineering Adaptation for Climate Change (BC Chapter), members of the APEGBC's Climate Change Advisory Group, Engineers Canada, practicing consulting engineers, a

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<sup>2</sup> Engineers Canada. (2011). Public Infrastructure Engineering Vulnerability Committee Engineering Protocol Part 1, Version 10.

Engineers Canada (2015). Principles of Climate Change Adaptation for Professional Engineers. Retrieved from: [http://www.apegm.mb.ca/pdf/Guidelines/model\\_guideline\\_climate\\_change\\_adaptation.pdf](http://www.apegm.mb.ca/pdf/Guidelines/model_guideline_climate_change_adaptation.pdf)

<sup>3</sup> U.S. Department of Transportation Federal Highway Administration (2014). Transportation Engineering Approaches to Climate Resilience: Assessment of Key Gaps in the Integration of Climate Change Considerations into Transportation Engineering. Retrieved from [https://www.fhwa.dot.gov/environment/climate\\_change/adaptation/ongoing\\_and\\_current\\_research/teacr/key\\_gap\\_s/fhwahep15059.pdf](https://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/teacr/key_gap_s/fhwahep15059.pdf)

climate scientist from Pacific Climate Impacts Consortium (PCIC), and staff from BC Ministry of Transportation and Infrastructure (BCMoTI).

While these guidelines are written with partial funding support from BC Ministry of Transportation and Infrastructure for the purposes of providing practice guidance for APEGBC professionals who work on Ministry projects, the steering committee has indicated that these guidelines are relevant to other *infrastructure* projects in the province of BC.

### 3.1 Purpose of the Guidelines

This document provides guidelines of professional practice for an *Engineer of Record (EOR)* or *Coordinating Engineer of Record (CEOR)* to carry out *Highway infrastructure Climate Change Resilient Design* and for a *Qualified Professional (QP)* to complete a *climate change vulnerability risk assessment (risk assessment)*. These interim guidelines apply to *highway infrastructure* owned by BCMoTI.

The specific objectives of these guidelines are to:

- i. Outline the professional services of an *EOR* carrying out climate change resilient design of *highway infrastructure* in BC.
- ii. Outline the professional services to be provided by a *QP* (or *EOR* if they are sufficiently trained) conducting *risk assessments* on *highway infrastructure* in BC.
- iii. Describe the suggested standard of care to be followed when a *QP* is providing professional services related to conducting *risk assessment* of *highway infrastructure* in BC.
- iv. Specify the tasks that should be performed by the *QP* and/or *EOR* to demonstrate that climate change has been considered in the design of the *highway infrastructure* and demonstrate that their obligations under the Engineers and Geoscientists Act have been met. These obligations include the duty to protect the safety, health and welfare of the public and the environment.
- v. Describe the roles and responsibilities of the various participants/stakeholders involved in carrying out climate change resilient design of *highway infrastructure* and *risk assessment*.
- vi. Describe the record keeping and other quality management processes to be followed when conducting *risk assessments* of *highway infrastructure*.
- vii. Provide consistency in the approach to *risk assessments* including the relevant reports and other documents prepared when providing professional services in this field of practice and;
- viii. Describe the typical knowledge and the responsibilities that professionals take on when providing services related to conducting *risk assessments*.

By outlining the process of *resilient design of highway infrastructure*, these guidelines aim to assure adaptability and resilience of *highway infrastructure* to future climate conditions.

Appendix A to these guidelines provides a *climate change vulnerability risk assessment assurance statement (assurance statement)* provided to the *owner* along with the

*Highway infrastructure Climate Change Resilient Design report (report) and BCMoTI Design Criteria Sheet. It is important to note that the **assurance statement** assures that the professional has followed the suggested standard of care as defined in these guidelines – it does not guarantee that a specific design will perform without issue under future climate conditions.*

The preparation of the *report* together with the *assurance statement* and the *BCMoTI Design Criteria Sheet* is informed by the *risk assessment* conducted by the *QP*.

### 3.2 Role of APEGBC

Members and licensees are professionally accountable for their work under the Engineers and Geoscientists Act, which is enforced by APEGBC. These interim guidelines have been adopted by the Council of APEGBC, and form part of APEGBC's ongoing commitment to maintaining the quality of services *members* and *licensees* provide to their clients and the general public.

These guidelines may be used to assist professional activity in agreement with the *client* in establishing the objectives, type of *risk assessment*, level of service, terms of reference and associated fees. Insufficient fees are not a justification for services that do not meet the intent of these guidelines.

Following these guidelines demonstrate to the *client* or the *owner* how professional obligations are fulfilled, especially with regards to APEGBC Code of Ethics Principle 1 (hold paramount the safety, health and welfare of the public, protection of the environment and promote health and safety in the workplace<sup>4</sup>). Failure to meet the intent of these guidelines could be evidence of unprofessional conduct and lead to disciplinary proceedings by APEGBC.

### 3.3 Scope of the Guidelines

These guidelines establish the standard of care for conducting climate change *risk assessments* and for incorporating climate change resilience into the design of new or retrofit *highway infrastructure* that is under the ownership of *BCMoTI* (refer to Appendix C: BCMoTI Climate Change Design Process and Project Design Criteria Sheet). These guidelines facilitate the application of a consistent and comprehensive level of professional practice for BCMoTI projects in BC.

Furthermore, these guidelines are provided so that climate adaptation planning can be adequately performed by the *owner*. It does not address greenhouse gas mitigation in relation to the construction activities to be carried out.

These guidelines are similar in format to the *Guidelines for Legislated Flood Assessment Guidelines in a Changing Climate in BC* (APEGBC, 2012):

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<sup>4</sup> APEGBC's Code of Ethics is at <https://www.apeg.bc.ca/APEGBC/media/APEGBC/Governance/APEGBC-Code-of-Ethics.pdf>. The Code of Ethics, along with accompanying Guidelines and Commentary, are published in the current (1994) edition of APEGBC's "Guidelines for Professional Excellence".



- Section 3 covers the introduction
- Section 4 outlines the roles and responsibilities of professionals involved in climate resilient design of highway infrastructure
- Section 5 provides guidelines for professional practice
- Section 6 informs on quality assurance and control
- Section 7 explains the requirements for registration, education, training and experience
- Section 8 provides information of climate science, the *assurance statement*, references, case studies on how these guidelines would apply on large and small projects and design examples.

*APEGBC* supports the development of common standards of care in professional practice in engineering and geoscience across Canada. This includes carrying out climate *risk assessments and preparing reports*. Therefore, *APEGBC* encourages other engineering and geoscience regulators in Canada to use of these guidelines, with revisions where considered appropriate, in their jurisdiction.

### 3.4 Applicability of the Guidelines

These guidelines are influenced by current provincial legislation, current case law, advances in knowledge, and evolution of general professional practices in British Columbia. As such, the current version of the guidelines is the first of many iterations.

Notwithstanding the purpose and scope of these guidelines, a decision not to follow one or more elements of these guidelines does not necessarily mean a failure to meet professional obligations. Such judgments and decisions depend upon weighing the facts and circumstances to determine whether reasonable and prudent *conduct was followed*, in a similar situation and during the same time frame.

Specific climate change related resources, may be referenced (e.g. those referenced in these guidelines and the *climate change information portal*), however professional discretion should be exercised in determining which resources are necessary on a particular project. This reflects the constant introduction of new, or revisions to existing resources that are associated with this emerging field.

### 3.5 Acknowledgments

These guidelines were prepared by a Steering Committee of *APEGBC* professionals, and reviewed by several external parties, stakeholders and members. The authors and reviewers are listed in Appendix F. The authors thank the reviewers for their constructive suggestions. A review of this document does not necessarily indicate the reviewer and/or his employer endorses everything in the document.

*APEGBC* thanks the BC Ministry of Transportation and Infrastructure for funding and technical support in the preparation of these guidelines.

## 4 PROJECT ORGANIZATION AND RESPONSIBILITIES

### 4.1 Common Forms of Project Organization

The *EOR* oversees the project and is responsible for incorporating climate change resilience into the design of the *highway infrastructure* based on the recommendations made by the *QP*. For large projects where there may be multiple *EORs* overseen by a *coordinating engineer of record (CEOR)*, the *CEOR* will oversee the overall project, ensure climate change resilience is incorporated appropriately into the design of the *highway infrastructure* and fulfil the responsibilities of the *EOR* as outlined in this section.

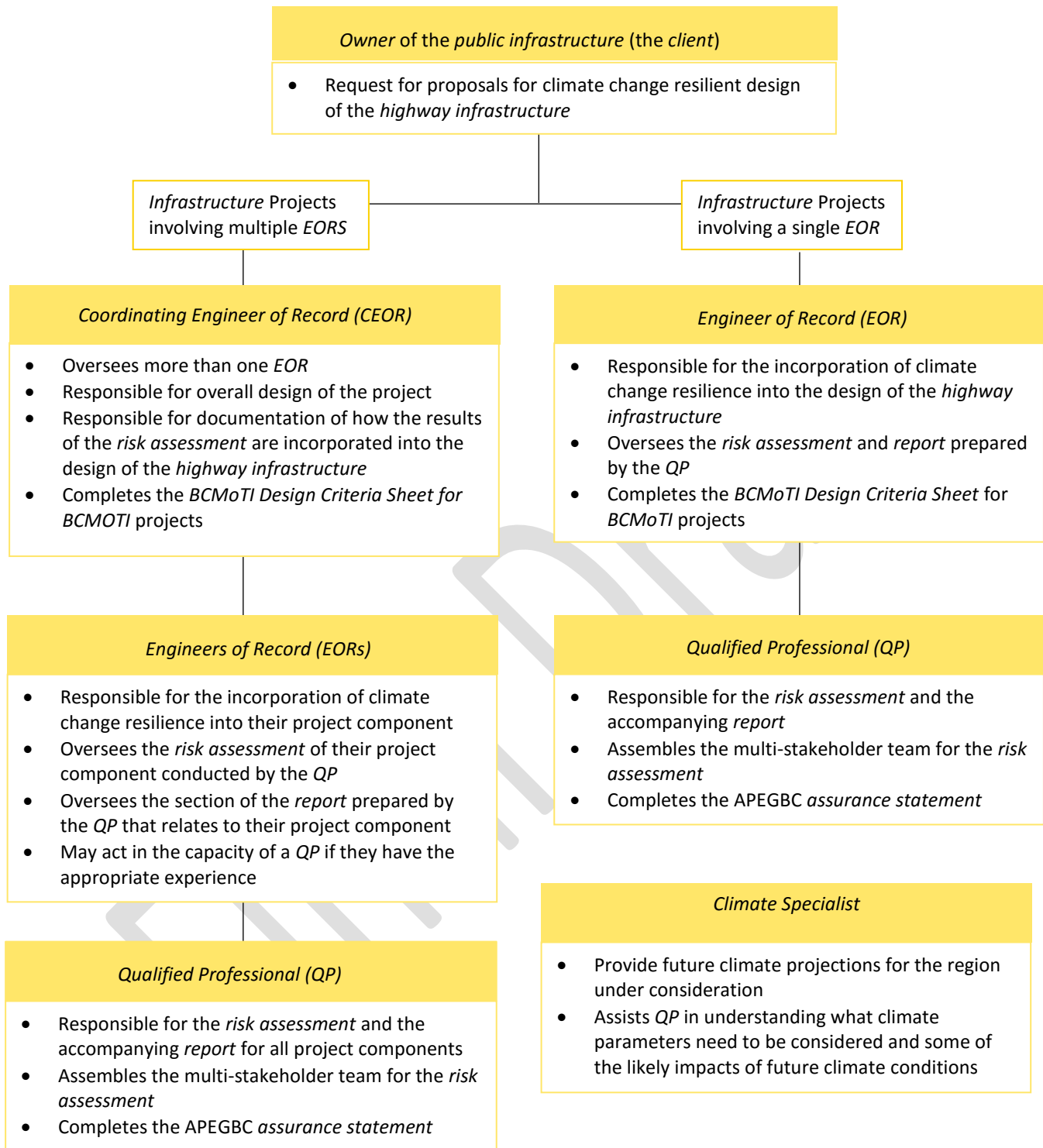
The *QP* prepares the *report* detailing the results of the climate change *risk assessment*. This *report* should be prepared in consultation with the *EOR*. Typically the *highway infrastructure owner* is the *client* establishes an *agreement* for professional services with the *EOR*. Within the *agreement*, the *EOR* should ensure that their role, in relation to the *client* is clearly defined. The *EOR*, if unable to act in the capacity of a *QP*, establishes an *agreement* for professional services with the *QP* who is responsible for the climate change *risk assessment*.

In some cases the *client* may not fully understand or appreciate the level of effort required by the *EOR* to carry out climate change resilient design of the *highway infrastructure*. The available data and previous assessments that are available to the *QP* for conducting the *risk assessment* may significantly affect the level of engineering analysis carried out by the *EOR*.

The *EOR* should review the typical responsibilities listed below, to assist in establishing an appropriate *agreement* for professional services with the client and inform them of the expectation of appropriate and adequate compensation (APEGBC Code of Ethics Principle 5).

### 4.2 Stakeholder Responsibilities

Sections 4.2.1, 4.2.2 and 4.2.3 describe some of the typical responsibilities of the *client*, *EOR* and the *QP*. Section 4.2.4 describes some of the typical responsibilities of a *QP* when asked to review a *report* prepared by another *QP*. The responsibilities of the *EOR*, the *QP* and the *CEOR* are illustrated by the project organization chart in figure 2.



**Figure 2: Roles and responsibilities of professionals in *highway infrastructure* projects.**

#### 4.2.1 The Client/ Highway infrastructure Owner

The *highway infrastructure owner* may indicate resources regarding climate projections to the *QP/ EOR* for use in the *risk assessment*. This may include climate data providers such as the Pacific Climate Impacts Consortium (PCIC) to produce appropriate climate projections, and depending on the project, it may be advisable and recommended to engage a *climate specialist* from these organizations.

##### 4.2.1.1 Preparing Requests for Proposals

The scope of the risk assessment portion of *Highway Infrastructure Climate Change Resilient Design* project should normally be described in the request for proposals. It should be based on the risk tolerance identified by the *owner* (if available) and reflect the state of knowledge of the design, construction, operation, and maintenance of the *highway infrastructure* as well as to reflect the availability of climate projections, the level of service and the service life.

##### 4.2.1.2 The Client/Engineer of Record Involvement

It is recommended that the *client* select the *EOR* and the firm they work for based on their qualifications, availability, experience and local knowledge using a qualifications-based selection process. The recommended best practices for selecting an engineering consultant to act in the capacity of an *EOR* can be found in Infraguide's document "Selecting a Professional Consultant"<sup>5</sup>. Through this process the need for a *QP* to be engaged in a project can also be identified.

ACEC-BC has developed an online resource to help municipalities and other owners implement effective procurement practices. Supported in part by ACEC-Canada, the website [www.yes2qbs.com](http://www.yes2qbs.com) brings together QBS-related information in one convenient location and includes guides, templates and studies that offer detailed explanation of Qualifications Based Selection.

#### 4.2.2 The Engineer of Record

The *EOR* oversees the project and is responsible for the overall concept, sizing, risk analysis, design, costing, project management and documentation. The *EOR* normally receives the *report* from the *QP* and is responsible for documenting how the recommendations made in the report are incorporated into the design of the *highway infrastructure*. For projects under the ownership of *BCMoTI*, the *EOR* should complete the "BCMoTI Design Criteria Sheet for Climate Change Resilience" to document how climate change was considered for each design component.

On large projects, it is the responsibility of the *EOR* assembling a multi-stakeholder team of individuals with the appropriate qualifications and experiences to carry out *highway infrastructure* climate change resilient design. It is appropriate for the *client* to approve the multi-stakeholder team prepared by the *EOR*.

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<sup>5</sup> <https://www.apeg.bc.ca/getmedia/8a8b72a6-ad49-45d0-835a-e7ccf653e8c0/APEGBC-InfraGuide-Selecting-Professional-Consultant.pdf.aspx>

For large projects, there may be a *CEOR* who oversees multiple *EORs*. In this case, the *CEOR* may fulfill the role of the *EOR* identified throughout these guidelines.

#### **4.2.2.1 The Engineer of Record/Qualified Professional Involvement**

It is recommended that the *EOR* select the *QP* based on their qualifications, availability, and local knowledge using a qualifications-based selection process. Although the *EOR* is likely to engage the *QP* to conduct the *risk assessment*, this decision may need to be approved by the *client*. The client would normally delegate this to the *EOR* who submits the person as part of the multi-disciplinary team that would undertake the work. Approval of this person would be implied by their selection in the RFP evaluation process and not after the fact.

Once the *EOR* has selected a *QP* to conduct the *risk assessment*, the *EOR*, with assistance from the *QP*, should complete a written *agreement* with the *QP*. This *agreement* should confirm the scope of work, schedule and cost estimate for the *risk assessment* as well as the need and scope of specialty services and need for external peer review. It is recommended that such an agreement include a clause that deals with potential disclosure issues due to the *QP's* obligation under APEGBC Code of Ethics Principle 1 (hold paramount the safety, health and welfare of the public, the protection of the environment, and promote health and safety in the workplace).

The *QP's* scope of work and cost estimate may have to be amended during the assessment, depending on their findings and analysis. The estimated cost based on an understanding of the information provided by the client should be discussed and agreed prior to the assessment being initiated.

During the *risk assessment*, it will be necessary for the *client* to provide the relevant background information through the *EOR* for the *QP* to conduct the assessment. The *QP* will discuss this with the *client* and the *EOR* to ensure an understanding is established. In addition, the *client* may be required to provide access to the *highway infrastructure* to enable the *QP* to conduct field work.

It is important that the *EOR* and the *client* review the *report* and understand its conclusions and recommendations. The *report* should be written using clear language and should unambiguously convey the potential risks and consequences associated with not implementing the recommended climate adaptation measures. This addresses the *QP's* obligation under APEGBC Code of Ethics Principle 8 (Present clearly to employers and clients the possible consequences if professional decisions or judgments are overruled or disregarded).

#### **4.2.3 The Qualified Professional**

The *risk assessment* must be carried out by a *QP*. It is the joint responsibility of the *EOR* and the *QP* to assemble a multi-stakeholder team of individuals with the appropriate qualifications and experiences in relevant disciplines to carry out a *risk assessment*. The *QP*

is responsible for ensuring that proper coordination occurs between the various members of the multi-stakeholder team. The multi-stakeholder team may require approval by the *client*.

On projects where past climate data and regional climate projections are readily available, and are endorsed by the *Owner*, the *QP* may act individually to conduct a *risk assessment*, under the following circumstances:

1. the *QP* must have developed proficiency in doing these kinds of assessments which can include working on projects in the same geographic area,
2. the *QP* has worked with multi-stakeholder teams on *risk assessments* and while ensuring that the assessment is compatible with other relevant work being completed by the *owner* which can include related infrastructure, and
3. the *QP* must have access to appropriate regional climate projections.

The *risk assessment* allows the *qualified professional* to communicate the climate change implications and risk to the *owner* and the *engineer of record*. After the *qualified professional* communicates the implications and risk, the *engineer of record* will carry out climate change resilient design under the advisement of the *highway infrastructure owner*.

Although *risk assessment* is to be completed by a multi-stakeholder team, the *QP* is responsible for preparing the *report*, which will include recommended adaptive measures and the *assurance statement* and providing these documents to the *engineer of record* and the *client*.

If certain professional activities such as aspects of field work are delegated by *QPs* to subordinates including non-professionals, this must occur under the *QP's* direct supervision. The *QP* assumes full responsibility for all work delegated in accordance with the *Engineers and Geoscientists Act*.

It is recommended that a clause be included within the *agreement* to address potential disclosure issues that are an obligation of the *QP* under APEGBC Code of Ethics Principle 1 (hold paramount the safety, health and welfare of the public, the protection of the environment, and promote health and safety in the workplace). The *QP* may have to convey adverse *risk assessment* findings to parties who may not be directly involved, but who have a compelling need to know. Following is suggested wording for such a clause:

“Subject to the following, the qualified professional will keep confidential all information, including documents, correspondence, reports and opinions, unless disclosure is authorized in writing by the client. However, in keeping with APEGBC’s Code of Ethics, if the qualified professional discovers or determines that there is a material risk to the environment or the safety, health and welfare of the public or worker safety, they shall notify the client as soon as practical of this information and the need that it be disclosed to the appropriate parties. If the client does not take the necessary steps to notify the appropriate parties in a reasonable amount of time, the qualified professional shall have

the right to disclose that information in order to fulfil their ethical duties and the client hereby agrees to that disclosure.”

#### **4.2.4 Internal and External Review of the *Highway infrastructure Climate Change Resilient Design Report***

If additional external review of the *report* is deemed necessary by the *owner* then another *QP* may be engaged to carry out an independent external review at the *owner's* expense or alternately, seek a voluntary review from an external review committee.

## 5 GUIDELINES FOR PROFESSIONAL PRACTICE FOR HIGHWAY INFRASTRUCTURE CLIMATE CHANGE RESILIENT DESIGN

Professionals who design *highway infrastructure* already consider climatic factors – either explicitly or implicitly. Examples of explicit application include wind loads and snow loads for bridges, and rainfall intensities for drainage systems. An example of implicit application is the use of codes and standards: minimum dimensions, maximum spans, or maximum drainage areas.

Currently, most climate design values are determined from statistical analysis of historical climate records. The key assumption of this process is that climate in the future will be essentially the same as that of the past. This assumption is no longer valid since there is evidence that the climate is changing (see Appendix A). While the general design process for each type of *highway infrastructure* will remain relatively unchanged, it is essential that the proposed infrastructure functions under both existing and future climate conditions. This is especially true for *highway infrastructure* with longer service lives (50 to 100 years for example).

It is important to acknowledge that historical climate records will continue to play a vital role in the development of climate design values. These data provide context for understanding the range of probable values as well as the basis for developing future climate projections. It is also important to recognize that many historical climate records carry significant, and usually unacknowledged, uncertainty due to recording and archiving errors, short or incomplete records, or the use of statistical analysis.

Design professionals currently account for uncertainty by establishing design event or threshold criteria, then applying safety factors. Historical climate records are considered to be a reflection of “reality”, and by applying statistical analysis to these data to develop design values, there is a sense that uncertainty has been addressed and that the design values can be used with some confidence.

From an engineering perspective, future climate projections are considered to carry greater uncertainty than that associated with historical climate records. This is primarily due to the large range of values generated by the full ensemble of GCMs contrasted with the need to select values for design. The fact that climate science is still being refined, especially with respect to projecting extreme values at a sub-daily level, reduces confidence in the projected values. All of this combines to create a perceived increase in risk, which must be acknowledged and managed.

These factors make it imperative to conduct a *risk assessment* as part of the *highway infrastructure* design process. It is also essential to determine appropriate measures to ensure that the design is resilient to climate change, keeping identified risks at a level acceptable to the stakeholders. This will require new approaches to design since each climate value within the range of projected values has the same likelihood of actually occurring in the future as all of the other values in the range. This means that rather than selecting a single climate value from a single model for design purposes, design risk must be addressed by determining the impact of the full range of climate values and developing appropriate adaptive measures to ensure resiliency over that range.



Note that there is potential for secondary impacts from climate change, such as changes to land cover, resource availability, and demographics. These impacts should also be considered, but are not the focus of these guidelines since they may affect the viability of a project rather than the actual design.

This section of the guidelines establishes the standard of care that is expected of each professional involved in the design of highway infrastructure with respect to incorporating resiliency for climate change. Sub-section 5.1 outlines the general process for incorporating climate change into a resilient design. The remaining sub-sections provide a suggested approach for Developing Climate Change Resilient Designs for the *highway infrastructure*. Professionals are encouraged to exercise their judgment in the use of the approach outlined in the following sub-sections.

## **5.1 General Process**

Each *highway infrastructure* design project is unique when considering the combination of location, service objectives, stakeholders, and design team. Consequently, the design process will also be unique for each project. There are, however, common aspects of the design process that are addressed in this section of the guidelines. These aspects are each influenced by, or exert an influence on, the climate design values used for the design.

For the purposes of these guidelines, it is assumed that the *EOR* or *CEOR* (if there are multiple *EORs* on a project), is responsible for the overall project design, for ensuring that climate change impacts are considered, and that adaptation measures are incorporated. It is also assumed that the *QP* is responsible for conducting the climate change impacts assessment and for facilitating development of adaptation measures.

### **5.1.1 Level of Effort and Detail**

Given that the scope, scale, and objectives of design projects can vary significantly from one to another, the level of effort expended to apply the standard of care with respect to preparing a climate resilient design will also vary.

Projects that are complex and large in scale and/or scope will usually require a greater level of effort and detail. This may include specialized team members, rigorous risk assessment, detailed engineering analysis, and detailed reporting. The roles of *EOR*, *QP*, and other team members are likely to be performed by separate individuals.

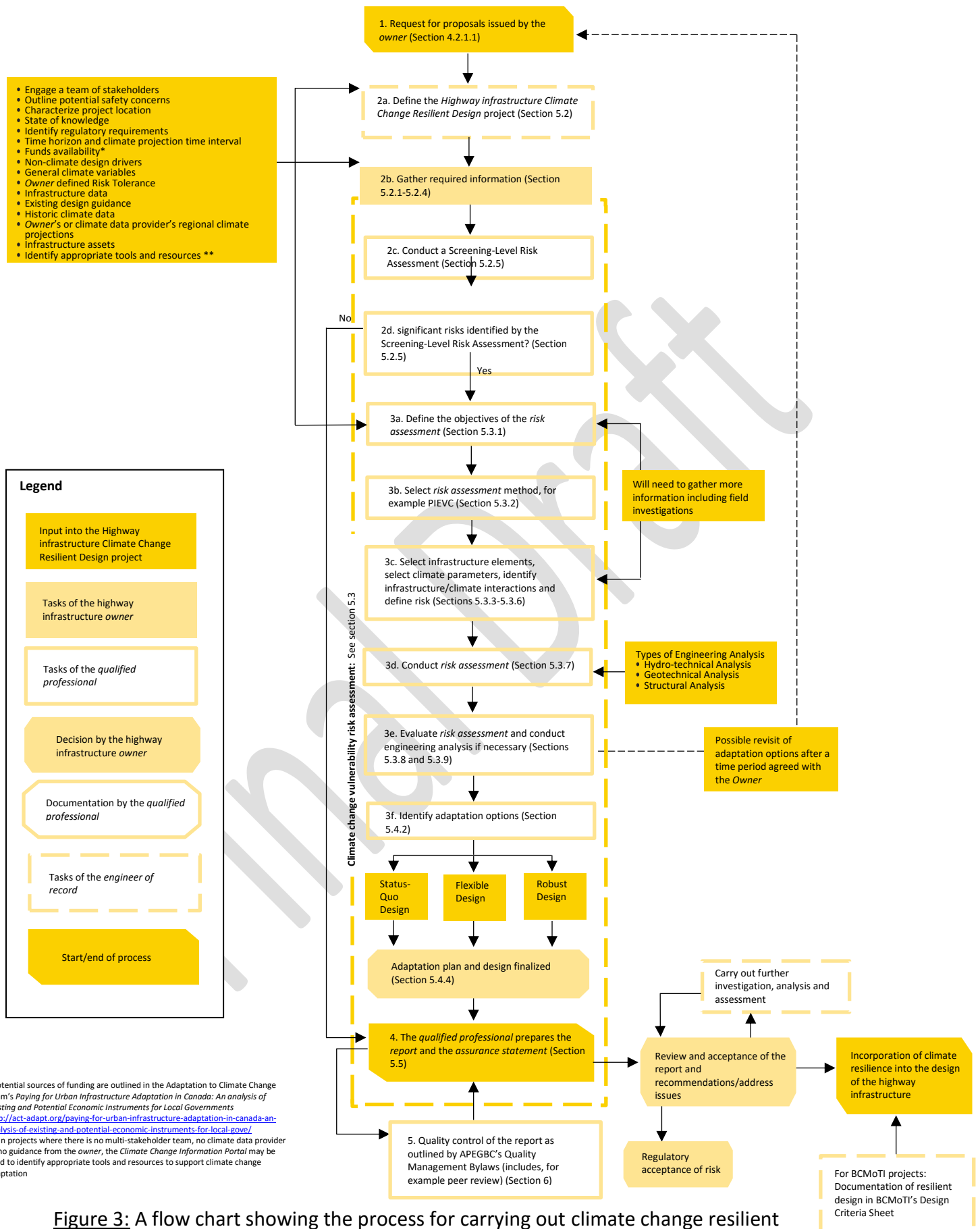
Some projects, however, may require significantly less effort to prepare a climate resilient design. The project may have negligible consequences should it fail, or be governed by climate design criteria prescribed by the owner or approving authority.

The level of effort does not always depend on the scope and scale of the project. It can also depend on the climate data available for the analysis. For instance, in considering hydrotechnical design of two bridges with similar scope but in different geographic locations, one of them could

be in one of the four watersheds where PCIC already provides projected flows, whereas the other location may only have projected temperatures and precipitation data. It is a significant effort to develop hydrologic model to estimate flows from projected temperature and precipitation. That is, the amount of effort required for the two projects will be significantly different.

Whatever level of effort is ultimately applied, it is essential that the roles of *EOR* and *QP* with respect to incorporating climate resiliency in the design are fulfilled and documentation that discloses that future climate was appropriately considered must be provided. For *BCMOTI* projects, this is a requirement.

Figure 3 presents a flow chart that outlines the process of carrying out *Highway infrastructure Climate Change Resilient Design* and the roles and responsibilities of the *QP*, the *EOR*, and the owner.



**Figure 3: A flow chart showing the process for carrying out climate change resilient**

## 5.2 Define the Project

It is critical to establish the context within which climate risks can be evaluated, and adaptation measures can be developed and integrated into the design. This context is established by:

- characterizing the project location,
- listing the key infrastructure components,
- identifying non-climate design drivers,
- identifying general climate parameters that should be considered,
- selecting the key team members,
- identifying key stakeholders, and
- defining the project time horizons.

Each of these tasks are described in more detail in the following sub-sections.

### 5.2.1 Characterize Project Location and Identify Infrastructure

For the purposes of these guidelines, “project location” encompasses more than just the coordinates of the project extents. It provides the context for determining what infrastructure is to be constructed and what climate-based events are likely to occur. For example, a road located along the coast may be affected by tides and storm surges, while a road located in a mountain pass is more likely to be affected by deep snow. Both could be subject to high stream flows, avalanches or intense rainfall.

Different location characteristics also contribute to different potential risks. Flood plains are subject to potential flooding, alluvial fans to both flooding and potential debris flows, and steep mountain passes to avalanches and/or unstable slopes. It is essential, therefore, to fully characterize the project location in a way that identifies and communicates climate-related issues that must be addressed through design. This could include, but not be limited to:

- project limits
- water bodies, streams, drainage catchments
- topographic characteristics - elevation range, slopes, high and low points
- geographic characteristics – flood plain, alluvial fan, mountain side, narrow valley, etc.
- geologic characteristics – soil types, groundwater
- populated or developed areas
- environmental resources – wetlands, habitat, riparian areas
- other critical infrastructure – power lines, dams, gas or oil facilities
- local or provincial standards, applicable by-laws and land use zoning

It is also useful to list the key infrastructure components to be designed and constructed. Great detail is not required at this stage of the project, but it should be sufficient for team members to fully understand project elements. For example, it would be sufficient to

identify the following infrastructure components for a highway project, including estimated quantity and location:

- roadway – number of lanes, lane separation
- bridges
- grade-separated intersections
- culverts – by relative size (small, medium, large)
- stormwater detention/treatment facilities
- snow sheds
- break-waters
- retaining walls

Perhaps not all of this information is known at the start of the project. However, any infrastructure component that has some likelihood of being constructed should be included in the project definition. This will provide a broader context for identifying climate parameters later in the process.

### **Minimum Level of Effort**

In this case, the level of effort would be proportional to the scope and scale of the project. If, for example, the project consists of lane widening for a couple of kilometers that includes one stream crossing, the list of components would be relatively short with simple descriptions. Only key items would be shown on the location map – the extents of the project, the stream, and any other items that might impact the infrastructure because of climate.

### **Identify Non-Climate Design Drivers**

There are many reasons for constructing *highway infrastructure*. These could include responding to population growth, fostering economic development, delivering goods and services to communities, improving safety, or any combination thereof. The purpose of identifying these non-climate design drivers is to establish a base design scenario. For example, if the project is to provide increased capacity in response to population growth, then design criteria will be established accordingly. This base scenario provides the means to evaluate the significance of any potential climate change impacts to the project.

Depending on the specific project, and especially on its design service life, some non-climate drivers likely have the potential to be impacted by climate change. Should this be the case, it would be useful to consider the broader potential impacts to the project. For example, increasing capacity to service population growth in an area that might ultimately be abandoned because of sea level rise could influence more than just the design of the infrastructure, but the very viability of the project itself. Identifying these issues as part of the project definition could be useful when determining what, if any, design changes will be incorporated into the project in order to address risks posed by climate change. However, they will not be assessed as part of the climate risk assessment.

### Minimum Level of Effort

A simple list or short description of these drivers should be sufficient. The key is to be aware that they exist and have an impact on the design.

#### 5.2.2 Identify General Climate Parameters

Identifying the general climate parameters that are typically used during design of the subject infrastructure may include, but are not be limited to:

- rainfall - intensity, duration, and depth
- temperature – maximum, minimum, average degree-days
- snow – daily snowfall, total accumulated depth
- wind – average speeds, maximum gusts, direction
- sea level – average level, high tides, storm surges

It is important to recognize that one or more of these general climate parameters usually directly impacts other design values. Rainfall, temperature, and snow melt for example, all impact streamflow, which is used to size hydraulic components such as culverts and bridges. Certain combinations of humidity and temperature can form fog and ice, which could impact safety. Therefore, endeavor to identify all pertinent climate parameters, even those that indirectly impact the design. Specific parameter values will be defined later in these guidelines.

#### 5.2.3 Define the Team and Identify Stakeholders

Each *highway infrastructure* design project will require its own set of specialized skills and knowledge in order to be completed successfully. Regardless of project scale and scope, and whether there are many or few team members and stakeholders, it is essential that all involved are aware of potential impacts of climate change and corresponding potential implications for design. Initially, team members may be limited in number until the *screening-level risk assessment* is completed.

Early in the project, the *EOR* or *CEOR* should list the key team members and stakeholders, as well as their roles. The following list is an example only, details will vary by project.

- *Owner* – project scope definition; financial decisions; risk acceptance
- *Engineer of Record* – overall concept; sizing; risk analysis; design; costing; project management; documentation; overall design responsibility
- Specialty Engineers and Practitioners (functional, geotechnical, structural, hydrotechnical, drainage, environmental, coastal, electrical, communications, etc.) – performance; safety; operations and maintenance; sizing; risk analysis; detailed design; costing, longevity, documentation, etc.)
- Approvals Officers – review and approvals; standards enforcement

With climate change, the team should be expanded to include qualified professionals and specialists with respect to the following.

- Climate projections – typically climatologists or *climate specialists*.
- *Risk Assessment* – a group of seasoned individuals who can provide sound judgment with respect to potential interactions between specific climate parameters and components of the subject infrastructure under design. In many cases, the specialty engineers and practitioners can provide this function. However, depending on the design project, additional team members might include individuals with knowledge and experience in:
  - hydrology, geology, forestry, biology, environment;
  - hands-on operation and maintenance personnel for the infrastructure being assessed;
  - hands-on management experience; and
  - local knowledge and history of previous climatic events.
- Climate adaptation – a *QP* or group of *QPs* that are able to develop and recommend design adaptation measures to improve the climate change resilience of the proposed infrastructure.
- Risk-based design – a design professional who can communicate the various risks associated with projected climate change to the Owner and, at times, to the Approvals Officers, and who can complete the design to meet an acceptable level-of-risk.

In special cases, the *qualified professional* should also include team members with knowledge and experience in one or more of the following fields:

- social impacts
- economic impacts
- politics
- insurance
- community issues
- emergency preparedness and response.

These additional team members can be critical to the success of the infrastructure design project. It is the *QP's* responsibility to know when the expertise of each of the specialty team members is required, and to engage them accordingly.

### **Minimum Level of Effort**

The team selected should, at a minimum, include the Owner, EOR, and a person reasonably knowledgeable about general climate projections. The team members must have sufficient knowledge and experience to identify and characterize key climate events that could impact the infrastructure, determine what types of interactions might occur between the climate events and the infrastructure, estimate the likelihood of the interactions occurring, and estimate the corresponding consequences should the interaction occur.

#### 5.2.4 Define Assessment Time Horizons

*Highway infrastructure* projects can have relatively long service lives, typically 50, 75, even 100 years. Right-of-ways for these infrastructures can remain in place even longer. Some infrastructure or infrastructure components, however, have relatively short service lives, ranging between 10 to 20 years. Considering that many climate parameters exhibit a trend of increasing or decreasing average annual values, it is important to select projected climate data that corresponds to each infrastructure's service life.

In many cases, depending on the climate parameter under consideration, the range of values projected using different GCMs may also increase as the time horizon is extended. For example, the difference between the highest and lowest average annual temperature generated by the full ensemble of GCMs for the year 2100 is greater than that for the year 2030. In situations where the projected trend for a climate parameter increases the vulnerability of selected infrastructure over time, then from an engineering perspective, an increasing range of these climate values as the time horizon extends will further increase infrastructure vulnerability.

Therefore, the combination of infrastructure longevity and corresponding potential increase in the range of plausible future climate parameter values makes it important to identify the service life of the components and systems that comprise the proposed *highway infrastructure*. This provides context for developing climate projections, conducting risk assessments, and identifying appropriate adaptation measures.

Infrastructure with a short service life is usually subject to periodic refurbishment or replacement. This provides an opportunity to re-evaluate corresponding climate risks and adaptation measures. Risks associated with climate change for such infrastructure may be low because the climate trend has had little time to develop. However, for infrastructure components that are not eligible for replacement or refurbishment prior to the end of their service life, the consequences of decisions made during the design process can be significant.

Note that the above discussion is based on the relationship between infrastructure service life and long-term climate trends of average values. Within this context, it is important to recognize that extreme annual climate values may exhibit greater increases over a short time horizon than average climate values. This should be identified and considered when selecting climate parameter values for the *vulnerability assessment*.

It is also important to recognize that the *QP* is not expected to make perfect decisions, but is expected, "based on professional judgment, to make appropriate decisions within the context of current scientific, economic, and social constraints." <sup>6</sup>

#### Minimum Level of Effort

At a minimum, the team could assign a single assessment time horizon for the whole project, based on the infrastructure component with the longest service life. To further

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<sup>6</sup> Engineers Canada (2015). Principles of Climate Change Adaptation for Professional Engineers. Retrieved from: [http://www.apegm.mb.ca/pdf/Guidelines/model\\_guideline\\_climate\\_change\\_adaptation.pdf](http://www.apegm.mb.ca/pdf/Guidelines/model_guideline_climate_change_adaptation.pdf)



reduce total effort, identify infrastructure elements that have a relatively short service life and if appropriate, eliminate them from the assessment.

### 5.3 Conduct Climate Change Vulnerability Risk Assessment

Risk management is not a new concept to engineers and geoscientists. It consists of identifying risks, evaluating them, and then making decisions to ensure that effective risk controls are developed and implemented. The *risk assessment* addresses the first part of risk management: identifying and evaluating the risks. The *QP* should have a reasonable level of competence in risk assessment – particularly with respect to the impacts of climate change.

Table 1 outlines the standard of care that a *QP* should apply when carrying out *risk assessments*. The elements of this table are further explored throughout sections 5.3 to 5.5.

Project Details	Professional Considerations
Project Scope	<ul style="list-style-type: none"> <li>Identify if an <i>owner</i>-defined risk tolerance is available and if not, seek to engage with the <i>owner</i> to establish their risk tolerance</li> <li>Establish <i>owner</i>-defined time horizon for the infrastructure</li> </ul>
Project Team	<ul style="list-style-type: none"> <li>Assemble qualified team in collaboration with the <i>owner</i></li> </ul>
Regional Climate Projections	<ul style="list-style-type: none"> <li>Could be developed by a <i>climate specialist</i></li> <li>A range of RCP or equivalent SRES scenarios should be used to generate regional climate projections</li> <li>An ensemble of models should be used to generate regional climate projections. For example, the top 3 climate models for Western North America as indicated by PCIC are CNRM-CM5-r1, CanESM2-r1 and ACCESS1-0-r1<sup>7</sup></li> <li>Design should be based on existing codes and standards, but future climate projections for the time horizon identified should be used in place of climate data referred to in the codes and standards</li> </ul>
Background Information	<ul style="list-style-type: none"> <li>Sufficient fieldwork should be conducted by the <i>QP</i> and their team</li> <li>The <i>QP</i> should review available and collect additional background information (see step 2b. in figure 3)</li> </ul>
Climate adaptation method	<p>Explore the following adaptation methods:</p> <ul style="list-style-type: none"> <li><i>Robust design</i> that makes the infrastructure resilient to a wide range of future climate projections is preferable</li> </ul>

<sup>7</sup> <https://www.pacificclimate.org/data/statistically-downscaled-climate-scenarios>

	<ul style="list-style-type: none"> <li>• <i>Flexible design</i> that includes redundant systems or has the capacity for design components to be changed in the future</li> <li>• <i>Status-quo design</i> that recognizes that implementing no explicit adaptation measures is a valid response</li> <li>• If appropriate, revisit adaptation options after a time period agree with the <i>owner</i></li> </ul>
Highway infrastructure Climate Change Resilient Design Report	<ul style="list-style-type: none"> <li>• Convey in plain language, the climate change risks associated with status-quo/worst-possible emissions scenarios (for example, RCP 8.5) to the <i>owner</i> to enable decision-making</li> <li>• Address the frequency of re-assessment and monitoring required (also includes collection of climate data appropriate for the location to inform future design)</li> </ul>
Project Documentation	<ul style="list-style-type: none"> <li>• The findings of the risk assessment and any assumptions made need to be fully documented and clearly communicated to the owner to demonstrate compliance with the intent and objectives of these guidelines</li> <li>• Climate model ensemble used</li> <li>• Vulnerability risk assessment tool (and version), if applicable</li> </ul>

**Table 1:** Table outlining suggested standard of care defined in guidelines for a *QP* conducting a *risk assessment*

### 5.3.1 Define Objectives

Specific objectives that must be met by the design with respect to capacity, safety, reliability, and longevity should be identified to ensure that appropriate information is included in the climate risk assessment. These are the elements that contribute to the risk tolerance of the owner. For example, consider a road that is the only viable route to a given location. It may be that this road cannot be closed for more than 2 days without causing severe hardship. This forms a reliability objective that should be reflected in the infrastructure components and climate parameters selected for the climate risk assessment. Or consider a bridge for which the design requires a peak stream flow rate. Historical hydrometric analysis would be adequate for establishing existing design values, but hydrologic modeling would be required to estimate design values based on future climate. Identifying this as an objective ensures that appropriate specific climate parameters are included in the climate risk assessment.

#### Minimum Level of Effort

There is little opportunity to reduce effort for this task, except perhaps, the level of documentation detail.

### 5.3.2 Select Risk Assessment Method

Several *risk assessment* methods have been developed by various organizations. At their core, however, each climate risk assessment is comprised of the following:

- A list of infrastructure components.
- A list of specific climate parameters.
- A matrix showing the combinations of listed infrastructure components and specific climate parameters. The matrix identifies the infrastructure component/climate parameter combinations where there is some potential for the infrastructure component to be negatively impacted by a change in the climate parameter.
- Assignment of a numerical likelihood that each identified matrix interaction will occur.
- Assignment of a numerical severity rating to each potential interaction in the matrix, should the interaction occur.
- Calculation of risk (product of severity rating and likelihood value) for each matrix interaction.

Risk assessments can be more detailed than this, however, all risk assessment methods include, at a minimum, each of the above-listed elements. Many risk assessment methods include guidance for evaluating the risks once they have been identified, which can be useful.

A well-known climate risk assessment protocol in Canada is the Engineers Canada Public Infrastructure Engineering Vulnerability Committee (PIEVC) *Engineering Protocol for Climate Change Infrastructure Vulnerability Assessment* ([www.pievc.ca](http://www.pievc.ca)). This is a comprehensive protocol that covers everything from planning and initiating the process to documenting each step along the way. It is available for use through a license agreement with Engineers Canada at no financial charge. The protocol is very specific with respect to how the assessment is conducted, such as team composition, information required, how information is gathered and assessed, how results are interpreted, and how the entire process is documented. All of these steps are included as part of the protocol.

Another tool that is especially applicable to assessing climate change risk for transportation infrastructure is the US Department of Transportation Federal Highway Administration's (FHWA) Vulnerability Assessment Scoring Tool<sup>8</sup> (VAST). It is a "spreadsheet tool that guides the user through conducting a quantitative, indicator-based vulnerability screen." The tool can be downloaded and used without further interaction with FHWA. This ease-of-access makes the tool attractive – especially for smaller or less complicated design projects. It can be applied to large or complicated design projects also,

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<sup>8</sup>[https://www.fhwa.dot.gov/environment/climate\\_change/adaptation/adaptation\\_framework/modules/index.cfm?moduleid=4](https://www.fhwa.dot.gov/environment/climate_change/adaptation/adaptation_framework/modules/index.cfm?moduleid=4)

but lacks some of the elements of the PIEVC protocol, such as team development and documentation, that might prove useful.

References for these and other risk assessment tools and methods can be found on the APEGBC Climate Change Information Portal<sup>9</sup> (CCIP).

Note that current risk assessment methods and tools were originally developed to assess existing infrastructure. They can, however, be adapted for use in the design process. For example, the capacity of existing infrastructure can be determined because it has physical attributes that are documented or that can be measured. It may have built-in resilience to climate change if the load generated by projected climate is less than its capacity. When assessing the vulnerability of infrastructure being designed, it is necessary to first establish capacity or expected performance, and therefore, it might be useful to size or select components based on current climate values. In this way, infrastructure with high risk scores can be resized using projected climate values to reduce risk.

Also note that most, if not all, of these tools and methods are being further developed and refined with application experience. Therefore, it is the *QP*'s responsibility to remain informed about the status of available tools and methods to ensure that the most current version is applied.

#### **Minimum Level of Effort**

At a minimum a simple matrix listing the selected climate events and infrastructure components should suffice.

### **5.3.3 Select Infrastructure Components**

The climate risk assessment relies on selecting appropriate infrastructure components. Components may be defined individually, or as a group, or as both if the situation warrants. For example, the *QP* may choose to group all roadway culverts as a single component, list each culvert as a single component, or group some culverts into a single component while listing others individually. Or a bridge might be listed as a single infrastructure component, or included as individual components (piers, abutments, superstructure, and deck).

Listing individual infrastructure components may yield a more detailed risk assessment, but with extra effort and cost. This might not be warranted, and a balance should be established between effort and effectiveness. The ability to select and group infrastructure components likely to be sensitive to climate change comes with experience, but it might be useful to review assessment reports based on the PIEVC protocol for examples of how infrastructure components have been defined for similar projects. These are located on the PIEVC website.

It is often useful to consider some of the following items to determine if a particular infrastructure component should be assessed individually, as part of a group of components, or not included at all.

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<sup>9</sup> [www.apeg.bc.ca/climateportal](http://www.apeg.bc.ca/climateportal)  
Final Draft

- Is there a chance that the component might be affected by climate? If it is obvious that the component is not impacted by climate at all, then there is no reason to include it in the assessment. However, this should still be documented as a part of the assessment.
- What is the functional lifespan of the component? Is it likely to be replaced through routine maintenance in a few years, or will it remain in service for decades? Only include the component if it is likely to be in service in the distant future. Components that are replaced through routine maintenance can be assessed at a later date.
- How critical is the component to the overall performance of the project? Would its failure cause significant impacts in terms of performance and/or safety? Can it be easily replaced or repaired or would this be costly in terms of money and time?
- Are there many identical or similar components in the project? Is it likely that their response to a specific climate change parameter would also be similar? This is usually a good indicator that the components can be assessed as a group.

The *QP* should work with team members to create the list of infrastructure components to be assessed. Engineering judgment will be required to determine if a component should be assessed individually, as part of a group, or assessed at all.

#### **Minimum Level of Effort**

At a minimum it may be adequate to start with the infrastructure as a whole, or with key component groups if the infrastructure is more complex. For example, if the project is a new or upgraded road that includes no major structures such as bridges, grade-separated intersections, or snow sheds, then the selected infrastructure could simply be “road structure”. If the project does include major structures, then the list could be expanded to include primary structure groups – culverts, bridges, or snow sheds for example.

#### **5.3.4 Select and Define Specific Climate Parameters**

The *QP* will need to expand the list of general climate parameters outlined in Section 5.2.2 by adding specific climate parameter definitions. It is useful to list the specific climate parameters that are explicitly and implicitly used in the design process for components. In engineering design, the extreme event is often critical, for example, “rainfall intensity” is a general climate parameter, but “the 1:100 year rainfall intensity for a one-hour duration” is a specific climate parameter. Each of these specific climate parameters should have some interaction with, or impact on the performance of, at least one of the infrastructure components identified in Section 5.3.3 and in the example “A Summary of PIEVC Risk Assessments conducted by the BC Ministry of Transportation and Infrastructure” provided in appendix C.

*QPs* may have the knowledge and experience to select and interpret projected climate values on their own. However, when this is not the case, and as recommended in Section 5.2.4, the *QP* should work with climate experts to determine the appropriate parameters

and corresponding values to include in the risk assessment. This is especially important for certain climate parameters, such as sub-daily rainfall intensities for example, since many climate projections are based on annual averages or at best, daily values.

The *QP* should also engage *Climate Specialists* in discussions of how the climate values will be used to ensure that the information provided is suitable for the intended purpose. Ranges of values should be identified, discussed, and documented since these will have an influence on how the climate values will be applied.

*Climate Specialists* may identify climate parameters that previously have not been considered as a design parameter. For example, temperature might not typically be used in the design of certain infrastructure. However, if increased and sustained temperatures are projected for the future, the corresponding changes in the asphalt mix for road construction might be secondary variable that could influence the design. In the case where climate projections for a specific climate parameter are not available, climate experts might be able to recommend a different climate parameter to use as a proxy for the desired value.

Some climate parameters are indirectly used for design purposes. For example, design flows for culverts or bridges are a function of rainfall, snowpack and temperature, or both. In such situations, it may be beneficial for the *QP* to engage *Climate Specialists* and other experts, such as hydrologists/water resources experts, to adequately define the climate parameters and values required. For example, to address specific issues of future hydrologic changes (e.g. hydrologic regime shift from snow dominated to rain dominated, early snowmelt driven freshet, rain-on-snow events etc.), input from a scientist/engineer with expertise/ familiarity in that specific area will help.

The key concept to remember is that by working with *Climate Specialists* and other experts, the *QP* is more likely to identify the appropriate specific climate parameters to use for the vulnerability risk assessment, and is also more likely to obtain accurate values that reflect projected climate conditions. Most climate parameter projections provide a range of values. The *QP* should use their professional judgment and methods such as sensitivity analysis to select the appropriate value going forward, with the selection rationale documented. Note that each vulnerability risk assessment method or tool has its own specific format for documenting the climate parameters. This format should be used by the *QP* unless there is a compelling reason to do otherwise.

### **Minimum Level of Effort**

It is not necessary to have specific numeric values for each of the general climate parameters identified in Section 5.2.2. It should be sufficient to determine if the projected change for each parameter is large, moderate, or negligible, and if the change is an increase or decrease from current values. It is likely safe to assume that extreme values will reflect the magnitude and direction of changes to the average values of a given climate parameter. For example, if average precipitation is projected to increase moderately, then extreme precipitation for short duration events can be assumed to

increase at least moderately. It may be useful to confer with a *Climate Specialist* to confirm these generalized assumptions.

#### 5.3.5 Identify and Characterize Infrastructure/Climate Interactions

For each combination of listed infrastructure component and climate change parameter, the *QP* and assessment team must determine what type of interactions might occur should the climate event happen. Essentially, the team is to identify “what, if anything, could happen” for each potential interaction. If, for example, the current one-hour rainfall intensity with a 1:100 year return period were to increase by 50%, what might happen to the proposed catch-basins, or culverts, or ditch rip-rap? Could the catch-basins become overwhelmed with increased runoff? Could the road sections with culverts be over-topped and washed-out? Could the rip-rap be washed downstream, causing erosion or damage to downstream structures?

At this point in the climate risk assessment, the only task is to identify potential interactions between each infrastructure component and each climate change parameter. Estimates of likelihood and severity will be made later. Professional judgment, however, is required to ensure key realistic interactions are identified. It is also important to recognize that there might not be an interaction for every combination of infrastructure component and climate change parameter. This is acceptable and will be part of the result.

Each risk assessment method specifies the format and process for characterizing and documenting the interactions between each infrastructure component and specific climate parameter. These should be followed to ensure consistency across various tasks of the assessment. The climate-infrastructure interaction table used in a MoTI risk assessment is provided as one of the examples in Appendix B.

##### **Minimum Level of Effort**

There is little opportunity to reduce effort for this task, except perhaps, the level of documentation detail.

#### 5.3.6 Define Risk

As defined previously, and within the context of infrastructure design and climate change, *risk* is a measure of how vulnerable a design component is to negative impacts of climate change. From a design perspective, a negative impact can be considered a failure of the design component— either physically or in terms of performance criteria. As defined previously, and within the context of infrastructure design and climate change, *risk* is a measure of how vulnerable a design component is to negative impacts of climate change. From a design perspective, a negative impact can be considered a failure of the design component— either physically or in terms of performance criteria. *Risk* is a function of two attributes:

- the probability, or likelihood of the failure to occur, and the
- severity of the consequences should the failure occur.

Each risk assessment method provides specific guidance on how to define the scoring system. For example, scores could range from 0 to 7 for both “zero to high likelihood” and for “no to high severity”. Each value in the range of scores must be defined in a way that is meaningful to the team and to the stakeholders. For example, a likelihood score of 7 could be defined to mean “highly likely to occur” or “100% chance of occurrence” or “approaching certainty”. A severity score of 7 could be defined as “catastrophic” or “loss of asset”.

The key is that risk be determined using the same definition and calculations for all identified interactions. This provides consistency for the entire assessment process, and will result in a better understanding of how vulnerable each selected infrastructure component is to each identified climate parameter.

The Climate Change Vulnerability Risk Assessment has some levels that include

- i) Screening of the interaction
- ii) Vulnerability Analysis or Assessment
- iii) Engineering Analysis

#### **Minimum Level of Effort**

It would be sufficient to define a scoring system where scores would range from 0 to 3 for “zero, low, medium, and high” likelihood and “no, low, moderate, and high” severity or consequence.

#### **5.3.6.1 Conduct Screening-level Risk Assessment**

A Screening-level risk assessment will help the QP determine the level of effort to be expended on conducting a *climate vulnerability risk assessment* of the subject infrastructure. A Screening-level risk assessment (screening risk assessment) is the first step of a climate vulnerability risk assessment conducted to help the QP determine if a more comprehensive climate vulnerability risk assessment is required. Even if it is determined early in the process that a minimal level of effort is not sufficient to conduct risk assessment, the Screening-level assessment could provide insight regarding where additional resources and effort are best applied during a comprehensive *risk assessment*.

Each of the *risk assessment* tasks described in Section 5 includes a statement about “minimum level of effort”. These statements outline the process for conducting a *Screening-level assessment*. If the QP completes each risk assessment task by applying the minimum level of effort, they will essentially complete a Screening-level *assessment*.

This contains a yes/no determination if there is an interaction between infrastructure components and climate and thus potential vulnerability. If the Screening-level *assessment* indicates that there is insignificant risk due to climate change, then a more comprehensive *risk assessment* will not be required. When the Screening-level *assessment* indicates that risks are moderate or high, then it is prudent for the QP to arrange for a more comprehensive risk assessment. This may require expanding the team to provide



additional information or expertise, conducting more detailed engineering analysis, defining climate change events in more detail, or any number of actions. The QP will have to apply professional judgement in order to determine how much effort is required to complete the comprehensive *risk assessment*.

#### **5.3.6.2 Conduct Risk Assessment**

Once the potential interactions between the selected infrastructure components and defined climate change parameters have been determined, the risk assessment is completed by:

- assigning a likelihood of each interaction occurring,
- assigning a severity score describing the consequences of the interaction occurring, and
- calculating a risk score as the product of the likelihood and severity score.

In mathematical terms, risk = likelihood x severity.

It is important to determine the likelihood and severity scores independent of each other. The QP cannot allow perceived severity to influence the assigned likelihood for a given interaction. The reciprocal is true for perceived likelihood influencing the assigned severity score. Documenting the reasons for independently selecting both the likelihood and severity for each interaction can be useful when identifying adaptation measures. The design team can reduce risk by:

- reducing the likelihood that the interaction will occur,
- reducing the severity of the interaction should it occur, or
- both.

Determining the likelihood and severity scores for each interaction requires significant expert judgment. This is best accomplished by engaging team members that have experience with the selected infrastructure components when they are subjected to climate events that are similar to the identified climate change parameters.

The QP should also document interactions that require further clarification and thus engage extra risk analysis processes, such as engineering analysis or additional information in order to determine an appropriate likelihood or severity score. This analysis is discussed in Section 5.3.9.

#### **Minimum Level of Effort**

While the *screening assessment* could technically be completed by a single person, it should be completed by the minimal team identified in Section 5.2.3. It is important that different perspectives and areas of expertise be engaged to increase confidence in the results.

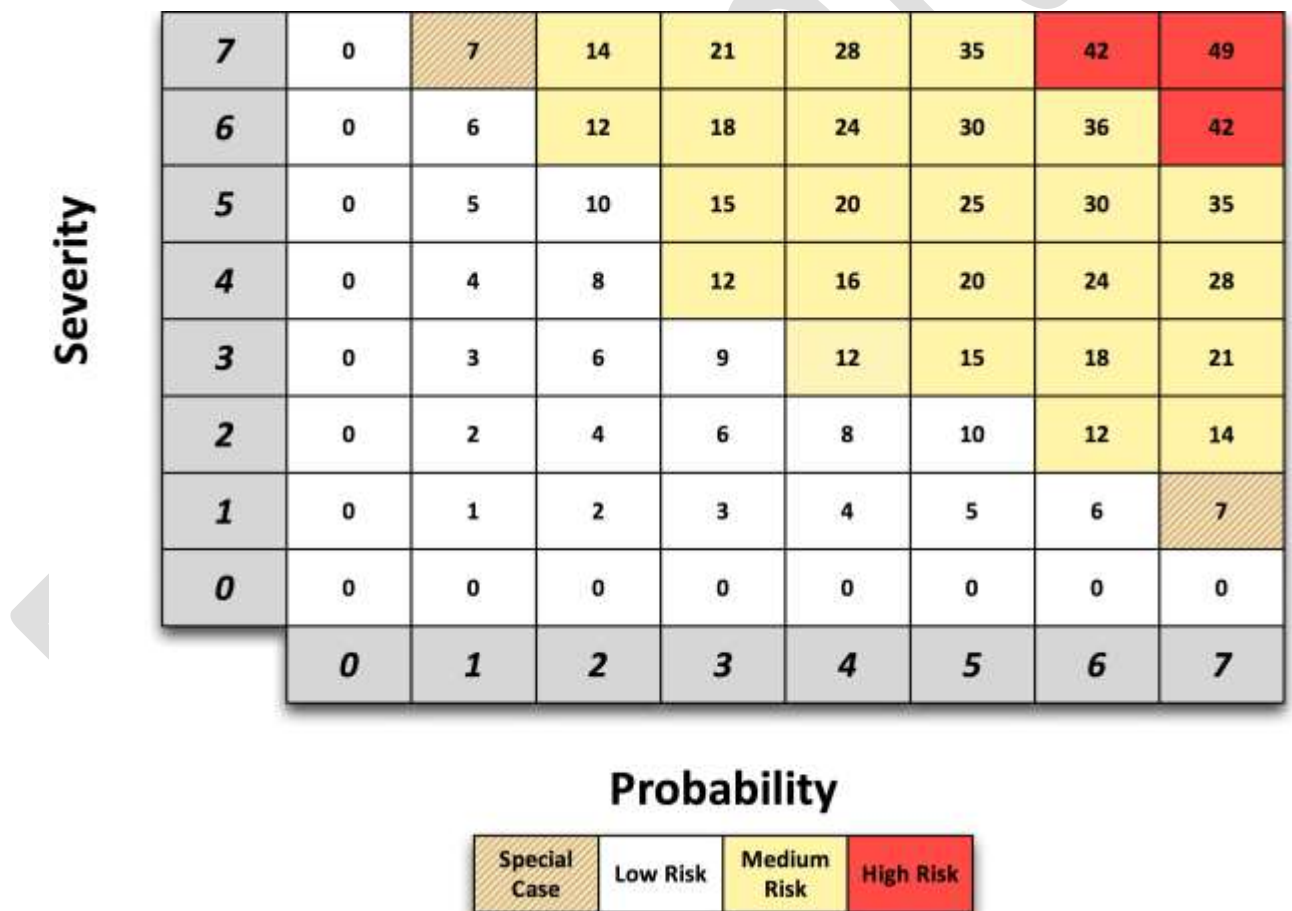
#### **5.3.6.3 Evaluate Climate Risk Assessment**

Quantifying risk associated with each of the infrastructure component/climate parameter interactions forms the basis for developing strategies to manage these risks. For example,

infrastructure with low risk scores that are the product of low probability and low consequence scores can usually be designed without further consideration of climate change. Infrastructure with high risk scores that are the product of high probability and severe consequence scores may be candidates for robust design.

Infrastructure components that garner “medium” risk scores may be candidates for flexible design, or may be evaluated further to determine if additional assessment, such as using engineering analysis, is required to clarify risk and identify appropriate adaptation measures.

Two special cases that can occur are the combination of low likelihood and high severity, or high likelihood and low severity. The corresponding risk for these interactions is typically scored as “low”, but further evaluation and engineering judgement should be applied to determine actual risk. These special cases and the risk matrix are shown in the figure 4 (adopted from the PIEVC document version 10 October 2011 version).



**Figure 4: Example Risk Matrix**

Note that application of the climate risk assessment results will depend, to a large degree, on the owner’s *risk tolerance*. If a coastal highway is at risk due to flooding under a future extreme event, the *owner* of the infrastructure has to assess the importance of the

highway to the community or the economy, assess the remaining design life, and assess the adaptive capacity of the highway to determine if and when and what level of upgrades to consider. Based on this assessment the *owner* will establish their level of *risk tolerance* which will define the level of climate resilience incorporated into the design.

The risk assessment results, and the recommended actions for each of the selected infrastructure components, should be reviewed with the *owner* and *EOR*. Final decisions are documented in the *report*.

#### **Minimum Level of Effort**

There is little opportunity to reduce effort for this task, except perhaps, the level of documentation detail.

#### **5.3.6.4 Conduct Engineering Analysis**

There may be reasons to conduct the additional step of engineering analysis as part of the climate risk assessment. A key reason is to clarify the level of risk associated with a particular infrastructure/climate interaction, particularly when the initial assessment does not yield a clear vulnerability risk score. Typical triggers for an engineering analysis may include a medium risk score that generated significant team debate, interactions that tend to exhibit vulnerability regardless of risk score, or insufficient data to make a definitive assessment. The objective of engineering analysis is to quantify the adaptive capacity to climate change of the proposed design, so it looks in detail at the load and capacity of the subject infrastructure under projected climate conditions.

Details will differ depending on the infrastructure to be analyzed and the risk assessment method selected. However, all engineering analyses will determine total load and total capacity. The total load includes loads due to both climate and non-climate drivers. Total capacity includes design capacity adjusted for aging, normal wear, and other factors. When the total load exceeds total capacity, the infrastructure is considered to be vulnerable. If total load is less than total capacity, the infrastructure is considered to have adaptive capacity – resilience. The engineering analysis results can be used to establish climate change safety factors, which are factors required to establish the loads required to provide the adaptive capacity required, increase resilience and reduce the risks to acceptable levels.

Another reason to conduct engineering analysis is to facilitate selection of adaptation measures. The contrast between design values generated by both current and projected future climate values can be used to identify ways to reduce risk. For example, the hydraulic capacity required to convey peak flows generated from future climate values could be achieved by increasing conduit diameter, using a material with a lower roughness coefficient, introducing upstream storage to attenuate the peak flow, or a combination of two or more of these options. The analysis can be used to determine which of the options are feasible, and to what extent. These analyses may also provide non-structural options that address the vulnerabilities that contribute to the feasibility and cost-effectiveness of the options.

The following three sub-sections provide additional discussion regarding engineering analysis for each of the three primary engineering fields associated with the design of *highway infrastructure* – hydrotechnical, geotechnical, and structural. Engineering analysis may also be required to confirm climate change vulnerability risk associated with avalanches, environmental protection, icing and ice jams, electrical systems, signage systems, and other specialized fields pertinent to the overall infrastructure design. While these engineering fields are not discussed specifically, the *risk assessment* and adaptation principles presented in these guidelines also apply.

### **Minimum Level of Effort**

If engineering analysis is to be conducted to help determine whether or not a more comprehensive *risk assessment* is required, a sensitivity analysis may be sufficient. That is, rather than determining projected design climate values for load analysis, it may be sufficient to calculate capacity required if total load was increased by a specified amount. For example, if total load based on current design climate values were to be increased by 10%, 25%, or even 50%, what would be the impact on the design to provide the corresponding capacities?

#### **5.3.6.4.1 Hydrotechnical Analysis**

Hydrotechnical analysis is conducted to support the design of bridges and large culverts for highway projects, as well as piers, jetties and erosion protection for ports. This includes for example, recommendations for hydraulic design, stream bank and channel erosion protection, scour protection, stream diversions, and foreshore erosion protection.

Most, if not all, of the climate data required to conduct hydrotechnical analysis are used indirectly. Design values such as water levels, flow rates, wave action, and storm surge heights are the results of climate parameters such as precipitation, wind, snowpack and temperature. In many cases, design values are determined by conducting statistical analyses of historical records – maximum annual flows, for example. However, when considering the impacts of climate change, this approach is not suitable since future values may change from historical values. This may necessitate modeling and apply non-stationary methods to estimate the impacts of climate change on the required design values.

Modeling climate change impacts for every infrastructure design project may not be necessary since some of this work is ongoing and potentially available from many sources. Sea level rise, for example, has already been modeled by several organizations and estimates of future levels are available. Hydrologic models that reflect potential climate change have also been completed for select watersheds in BC. However, the results might be too coarse at this time, both temporally and spatially, to be of use in design projects. Engineering judgment will be required to determine how to best estimate the impacts of climate change on the hydrotechnical design values required for each project.

Since the hydrotechnical analysis usually involves design considerations for few key components (i.e. bridge or culvert) interacting with a small number of climate parameters (i.e. rainfall, freshet peaks) less time may be spent on the risk assessment (listing

components and evaluating interactions). Thus, more time could be spent on an adaptive design approach which considers anticipated effects of climate change on site hydrology and how modified hydrology effects the structure performance.

#### **5.3.6.4.2 Geotechnical Analysis**

Geotechnical analysis is conducted to support the design of roads, bridge piers and abutments, retaining walls, and rock-fall protection. Geotechnical design values – such as bearing capacity or slope stability, are dependent on physical properties of the soil, such as texture, moisture, cohesion, groundwater levels and flow, and bedrock presence and composition. None of these are climate parameters, but some can be influenced by climate change.

Permafrost, for example, is highly susceptible to warming trends. Pavements may become more susceptible to failure from a combination of temperature and water impacts – higher, sustained temperatures may soften asphalt surfaces which can increase rutting; increased freeze/thaw cycles could cause damage from frost heaves or thermal fatigue cracking; higher moisture contents in the road base can lead to increased cracking or rutting of the pavement surface due to reduced bearing capacity.

Changes in the average and extreme values of precipitation and temperature, including frequency and duration of events, can have a significant impact on geotechnical design. These should be identified and considered as part of any geotechnical analysis in order to support climate change resiliency in infrastructure design.

#### **5.3.6.4.3 Structural Analysis**

Structural analysis is conducted to provide design values for a variety of materials and performance objectives. Materials may include concrete, steel, aluminum, plastics, wood, protective coatings, and many composites and combinations thereof. Performance objectives include strength, durability, and sometimes even aesthetics. Climate parameters can directly affect the performance of these materials and the structural components that they comprise.

Loads are at least partially a function of wind, precipitation, and temperature (snow and ice). Durability of the structural components, or at least their protective coatings, may be subject to changes in temperature, solar radiation, and moisture. Performance of mechanical systems – both passive and active – may also be impacted by changes in temperature and moisture.

Many of these climate parameters are applied to structural design implicitly rather than directly, because they are embedded into the various codes that are typically used. It is vital that the *QP* work with the structural team members to identify appropriate climate parameters so that potential changes to the accepted values can be considered and included in any analysis.

## 5.4 Identify and Incorporate Adaptation Options

For the purposes of these guidelines, “adaptation” refers to any action that reduces the vulnerability of proposed infrastructure to the impacts of climate change. Infrastructure that is designed and constructed using an adaptation method is considered resilient to climate change for specified requirements. It is important to recognize that adaptation is not restricted to only increasing capacity or strength, but may include:

- enhanced maintenance practices,
- different construction materials or methods,
- different siting,
- phasing opportunities triggered by threshold events,
- further study or more detailed analysis, and/or
- monitoring, or any number of items that could enhance climate change resilience.

It is also important that adaptation reflect the following principles (excerpts from Federal Interagency Climate Change Adaptation Task Force):

- Adaptive actions should not be delayed to wait for a complete understanding of climate change impacts, as there will always be some uncertainty. Plans and actions should be adjusted as understanding of climate impacts increases.
- Adaptation often requires coordination across multiple sectors, geographical scales, and levels of government to build on the existing efforts and knowledge of a wide range of stakeholders. Because impacts, vulnerability, and needs vary by region and locale, adaptation will be most effective when driven by local or regional risks and needs.
- Ecosystems provide valuable services that help to build climate change resilience and reduce the vulnerability to climate change impacts. Integrating the protection of biodiversity and ecosystem services into adaptation strategies will increase climate change resilience.
- Adaptation should, where possible, use strategies that complement or directly support other related climate or environmental initiatives, such as efforts to improve disaster preparedness or reducing greenhouse gas emissions.

### 5.4.1 Professional Judgment

Professional judgment is required throughout the entire design and risk management process. However, its application is especially important when identifying and implementing adaptation measures to increase climate resiliency.

Given the level of public awareness of climate change issues, and by virtue of these guidelines, professionals cannot make the argument that they were unaware that climate change could potentially affect their professional work. Not considering these factors may lead to additional professional liability.

These Guidelines should not be interpreted to mean that the professional, specifically the *EOR*, must become an expert on weather and climate issues. Rather, the expectation is

that the professional will, as part of their normal practice, determine where climate information is embedded in codes, standards, and assumptions and evaluate how the information is applied in their professional work.

The key concept is to ensure that Professionals consider the implications of climate change on their professional work, and that they create a clear record of the outcomes of those considerations.

#### 5.4.2 Identify Adaptation Options

This section introduces a range of adaptation measures that could be implemented in order to ensure that the proposed infrastructure is resilient to the impacts of climate change. Figure 3 shows three categories of adaptation measures that could be applied to the infrastructure design process:

1. Status-Quo Design
2. Flexible Design
3. Robust Design

*Status-quo design* recognizes that implementing no explicit adaptation measures is a valid response, provided that the *QP* documents the reason or reasons that this is done. Some of these reasons may be that:

- the climate risk assessment shows that the subject infrastructure has low or no vulnerability risk due to projected climate change, or that
- the service life of the subject infrastructure is relatively short, and adaptation measures can be considered and/or implemented when the infrastructure is replaced or refurbished.

*Flexible design* is based on the assumption that there will be opportunities to adapt in the future. This approach could be selected for a variety of reasons, but the primary one is to reduce up-front capital costs. There are two philosophies to this approach. One is to initially design the infrastructure using climate values based on climate projections, while the other is to initially design the infrastructure based on historical climate values. In both cases, the ability to increase resiliency is provided should climate trend toward more severe climate conditions.

It is important, therefore, to identify the consequences if the worst-case climate scenario does unfold after the infrastructure is constructed, and to have a plan of action to modify or upgrade the infrastructure accordingly. Within this context, the term “worst-case scenario” refers to the potential that future design climate values may be best represented by the maximum values in the range of climate projection results. If it is not feasible to develop a response plan to climate conditions that are worse than designed, then the *flexible design* approach should not be used.

With *flexible design*, some adaptation measures may be implemented as part of the initial design, and others may be implemented when one or more pre-defined trigger events occur. Trigger events should be defined in a way that ensures continued integrity of the

subject infrastructure – no failures - but still signals increasing likelihood that the climate is trending toward conditions more severe than those used for initial design. For example, a trigger may be an event flood level, flow rate, or rainfall intensity that reaches or exceeds a threshold.

Flexible design is characterized by the ability to implement one or more of the following measures in the future:

- increase the infrastructure’s capacity or capacities
- reduce loads
- reduce consequences of failure

Note that flexible design is more appropriate for gradual changes over time, such as sea level rise or melting permafrost. It may be less appropriate for infrastructure subject to sudden extreme climate events that are not easily predicted based on observed conditions. Successful flexible design also requires monitoring of climate, loads, and infrastructure performance, and comparing the data to pre-defined thresholds. It should be implemented only if the *owner* has the funds, authority, and willingness to maintain the monitoring program and to implement the pre-determined upgrades if required.

*Robust design* has the objective of ensuring that the proposed infrastructure will perform as expected over a range of possible future climate conditions, including the “worst case” design scenario (as defined above). This approach will usually result in higher initial construction costs for the infrastructure, and therefore may be justified for those infrastructure components that are assessed to have high risk of vulnerability to climate change. Other considerations for choosing the robust design approach may be as follows:

- The overall cost of implementing flexible design far exceeds the additional cost of implementing robust design.
- Flexible design is not an option because there are no feasible opportunities to phase adaptation measures.
- There are social or political issues that are better addressed through robust design.

Robust design may include, but not be limited to the following:

- Use of generous safety factors applied to loads generated using “average” projected climate values, and ensuring that capacities are designed accordingly.
- Capacities designed to service loads generated using “worst case” projected design climate values.
- Redundant features added to the design to protect against failure.

It is worth noting that the *EOR* has the responsibility to select one of the design approaches identified above or an alternative approach based in part on the results of the risk assessment. Regardless of which design approach is selected it is incumbent to include



a maintenance program to assure design integrity over the service life. All designs assume a level of operations and maintenance that must be maintained to assure resilience. These assumptions must be clearly documented in the *Climate Change Resilient Design Report*.

### **Minimum Level of Effort**

If the screening assessment indicates that there are no vulnerabilities to climate change, then in consultation with the *owner*, the infrastructure design could proceed without any adaptation measures incorporated. If the screening assessment indicates only low climate vulnerability risk, simple adaptive or maintenance measures may be appropriate. Whatever adaptive measures, or lack of measures, are implemented into the design, the corresponding assumptions and reasons for doing so must be clearly documented.

### **5.4.3 Communicate Effectively**

In most cases, the *EOR* does not make all of the decisions with respect to implementing climate change adaptation measures for a design. As presented in Section 5.2.4, a team of professionals, specialists, and stakeholders may be involved in the design process. Since language used to communicate concepts and principles can be interpreted differently by practitioners in different disciplines, it is essential that team members are aware of the potential for misunderstanding, and that they take steps to ensure that what is communicated is understood as intended. In addition, highly technical information must be communicated to decision-makers, some of whom have little or no technical knowledge or experience. *BCMOTI*, along with contributions and support from other organizations, has published a document<sup>10</sup> that addresses this issue within the context of climate and climate projections.

Given the critical importance of these issues, it is the *QP's* duty to ensure that their communications are understood correctly. Technical terms should be defined and reviewed by team members to ensure a mutual understanding. When using common language, the *QP* must be aware of how such language is understood by the average person, and must adjust or elaborate communications as necessary.

Sometimes the *EOR* may have to communicate climate issues, risks, and proposed adaptation measures to non-receptive decision makers. In such cases, the *EOR* must ensure that the consequences of ignoring the issues or rejecting the recommended adaptation measures are clearly understood by the decision maker. Furthermore, if the *EOR* believes that public health and safety are at significant risk should the adaptation measures be excluded from the design, it is their duty to communicate such information more broadly – first within APEGBC to seek council and advice, and if deemed appropriate, with regulators and/or other external agencies.

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<sup>10</sup> Ministry of Transportation, BC., Nodelcorp Consulting, Pacific Climate Impacts Consortium. (2014) A Primer for Understanding Concepts, Principles, and Language Use Across Disciplines, Revision 6. Retrieved from: [http://www.th.gov.bc.ca/climate\\_action/documents/Climate\\_Data\\_Discussion\\_Primer.pdf](http://www.th.gov.bc.ca/climate_action/documents/Climate_Data_Discussion_Primer.pdf)

Although it is the *owner* that accepts the design recommendations from the *EOR*, the *EOR* should be aware that simply recommending actions to decision makers may be insufficient. Where appropriate, the *EOR* should communicate any ethical, legal or safety concerns from not implementing the adaptation measures identified by the *EOR* to the *owner*.

#### **Minimum Level of Effort**

There is little opportunity to reduce effort for this task, except perhaps, the level of documentation detail.

#### **5.4.4 Finalize Adaptation Plan and Resilient Design Measures**

Once the resilient design measures have been identified and organized into options, they must be presented to the *owner* and other appropriate decision makers. The goal of this action is to select the adaptive measures that will be incorporated into the final design. Subject to the cautions presented in Section 5.4.3, the identified adaptation measures should be presented with the following supportive information:

- A list of the infrastructure/climate change interactions that are addressed by the adaptive measure. This should include descriptions of the interactions, the assigned risk scores, and a summary of the likelihood and consequence severity scores that generate the risk scores – information readily available from the climate risk assessment.
- A description of how the adaptive measure would be implemented, especially if it is a “flexible design” measure as opposed to a “robust design” measure.
- An estimate of the financial impacts to implement the proposed adaptive measure.
- A discussion of any related issues that could impact the implementation of the adaptive measure – the need for monitoring, land acquisition, product sourcing, schedule impacts, etc.

The selected adaptation measures should be documented, along with any discussions that justify their selection. See Section 5.5 for more detail.

#### **Minimum Level of Effort**

The level of effort for this task will correspond to the number and types of adaptation measures incorporated into the design.

### **5.5 Document Process and Decisions**

It is critical to document key information associated with incorporating climate change resilience into the *highway infrastructure* design process. In addition to fulfilling the QA/QC requirements of the APEGBC Quality Management bylaws, such documentation will prove valuable for:

- developing and executing operation and maintenance plans
- maintaining the monitoring programs

- addressing upgrading or refurbishment issues
- demonstrating due diligence, should there be a failure caused by a climate event.

For *BCMoTI* projects, the *QP* is to complete the *assurance statement* (Appendix A) and submit it with the *report* as outlined in Section 4.2.3. As a minimum, key information from each of the tasks outlined in the Sections 5.2 to 5.4 should be clearly documented in this *report*. This may include, but not be limited to:

- *risk assessment* and design team members, including their qualifications and roles
- design criteria and associated references
- data sources and corresponding uncertainties, data gaps, and assumptions (each risk assessment method may specify the format for this information)
- reasons for selecting the infrastructure components and climate change parameters used for the climate risk assessment
- scoring methods for likelihood and consequence severity
- engineering analysis objectives, results, and conclusions
- design values and adjustments for future climate where appropriate
- adaptation measures other than adjusted design values (siting changes, monitoring programs, actions to be taken when thresholds are triggered, etc.)
- key decisions with respect to the adaptation measures selected for implementation and the corresponding justification for their selection
- the ensemble of climate models used in the *risk assessment*
- climate projections used in the *risk assessment*
- emissions scenario(s) considered in the *risk assessment*
- name and version of vulnerability risk assessment tools used in the *risk assessment*
- time horizon used for the *risk assessment*

The *EOR* is to also ensure that the *BCMoTI Design Criteria Sheet* is completed and submitted as required by *BCMoTI* (Appendix D)

### **Minimum Level of Effort**

There is little opportunity to reduce effort for this task, except for the level of documentation detail. Assuming that the screening assessment adequately indicated that the infrastructure has low or no vulnerabilities to climate change, the document will be limited to summary statements of each of the items listed above. However, it is essential that the documentation still clearly indicate the reasons for assumptions and decisions made.

## 6 QUALITY ASSURANCE/QUALITY CONTROL

### 6.1 APEGBC Quality Management Bylaws

As a minimum, a QA/QC program must satisfy the requirements of APEGBC Quality Management Bylaw<sup>11</sup>s 14(b)(1), (2) and (3) with regards to:

- the work being performed under the direct supervision of a *QP* ;
- retention of complete project documentation for a minimum of 10 years;
- documented checking of engineering and geoscience using a quality control process; and
- documented internal or external review of report.

APEGBC Quality Management Guidelines state that the project documentation should be retained for a minimum of 10 years, however, given the service life of *highway infrastructure*, the project documentation should be retained by the *owner* for the service life of the infrastructure.

These minimum requirements may be supplemented by an independent peer review where appropriate.

### 6.2 Direct Supervision

The Act (Section 1 (1)) states that direct supervision means taking responsibility for the control and conduct of the engineering or geoscience work of a subordinate. With regard to direct supervision, the *CEOR*, *EOR*, or *QP* having overall responsibility should consider:

- the complexity and nature of the project;
- which aspects of the risk assessment, and how much of those aspects, should be delegated;
- training and experience of individuals to whom work is delegated; and
- amount of instruction, supervision and review required.

### 6.3 Retention of Project Documentation

The following documentation related to the incorporation of climate change resilience into the design of *highway infrastructure* should be retained for a minimum of 10 years, or for the service life of the infrastructure:

- The *report* detailing the engineering analysis, conclusions and recommendations from the *risk assessment*;
- Any documentation related the *risk assessment*; and
- The *BCMoTI Design Criteria Sheet*

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<sup>11</sup> <https://www.apeg.bc.ca/getmedia/e0c7d14c-ed74-4872-9a58-0a4bb2cd59b7/APEGBC-Bylaws.pdf.aspx>

## 6.4 Internal and External Peer Review

An independent peer review is an additional level of review beyond the minimum requirements of Bylaw 14(b)(2) that may be undertaken for a variety of reasons by an independent Peer Reviewer not previously involved in the project. For example, the independent peer review could be requested by the owner or required as a part of a legal/technical investigation resulting from a complaint or a lawsuit. The peer reviewer will review the *risk assessment* and the *report* to determine the accuracy of the findings and the validity of the recommendations.

## 7 PROFESSIONAL REGISTRATION; EDUCATION, TRAINING AND EXPERIENCE

### 7.1 Professional Registration

A *professional engineer* who is engaged in work related to public infrastructure is typically registered with APEGBC in the discipline of geotechnical, structural, civil, or hydro-technical engineering. Not all *professional engineers* registered in the disciplines noted above are necessarily appropriately knowledgeable in *risk assessments*. It is the responsibility of the *professional engineer* or *professional geoscientist* to determine whether they are by training or experience able to undertake and accept responsibility for climate change vulnerability risk assessments as a *QP* or for the climate change resilient design of *highway infrastructure* as the *EOR* (APEGBC Code of Ethics Principle 2).

### 7.2 Education, Training and Experience

The minimum skill sets and competencies for an APEGBC member to act in the capacity of a *QP*:

- Should have worked in a multi-stakeholder team in conjunction with the *owner* to conduct *risk assessments*;
- Should be able to work with a climate specialist to acquire the appropriate regional climate data projections;
- Should be able to use regional climate data projections in a *risk assessment*;
- Should be able to recommend adaptation methods for design of the *highway infrastructure* based on the *risk assessment*; and
- Should be able to clearly document the results of the *risk assessment* to communicate the risks due to climate change to the *owner*.

## 8 REFERENCES AND RELATED DOCUMENTS

APEGBC. (2014). A Changing Climate in British Columbia: Evolving responsibilities for APEGBC and APEGBC Registrants. Retrieved from: <https://www.apeg.bc.ca/getmedia/a39ff60e-80a1-4750-b6a5-9ddc1d75248a/APEGBC-Climate-Change-Position-Paper.pdf.aspx>

Charron, I. (2014). A Guidebook on Climate Scenarios: Using Climate Information to Guide Adaptation Research and Decisions. Ouranos, 86p. Retrieved from: [http://www.ouranos.ca/media/publication/352\\_GuideCharron\\_ENG.pdf](http://www.ouranos.ca/media/publication/352_GuideCharron_ENG.pdf)

Committee on Adaptation to a Changing Climate. (2015). Adapting Infrastructure and Civil Engineering Practice to a Changing Climate. Retrieved from: <http://ascelibrary.org/doi/book/10.1061/9780784479193>

Daniel, Jo Sias et al. (2014) Impact of Climate Change on Pavement Performance: Preliminary Lessons Learned through the Infrastructure and Climate Network (ICNet). [https://www.unh.edu/erg/sites/www.unh.edu/files/daniel\\_et\\_al\\_2014\\_1.pdf](https://www.unh.edu/erg/sites/www.unh.edu/files/daniel_et_al_2014_1.pdf)

Engineers Canada. (2011). Public Infrastructure Engineering Vulnerability Committee Engineering Protocol for Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate, Revision 10-BETA. Retrieved from: [http://www.pievc.ca/sites/default/files/part\\_i\\_-\\_pievc\\_engineering\\_protocol\\_-\\_revision\\_10\\_-\\_beta\\_-\\_october\\_2011.pdf](http://www.pievc.ca/sites/default/files/part_i_-_pievc_engineering_protocol_-_revision_10_-_beta_-_october_2011.pdf)

IPCC. (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp. Retrieved from: <https://www.ipcc.ch/report/ar5/syr/>

Ministry of Environment. (2015). Indicators of Climate Change for British Columbia 2015 Update. Retrieved from: <http://www2.gov.bc.ca/assets/gov/environment/climate-change/policy-legislation-and-responses/adaptation/climatechangeindicators-2015update.pdf>

Ministry of Transportation, BC., Nodelcorp Consulting, Pacific Climate Impacts Consortium. (2014) A Primer for Understanding Concepts, Principles, and Language Use Across Disciplines, Revision 6. Retrieved from: [http://www.th.gov.bc.ca/climate\\_action/documents/Climate\\_Data\\_Discussion\\_Primer.pdf](http://www.th.gov.bc.ca/climate_action/documents/Climate_Data_Discussion_Primer.pdf)

Pacific Climate Impacts Consortium. (2012). Plan2Adapt. Retrieved from: <https://pacificclimate.org/analysis-tools/plan2adapt>

Summit Enterprises International Inc. (2014). Canadian Climate Change Risk Assessment Guide - A Strategic Overview of Climate Risks And Their Impact On Organizations. [http://www.iclr.org/images/CC\\_Risk\\_Assessment\\_Guide\\_Interim2\\_Jun\\_8\\_14\\_.pdf](http://www.iclr.org/images/CC_Risk_Assessment_Guide_Interim2_Jun_8_14_.pdf)

U.S. Federal Interagency Climate Change Adaptation Task Force (FICCATF). Guiding Principles for Adaptation (2011). <https://www.fedcenter.gov/programs/climate/guidingprinciples/>

## APPENDIX A: ASSURANCE STATEMENT

### CLIMATE CHANGE VULNERABILITY RISK ASSESSMENT ASSURANCE STATEMENT

Note: This Statement is to be read and completed in conjunction with the “*Highway Infrastructure Climate Change Resilient Design Report*” outlined in the “Professional Practice Guidelines - Developing Climate Change Resilient Designs for Highway infrastructure in British Columbia” (Climate Resilience Guidelines). This assurance statement is to be provided for *risk assessment* for the purposes of retrofit to existing infrastructure or to inform design process of new infrastructure as required by the BC Ministry of Transportation and Infrastructure (BCMoTI). Italicized terms are defined in the *Climate Resilience Guidelines*.

**It is important to note that the focus of *assurance statement* is on assuring that the professional has followed the suggested standard of care defined in these guidelines – not on guaranteeing that a specific design will perform without issue under future climate conditions.**

To: BC Ministry of Transportation and Infrastructure  
(or other BC Municipality)

Date: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Jurisdiction and address

With reference to (check one):

- ☐ New Design
- ☐ Retrofit
- ☐ Other (specify) \_\_\_\_\_

For the Infrastructure:

\_\_\_\_\_  
Legal description and GPS Coordinates of the Infrastructure

The undersigned hereby gives assurance that the attached risk assessment *report* on the above-mentioned Infrastructure substantially complies with the intent of the Climate Resilience Guidelines. The *Highway Infrastructure Climate Change Resilient Design report* must be read in conjunction with this Statement.

In preparing that report I have:

Check to the left of applicable items (The items in **BOLD** indicate the minimum level of effort that needs to be expended by the QP in doing the climate vulnerability risk assessment)

\_\_\_ 1. **Collected and reviewed appropriate background information including service life of the infrastructure**

\_\_\_ 2. **Reviewed the proposed or existing infrastructure development on the project**

\_\_\_ 3. Conducted field work and reported on the results of the field work on and, if required, beyond the project

\_\_\_ 4. **Assembled a qualified team in collaboration with the owner**

\_\_\_ 5. Considered any changed conditions on and, if required, beyond the project

6. **For the *climate change vulnerability risk assessment*, I have:**

\_\_\_ 6.1 **reviewed and characterized, if appropriate, future climate and extreme weather event projections and analyses**

\_\_\_ 6.2 worked with a climate data provider to obtain relevant future climate and extreme weather event projections



- \_\_\_ 6.3 estimated the risk on the Infrastructure using a BCMoTI/ other owner acceptable risk screening analysis (such as PIEVC protocol)
- \_\_\_ 6.4 included (if appropriate) the effects of climate change and land use change
- \_\_\_ 6.5 identified existing and anticipated future components at risk on and, if required, beyond the project
- \_\_\_ 6.6 estimated the potential consequences to those components at risk
7. **Where BCMoTI has specified a specific level of *risk tolerance* that is different from the standard design criteria<sup>12</sup>, I have**
- \_\_\_ 7.1 compared the level of *risk tolerance* adopted by BCMoTI/ other owner with the findings of my investigation
- \_\_\_ 7.2 made a finding on the level of risk tolerance on the Infrastructure based on the comparison
- \_\_\_ 7.3 made recommendations to reduce the risk on the Infrastructure
8. **Where BCMoTI has not specified a level of *risk tolerance* I have:**
- \_\_\_ 8.1 described the method of *risk assessment* used
- \_\_\_ 8.2 described the assumptions used in arriving at climate projections
- \_\_\_ 8.3 (where available) referred to an appropriate and identified provincial or national resource for level of risk
- \_\_\_ 8.4 compared this guideline with the findings of my investigation
- \_\_\_ 8.5 made a finding on the level of *risk tolerance* on the Infrastructure based on the comparison
- \_\_\_ 8.6 made recommendations to reduce risks
- \_\_\_ 9. **Reported on the requirements for future inspections of the Infrastructure and recommended who should conduct those inspections**
- \_\_\_ 10. Suggested an operations and maintenance schedule to ensure that climate resiliency and operational liability are addressed

Based on my comparison between

Check one

- ☐ the findings from the investigation and the adopted level of *risk tolerance* (item 7 above); or
- ☐ the appropriate and identified provincial or national guideline for level of *risk tolerance* (item 8 above)

I hereby give my assurance that the standard of care established in these guidelines has been applied in conducting the *climate change vulnerability risk assessment*, documenting the results in the *Highway infrastructure Climate Change Resilient Design report* and in informing the design of the *highway infrastructure*.

I certify that I am a *Qualified Professional* as defined in the Climate Resilience Guidelines.

\_\_\_\_\_  
Name (print)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

<sup>12</sup> The Technical Circular on BCMoTI website titled "*Climate Change and Extreme Weather Event Preparedness and Resilience in Engineering Infrastructure Design*" indicates implications to engineering project infrastructure components from climate change and extreme weather events. The BCMoTI Design Criteria Sheet for Climate Change will list infrastructure components impacted by climate change and extreme weather events and detail adaptation measures included in the infrastructure design.

\_\_\_\_\_  
Address

\_\_\_\_\_

\_\_\_\_\_  
Telephone

(Affix Professional seal here)

If the *Qualified Professional* is a member of a firm, complete the following.

I am a member of the firm \_\_\_\_\_  
and I sign this letter on behalf of the firm. (Print name of firm)

## APPENDIX B: BCMoTI CLIMATE CHANGE DESIGN PROCESS AND PROJECT DESIGN CRITERIA SHEET

Technical Circular T-06/15

Date: June 22, 2015

**To:**

Executive Directors	Ministry Traffic & Highway Safety Engineers
Regional Directors	Ministry Environmental Engineers
Directors of Engineering Services	Ministry Electrical Engineers
District Managers, Transportation	Operations, Planning & Major Projects
Ministry Structural Engineers	BCMoTI Maintenance Contractors
Ministry Geotechnical Engineers	BCMoTI Design Consultants
Ministry Highway Design & Survey Engineers	Field Services Branch

**Subject: Climate Change and Extreme Weather Event Preparedness and Resilience in Engineering Infrastructure Design**

**Purpose:**

This Technical Circular serves as a directive to consider climate change and extreme weather events in infrastructure project design. While it provides a directive, further practice guidance, as well as examples of engineering practices, can be obtained from professional associations. Climate information can be obtained from climate resource providers.

The BC Ministry of Transportation and Infrastructure is requiring infrastructure engineering design work to evaluate and consider vulnerability associated with future climate change and extreme weather events and to include appropriate adaptation measures when feasible, to mitigate against future consequences over the design life of infrastructure. This will apply to all new projects, as well as rehabilitation and maintenance projects. In so doing, the Ministry will continue to provide a provincial transportation system that is resilient, reliable and efficient regardless of unfolding climate change and extreme weather events.

This document outlines climate change adaptation considerations for engineering design as related to BC transportation infrastructure. This directive supports the BC Climate Action Plan - in developing strategies to help BC adapt to the effects of climate change and extreme weather events.

**Background:**

The design life of transportation infrastructure is inherently long, and service requirements for roads, bridges, tunnels, railways, ports and runways may be required for decades, while rights-of-way and specific facilities may continue to be used for transportation purposes for much longer.

In addition to normal deterioration, transportation infrastructure is subject to a range of environmental risks over long time spans, including flood, wildfire, landslide, geologic subsidence, earthquakes, rock falls, avalanche, snow, ice, extreme temperatures and precipitation, and storms of various intensities. When global climate change enters this mix, it can create additional challenges for the transportation system.

Infrastructure designers and operators must consider the magnitude of environmental stress that any particular project will be expected to withstand over its design life. Transportation infrastructure is currently designed to handle a broad range of impacts based on historic climate and preparing for future climate change and extreme weather events is a relatively new concept. Thus preparing for implications on the design, construction, operation, and maintenance of transportation systems to future conditions is critical to protecting the integrity of the transportation system and the sound investment of taxpayer dollars.

Climate change adaptation is the practice of implementing actions to address projected climate changes and impacts. Adapting transportation infrastructure to these impacts is critical to alleviating potential damage, disruption in service, and other concerns. Consideration of impacts, along with other economic, social and environmental factors will result in transportation infrastructure that is resilient and reliably maintain operational capacity, using resources that are invested wisely to protect current and future investments.

Climate change and extreme weather events present significant and growing risks to the reliability, effectiveness, and sustainability of the Province's transportation infrastructure and operations. Given the potential for climate change to impact transportation infrastructure in BC, directives and guidance are prudent for incorporating changing climate adaptation into engineering designs done for the BC Ministry of Transportation and Infrastructure.

**What is the scope and application of this guidance?** This directive pertains to transportation infrastructure engineering design work by BCMoTI staff and by engineering design consultants and others working on projects for BCMoTI. Many parameters, such as type, location, traffic volume, and design life of transportation infrastructure will determine the climate change and extreme weather event analysis required. For example, a low volume road with a short design life may not require more than a summary analysis, while a major highway with structures having a longer design life would require a rigorous analysis.

In general, for transportation engineering design projects BCMoTI will require:

- Consideration of climate change and extreme weather events
- Design which takes into account climate change and extreme weather event projections and analyses, where feasible
- Vulnerability analysis for the design life of components
- Climate and vulnerability screening analysis, information and sources
- Development of practical and affordable project design criteria which takes adaptation to climate change into account
- BCMoTI Design Criteria Sheet to summarize climate change parameter changes

**What is the timeline?** Effective immediately for all new engineering design assignments

**What are the expectation of BCMoTI for engineering design staff and engineering consultants?**

Consultants and staff of BCMoTI involved in new design, rehabilitation and maintenance projects will integrate consideration of climate change and extreme weather event parameter impacts and adaptation responses into the delivery and engineering design of the Provincial highway projects by:

1. Reasonable consideration of climate change and extreme weather events appropriate to the scale of the project
2. Using climate information and vulnerability screening methodologies for design work from sources such as those providers listed in Appendix 2 (and on the BCMoTI Climate Change and Adaptation website)
3. At the concept stages, the project designer will identify the design components most at risk from climate change and extreme weather events over the expected project design life

4. At the concept stages, the project designer will summarize changes in temperature, precipitation and other climatic variables over the expected project design life
5. The project designer will identify the vulnerabilities of these projected changes to the project's design components. These will be summarized and listed on BCMoTI Climate Change Design Criteria Sheet (Appendix 1)
6. The project designer will develop adaptation design strategies to address climate change vulnerabilities to the project
7. Based on evaluation of climate change effects, the project designer will develop a project-appropriate set of design criteria for climate change and extreme weather event preparedness and resiliency
8. The design team will implement the developed design criteria into the project

**Where can I obtain guidance, climate resources and vulnerability analysis tools?** For more information and links to resources and tools related to climate change and extreme weather event preparedness and resilience, please see Appendix 2 (and the BCMoTI website on climate adaptation). These contain links to climate information providers such as the Pacific Climate Impacts Consortium and vulnerability analysis protocols such as the Public Infrastructure Engineering Vulnerability Committee.

**What is the BCMoTI Design Criteria Sheet for Climate Change (included below)?** This document provides implications to engineering project infrastructure components from climate change and extreme weather events. This sheet will list infrastructure components most at risk of being impacted by climate change and extreme weather events and detail adaptation measures included in the infrastructure design. One criteria sheet is required per discipline involved in design work.

Appendix 1: Design Criteria Sheet

Appendix 2: Climate and Vulnerability Analysis Information Sources

Appendix 3: What definitions are used in this directive?

**Contact:**

Dirk Nyland, P. Eng.

Chief Engineer

BCMoTI Engineering Services Branch

Tel: (250) 356-0723

Dirk.Nyland@gov.bc.ca

---

Dirk Nyland, P. Eng.

Chief Engineer

# Appendix 1

## BCMoTI Design Criteria Sheet for Climate Change Resilience

### Highway Infrastructure Design Engineering and Climate Change Resilience

#### Ministry of Transportation and Infrastructure

#### (Separate Criteria Sheet per Discipline)

Project: *(i.e. Project Name and Number)*

Type of work: *(i.e. Capital/Rehab/Reconstruction, Bridge Structures, Culverts, Interchange/Intersection/Access Improvement, Corridor Improvement, etc.)*

Location: *(i.e. LKI Segment and km reference, Road Names (Major/Minor), Cardinal Directions, Municipality, Electoral District, etc.)*

Discipline:

Design Component	Design Life or Return Period	Design Criteria + (Units)	Design Value Without Climate Change	Change in Design Value from Future Climate	Design Value Including Climate Change	Comments / Notes / Deviations / Variances
e.g. Culvert <3m	50yr	Flow Rate (M <sup>3</sup> /S)	20	+10%	22	- See Work including climate projections
e.g. Culvert >3m						

#### Explanatory Notes / Discussion:

*(Provide brief scope statement, purpose of project and what is being achieved. Enter comments for clarification where appropriate and provide justification and evidence of engineering judgment used for items where deviations are noted in the design parameters listed above or any other deviations which are not noted in the table above.)*

Recommended by: Engineer of Record: \_\_\_\_\_  
*(Print Name / Provide Seal & Signature)*

Date: \_\_\_\_\_

Engineering Firm: \_\_\_\_\_

Accepted by BCMoTI Consultant Liaison: \_\_\_\_\_  
 (For External Design)

Deviations and Variances Approved by the Chief Engineer: \_\_\_\_\_  
 Program Contact: Dirk Nyland, Chief Engineer BCMoTI

## Appendix 2

### Climate and Vulnerability Analysis Information Sources

[BCMoTI Climate Adaptation site](#)

[Pacific Climate Impacts Consortium](#)

[Analysis Tools - Plan2Adapt etc](#)

[Pacific Institute for Climate Solutions](#)

[Climate Insights 101](#)

[Ouranos](#)

[Public Infrastructure Engineering Vulnerability Committee](#)

[Intergovernmental Panel on Climate Change](#)

[Federal Highway Administration – Climate Adaptation](#)

[AASHTO – Transportation and Climate Change Resource Center](#)

## Appendix 3

### What definitions are used in this directive?

1. **Climate Change.** Climate change refers to any significant change in the measures of climate lasting for an extended period of time. Climate change includes major variations in temperature, precipitation, or wind patterns, among other environmental conditions, that occur over several decades or longer. Changes in climate may manifest as a rise in sea level, as well as increase the frequency and magnitude of extreme weather events now and in the future
2. **Extreme Weather Events.** Extreme weather events can include significant anomalies in temperature, precipitation and winds and can manifest as heavy precipitation and flooding, heatwaves, drought, wildfires and windstorms. Consequences of extreme weather events can include reliability concerns, damage, destruction, and/or economic loss. Climate change can also cause or influence extreme weather events
3. **Extreme Events.** For the purposes of this directive, the term “extreme events” refers to risks posed by climate change and extreme weather events. The definition does not apply to other uses of the term nor include consideration of risks to the transportation system from other natural hazards, accidents, or other human induced disruptions
4. **Preparedness.** Preparedness means actions taken to plan, organize, equip, train, and exercise to build, apply, and sustain the capabilities necessary to prevent, protect against, ameliorate the effects of, respond to, and recover from climate change related damages to life, health, property, livelihoods, ecosystems, and national security
5. **Resilience.** Resilience or resiliency is the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions
6. **Adaptation.** Adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects
7. **Adaptive.** Design criteria that are adjusted (e.g. consider flood level increases over time)
8. **PIEVC.** Public Infrastructure Engineering Vulnerability Committee
9. **PCIC.** Pacific Climate Impacts Consortium



## APPENDIX C: ADAPTATION EXAMPLES FROM PRACTICING PROFESSIONALS

Climate science as it related to professional engineering is evolving. These guidelines are in an interim period and have not yet been applied to the design of highway infrastructure. The examples in this appendix serve to illustrate methods that can be used to incorporate a consideration of climate change into design. Feedback received during the interim period of these guidelines will inform updates that are made and users who have successfully applied these guidelines to the design of highway infrastructure are encouraged to submit their reports to Harshan Radhakrishnan, P.Eng., APEGBC Practice Advisor at the following email address:

[hrad@apeg.bc.ca](mailto:hrad@apeg.bc.ca)

**Submitted reports may be considered for inclusion in the updates to these guidelines or in APEGBC's Climate Change Information Portal.**

### **Coastal Flexible Design Example: Causeway Elevation in Consideration of Year 2100 and 2200 Sea Levels**

#### Problem Statement

Determine the minimum elevation for a new 2-lane causeway to be constructed adjacent to the sea in an area protected from large waves within the Strait of Georgia. A risk assessment has determined that the causeway is vulnerable to sea level rise and changes in wind and atmospheric pressure conditions. Design elevation to be appropriate for projected sea levels and climate to the year 2100 and to include flexible design to allow for climate adaptation to the year 2200.

#### References

1. BC Ministry of Forests, Lands and Natural Resource Operations, "Flood Hazard Area Land Use Management Guidelines", Draft Amendment to Section 3.5 (The Sea) and 3.6 (Areas Protected by Dikes) of the guidelines (3<sup>rd</sup> Draft –July 7, 2015.)
2. Eurotop, "Wave Overtopping of Sea Defenses and Related Structures: Assessment Manual", 2007.

#### Approach

[1] Minimum causeway elevation is calculated according to the methodology outlined in the Flood Hazard Area Land Use Management Guidelines (the Guidelines) draft amendment. Note that the Guidelines are intended as a tool to make land use decisions within flood hazard areas, and are not intended as a tool to design roads but they do specify a risk level for flooding. Only the Flood Construction Level (FCL) provisions have been used to design the causeway, the building setback provisions have not been applied.

[2] Obtain latest provincial policy sea level rise projections from the Guidelines.

[3] Obtain climate projections from a climate specialist. In this particular example, wind and atmospheric pressure conditions are not projected to change at the project site and sea level is the only climate parameter that is expected to change.

[4] Estimate the existing 1:200 Year Annual Exceedance Probability (AEP) water level through probabilistic analyses of measured water level data and predicted tide data. Adjust data for local effects (e.g. wind set-up) as required.

- [5] Obtain ground uplift/subsidence data from Natural Resources Canada- Geodetic Survey Division. Note potential causeway settlement should be considered. In this example, the causeway is expected to rise due to tectonic uplift.
- [6] Estimate deep water wave conditions through wave hindcasting based on wind data. Determine nearshore wave conditions considering appropriate wave transformations. Calculate the wave-overtopping rate for the design causeway slope and armoring at various elevations. Note that in this case, the wave run-up/overtopping does not change with water level.
- [7] Calculate the FCL for the year 2100 and 2200 and determine the required causeway elevation and width to allow the causeway to be raised for sea level rise adaptation to the year 2200.

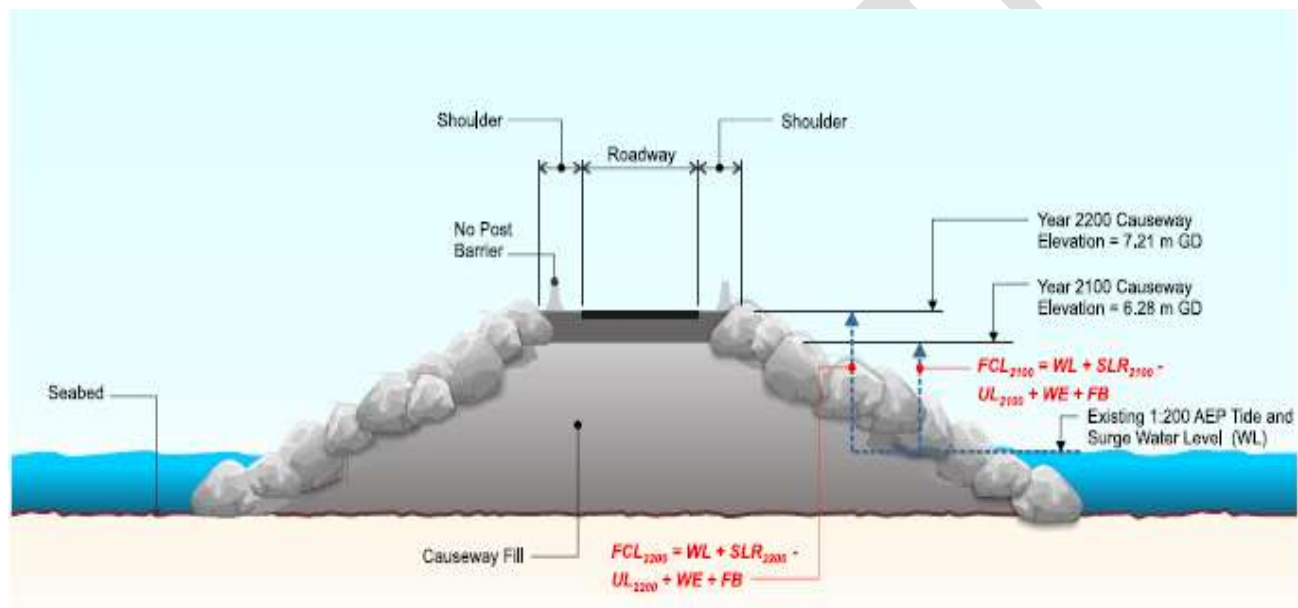


Figure 1: Causeway Cross Section Showing Year 2100 and 2200 Elevations

#### Design Criteria

Water Level	
1:200 Year Annual Exceedance Probability (AEP) water level as determined through probabilistic analyses of tides and storm surge (WL)	2.74 m Geodetic Datum (GD)
Sea Level Rise	
Allowance for Sea Level Rise to the Year 2100 (SLR <sub>2100</sub> )	1.0 m
Allowance for Sea Level Rise to the Year 2200 (SLR <sub>2200</sub> )	2.0 m
Ground Uplift/Subsidence	
Ground Uplift to the Year 2100 (UL <sub>2100</sub> )	+0.06 m

Ground Uplift to the Year 2200 ( $UL_{2200}$ )	+0.13 m
<b>Estimated wave effects associated with the Designated Storm with an AEP of 1:200</b>	
Height relative to Still Water Level (SWL) for safe driving at moderate to high speed (0.01 L/s/m overtopping rate) (WE)	2.0 m
<b>Freeboard</b>	
Freeboard allowance (FB)	0.6 m
Notes:	
1. Note that, in general, wave effects may change over time with a changing climate but in this example they do not.	

### Calculations

#### **Year 2100 FCL and Causeway Elevation**

$$FCL_{2100} = WL + SLR_{2100} - UL_{2100} + WE + FB$$

$$FCL_{2100} = 2.74 \text{ m GD} + 1.0 \text{ m} - 0.06 \text{ m} + 2.0 \text{ m} + 0.6 \text{ m}$$

$$FCL_{2100} = 6.28 \text{ m GD}$$

#### **Year 2200 FCL and Causeway Elevation**

$$FCL_{2200} = WL + SLR_{2200} - UL_{2200} + WE + FB$$

$$FCL_{2200} = 2.74 \text{ m GD} + 2.0 \text{ m} - 0.13 \text{ m} + 2.0 \text{ m} + 0.6 \text{ m}$$

$$FCL_{2200} = 7.21 \text{ m GD}$$

## **An Approach to Engineering Vulnerability Assessment of Climate Change Impacts on Flood Hazards to Highway Infrastructure**

Mariza Costa-Cabral, Piotr Kuraś, and Des Goold

*Northwest Hydraulic Consultants Ltd. (NHC)*

The B.C. Ministry of Transportation and Infrastructure (MOTI) has been developing vulnerability studies and reports to determine the implications and impacts that future climate change will have on its infrastructure. Past studies and reports were prepared in several parts of the Province that follow the PIEVC Engineering Protocol for Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate and which provided guidance through the steps of the vulnerability assessments.

As part of that protocol, and in the wake of consecutive large and damaging floods in 2010 and 2011, MoTI retained NHC to conduct an engineering vulnerability assessment of bridge and culvert infrastructure along three British Columbia Highway segments: (i) Highway 20 near Bella Coola; (ii) Highway 37A near Stewart; and, (iii) Highway 97 east of the Pine Pass. The Pacific Climate Impacts Consortium (PCIC) provided down-scaled climate projections for each of these regions to support NHC's assessment.



**Figure 1.** Looking down at Bitter Creek Bridge on Highway 37A just prior to the washout of its west abutment in September 2011- flow is left to right (September, 2011).

NHC's study met the following objectives:

- Improved MoTI's understanding of the circumstances that contributed to service interruptions along the highway segments, both climatic and those related to infrastructure design, operation and maintenance;
- Evaluated risk outcomes from future climate scenarios based on applying the PIEVC

Engineering Analysis process on select bridges and culverts that have been recently impacted by climate events; and,

- Contributed to the development of a Best Practice Document to assist highway infrastructure owners, operators, maintenance personnel and engineering staff address impacts of extreme precipitation.

For this project, a maximum of three GCM runs was desired by MoTI. Selection of the three global climate models (GCMs) to use was based on the recommendations of Trevor Murdock of PCIC. This recommendation was supported by PCIC's work based on GCM performance over Western North America, reported in Murdock et al. (2013). PCIC provided NHC with 150 years (1950-2099) of simulated (1950-2000) and projected (2000-2099) daily precipitation and temperature data for the 10x10 km grid cell corresponding to the location of each meteorological station used as historical climate reference for each highway segment. NHC analyzed the PCIC datasets and characterized projected changes in precipitation and temperature for the future mid-century period, 2040-2069, and the late-century period, 2070-2099 as compared to observed and GCM-simulated precipitation and temperature in the historical (reference) period. NHC then modified the historical climate record of each meteorological station in a manner consistent, statistically, with the GCM-projected changes. The methodology is summarized in Figure 2.

The historic time series and the future scenario time series (Figure 2) were used as input to an existing hydrologic model of Fisher Creek (a stream crossing Highway 97 east of Pine pass) to predict changes to the 200-year annual maximum hourly flow that occur as a result of the projected climate change. NHC used the results of the Fisher Creek analysis to make inferences regarding climate change impacts on streamflow for the other highway segments considering the characterization of projected climate changes along those segments.

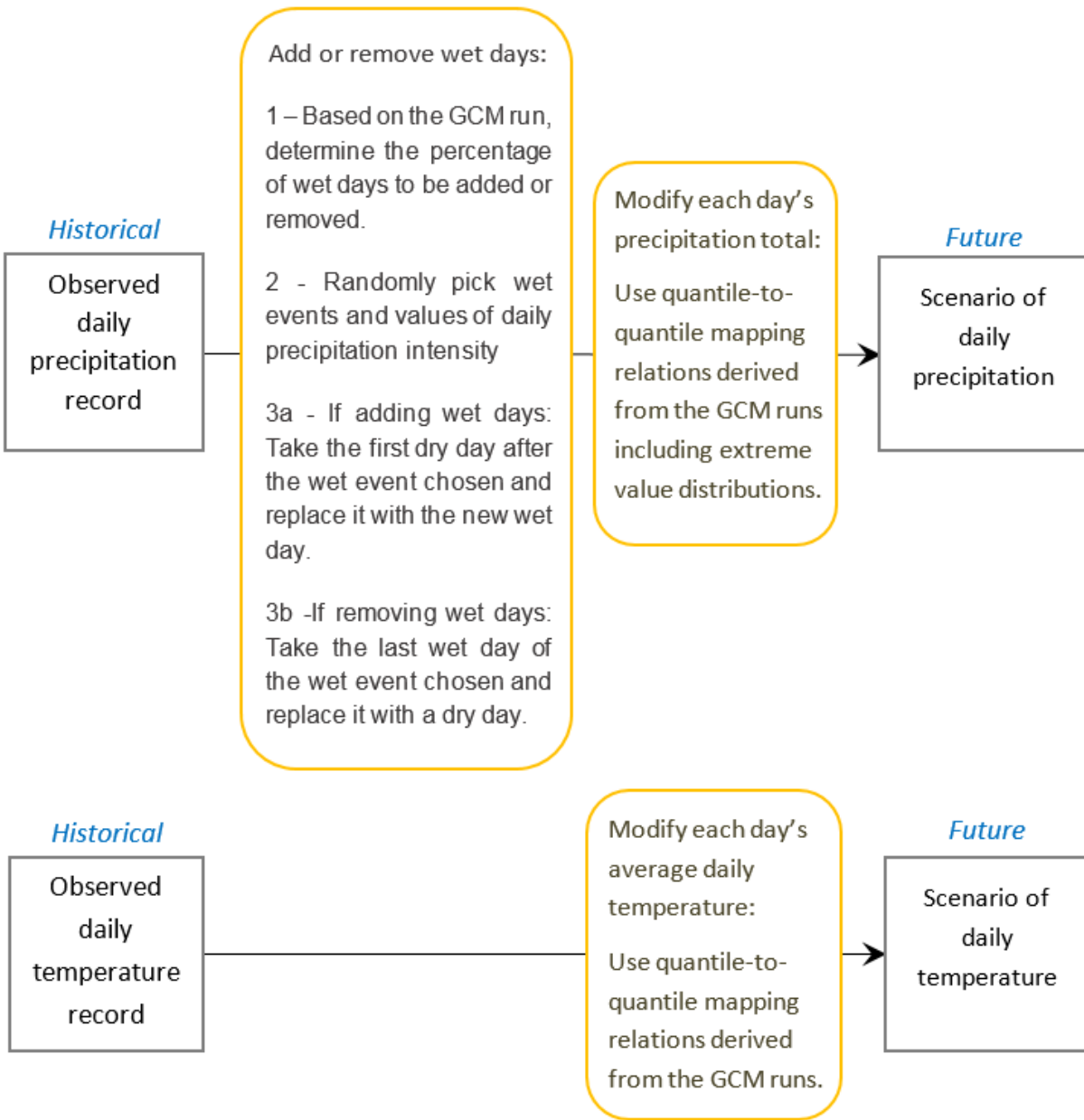
All three GCM runs predicted large increases in mean annual temperature. For instance along Highway 97, a warming of between 4.5°C and nearly 7°C by the end of the century. In the case of CanESM2, warming is projected to occur rapidly, reaching 4°C by mid-century. All three GCM runs also project increases in mean annual precipitation, in the case of CanESM2 by as much as 40%. Analysis of seasonal changes was outside the scope of this study.

The projected future changes in mean annual precipitation are in part due to changes in the mean intensity of precipitation on wet days, and in part to changes in the mean number of wet days per year. All three GCM runs project rises in mean precipitation intensity on wet days, and two of them project increases in the mean number of wet days per year. The ACCESS1-0 run projects a small decline in wet day occurrence.

Since the simulations have more wet days per year than the station observations, but their wet periods are similar in length, then NHC inferred it must be the case that the dry simulated periods tend to be shorter than the station dry periods. Future projected changes in dry period duration are small.

Important to this study is the occurrence of multiple-day precipitation events. We examined the percentiles of total precipitation accumulated over different periods from 1 day through 30 days. For all three GCMS there appears an overall tendency for the projected rate of increase in the 10<sup>th</sup> percentile to be slightly faster than that of the 50<sup>th</sup> percentile, and for the rate of increase of the 50<sup>th</sup> percentile to be slightly faster than that of the 90<sup>th</sup> percentile, up until mid-century. After mid-century, only the CNRM-CM5 run projects a further increase in the 90<sup>th</sup> percentile through the late century. CNRM-CM5 does not project increases in the 50<sup>th</sup> percentile from mid-century to late-century, yet projects increases in the 90<sup>th</sup> percentile during that same period.

The three downscaled GCM climate simulations provided by PCIC served as the basis for development of future climate scenarios to simulate with the Fisher Creek Hydrologic Model. The diagram in Figure 2 summarizes our procedure for creating future climate scenario time series. For each climate scenario, the observed precipitation record was modified so that its mean annual number of wet days increased or decreased by the same percentage as simulated by the GCM run (see description of steps in the figure). The resulting daily record was then subjected to daily quantile-to-quantile mapping so as to modify the daily values of precipitation intensity in the same manner as seen in the GCM simulations, i.e., when comparing future projections to the GCM's historical simulations. Daily quantile mapping was also used to modify the daily mean temperature to reflect the future changes projected by the GCM simulations.



**Figure 2.** Summary of the procedure used for creating time series of daily precipitation and temperature for future climate scenarios.

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## **An Approach to Flood Hazard Assessment for Small Watersheds: Assessment for the City of Surrey Accounting for Projected Climate Change**

Monica Mannerström, Malcolm Leytham, Vanessa O'Connor, and Mariza Costa-Cabral

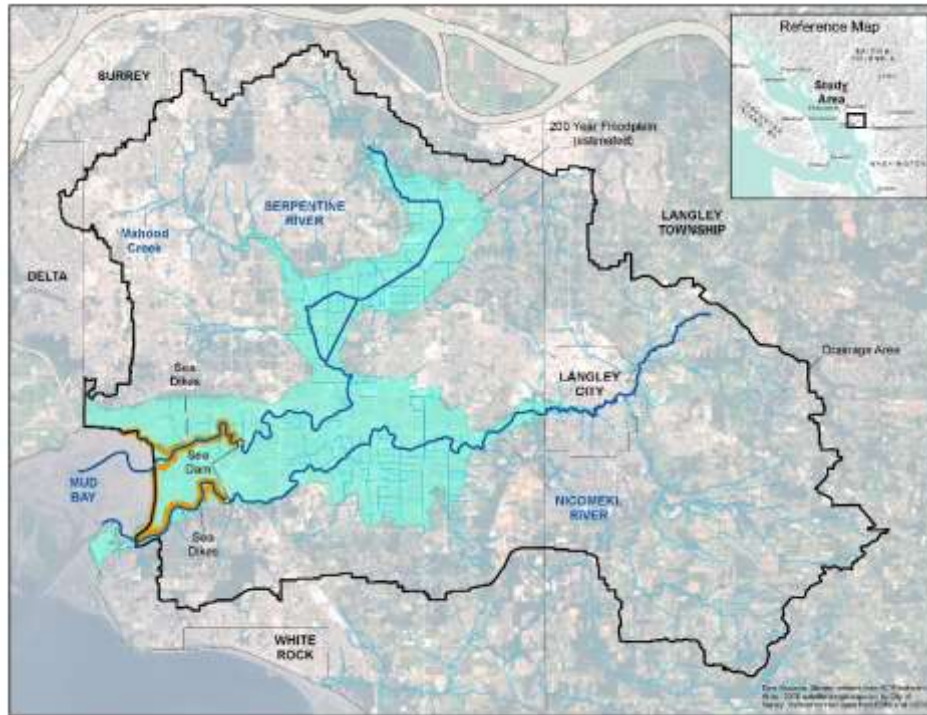
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The City of Surrey is located on the south coast of British Columbia, just south of the City of Vancouver and north of the Canada/USA border. The greater part of the city is drained by the Serpentine and Nicomekl Rivers. These rivers, with a combined drainage area of about 300 km<sup>2</sup>, originate in rolling uplands which have been heavily developed for residential and commercial use. The rivers then flow through flat, low-lying agricultural land to discharge into the Strait of Georgia and the Pacific Ocean. The lowland reaches of both rivers are extensively diked and their flood protection and drainage systems incorporate some 30 pump stations, 170 flap-gated culverts, and a complex network of flow storage areas, canals, ditches and spillways. At their outlets, the rivers drain into the ocean through flap-gated control structures ("sea dams"), with a sea dike protecting the flood plain from ocean flooding (Figure 1).

Flooding of the agricultural lowlands of the two rivers is typically the result of heavy rain or rain-on-snow events, in combination with high ocean tides and storm surge. Sea level rise and increased runoff associated with climate change are expected to have a significant impact on the Serpentine and Nicomekl basins in terms of floodplain extents and the adequacy of the existing flood protection and drainage infrastructure. Of particular concern is the increased risk of flooding at the lowland/upland interface where relatively modest increases in flood level could have a significant impact on residential and commercial properties.

The City of Surrey developed a scope of work to be conducted in two phases. In the first phase, completed in 2012, analysis of the impacts of climate change focused on the effects of projected sea level rise on flood risk and the infrastructure improvements required to ensure a 200-year level of protection from flooding in the year 2100. The second phase of work, completed in 2014, incorporated projected changes in rainfall regime under climate change scenarios.





**Figure 1.** Serpentine and Nicomekl watersheds.

Inundation of the Serpentine/Nicomekl River floodplain is a function of:

- a) The volume and temporal distribution of storm rainfall and the watershed's hydrologic response to rainfall;
- b) The time varying sea level at the river outlets coincident with the storm event; and,
- c) The hydraulic response of the system (comprising floodplain storage and the various hydraulic infrastructure) to the hydrologic inputs and the sea level boundary condition.

This complex system cannot be analyzed directly by statistical means and conventional storm event analysis; i.e. it is not possible to state a priori what combination of sea level conditions and storm rainfall event will result in flood depths and inundation extent having an annual exceedance probability (AEP) of 0.5% (return period of 200 years). To avoid the difficulties of a direct statistical joint probability analysis, a continuous simulation approach was adopted whereby long-term (approximately 50-year) simulations were conducted of the system's hydraulic performance, and the simulated annual peak floodplain water levels were subject to conventional frequency analysis. The approach involved the following steps:

1. An approximately 50-year time series of historic hourly rainfall data was assembled and used as input to an HSPF hydrologic model to produce 50-year time series of simulated hourly runoff under current (nominally year 2010) land use conditions.

2. A hindcasting approach involving reconstruction of historic tide records and numerical modeling of historic storm surge and wind setup was used to develop hourly time series of ocean water levels for the same approximately 50-year time period.
3. The runoff and ocean level time series were then used as boundary conditions for a HEC-RAS hydraulic model of the river and floodplain system, to produce 50-year time series of simulated water levels at selected floodplain locations.
4. Annual maximum water levels at key locations were extracted from the hydraulic model results. These were analyzed by conventional frequency analysis to estimate 200-year (0.5% AEP) floodplain water levels representative of current (year 2010) conditions.

Once simulation of current (year 2010) conditions was complete, floodplain water levels representative of the year 2100 were estimated as follows:

5. Hourly time series of projected precipitation, representing two contrasting future climate scenarios, covering the 21st Century, were developed for this study, to be used as input (“forcing”) to our calibrated HSPF hydrologic model, in step 6. The projected precipitation time series were developed to be consistent, in a statistical sense, with specific global climate model (GCM) runs, in what concerns daily intensity, storm duration, and the clustering in time of the highest-intensity episodes. The GCM runs of interest were selected from the most recent runs that served as the basis for the recent IPCC (2014) Fifth Assessment Report, i.e., the CMIP5 climate projections. We used GCM precipitation projections downscaled by the Pacific Climate Impacts Consortium (PCIC). Data from twelve GCMs are available from PCIC, and our first step was to analyze their downscaled results. Nearly all of the 12 GCMs project future increases in daily precipitation intensity accompanied by declines in the mean number of precipitation days in a year. The second step consisted in selecting two appropriate GCM runs. It was desired to identify which GCM runs represent, in the context of all PCIC projections, a “severe scenario” and a “moderately high scenario” in terms of flooding risk. The third step consisted in altering the observed historical time series of hourly precipitation at the Surrey Municipal Hall gauge, so as to create the two projected hourly time series. To create each future precipitation time series the observed historical time series was modified as follows. Precipitation days were removed at random from the observed time series, until the desired number was reached that is consistent with the GCM projections. The daily precipitation totals on the remaining wet days were then increased, so that the distribution of daily precipitation on wet days would be consistent with the GCM projected increases. To this end, the return period of each daily observed precipitation value was estimated, and the value was then replaced by a higher value having that same return period in the future distribution. To estimate return periods for the largest daily precipitation values, a generalized extreme-value distribution (GEV) was fit to each data set, using a peaks over

threshold (POT) methodology (Coles, 2001).

6. The HSPF hydrologic model was modified to reflect projected future (year 2100) land-use, to produce time series of projected runoff. In the first phase of work, future rainfall input was assumed unchanged from the historic record. In the second phase, the projected rainfall time series developed in step 5 were used.
7. A relative sea level time series representative of the year 2100 was developed considering the effects of absolute sea level rise and land subsidence. Provincial guidelines (Ausenco Sandwell, 2011) call for an assumed 1 meter absolute sea level rise between 2000 and 2100. The observed sea level rise from 2000 to 2010 was approximately 0.03 m. We therefore assumed a further 0.97 m of absolute sea level rise from 2010 to 2100. Land subsidence was estimated from historic observations at 2.5 mm/year. The net effect of absolute sea level rise and land subsidence results in a relative sea level rise of about 1.2 m from 2010 to 2100. This adjustment was applied to the historic sea level time series from Step 2 to represent conditions in 2100.
8. Steps 3 and 4 were repeated using the runoff and ocean level time series for year 2100 to produce revised 200-year floodplain water levels with climate change (sea level rise and rainfall changes).

The following results stem only from the projected rise in mean sea level, and changes in land use, but do not yet consider projected changes in precipitation or temperature. Compared to 2010 conditions, the 200-year flood level is expected to increase by 0.9 to 1 m on the approximately 12 km reach of the Nicomekl River upstream from the sea dam. For the approximately 14 km reach of the Serpentine River upstream from its sea dam, the 200-year flood level will increase by about 0.7 m. Further upstream, the flood level increases taper off to 0.1 m, due solely to the impacts of land-use change on peak flows. Floodplain storage cells will see 200-year water level increases ranging from 0.1 to 0.4 m. The modelling assumed that all dikes and the sea dam structures would be raised to prevent overtopping.

In response to the assumed 1m sea-level rise (per Provincial guidelines), the return period for particular flood levels will change greatly. Water levels with a current 72-year return period will on average occur annually by the year 2100. Similarly, the existing 200-year flood level will have an estimated return period of less than 2 years.

The continuous simulation approach adopted for this work provides a number of significant advantages over traditional event analysis:

- It explicitly captures the joint occurrence of extreme sea levels and severe rainfall events;
- It explicitly accounts for varying duration and amounts of rainfall (and runoff) and the matching of the rainfall with the sea level regime;

- It captures the shift in significance of longer lower intensity rainfall events under conditions of sea level rise.  
(Higher sea level implies that longer duration rainfall events become more important in defining interior flood levels since the sea dams are closed for longer periods of time); and,
- It avoids arbitrary assumptions about the coincidence or lack of coincidence of individual factors which would be required if a direct statistical analysis were attempted.

The information developed provides a necessary first step to understanding the system's response to climate change and the infrastructure improvement which may be necessary to manage future flood risk. The information is, however, subject to large and unquantifiable uncertainty, due to unknown future emissions of greenhouse gases, uncertain response of the global climate system to the atmospheric accumulation of those gases, and incomplete understanding of regional manifestations from such global changes (e.g., Hawkins and Sutton, 2010; Kundewicz et al., 2013). Additionally, precipitation processes are very complex and difficult to simulate accurately in models. The downscaling, in space and time, of GCM-projected climate variables, the extrapolation of frequency analyses to long return periods, and the disaggregation of projected daily precipitation to hourly represent additional sources of uncertainty. The sea level and precipitation projections developed in this work should be considered to be plausible representations of future conditions, given the best current scientific information, and do not represent specific predictions. The actual future realizations of precipitation at Surrey will differ from any of these scenarios.

## References

Ausenco Sandwell (2011) *Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use*. Report prepared for BC Ministry of Environment.

Coles S (2001) *An Introduction to Statistical Modeling of Extreme Values*. Springer-Verlag, London, U.K.

Hawkins E, Sutton R (2010) The potential to narrow uncertainty in projections of regional precipitation change. *Climate Dynamics* 37:407–418. DOI:10.1007/s00382-010-0810-6.

IPCC (Intergovernmental Panel for Climate Change) (2014) *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

Kundewicz AW, Kanae S, Seneviratne SI, Handmer J, Nicholls N, Peduzzi P, Mechler R, Bouwer LM, Arnell N, Mach K, Muir-Wood R, Brakenridge GR, Kron W, Benito G, Honda Y, Takahashi K, Sherstyukov B (2013) Flood risk and climate change: global and regional perspectives. *Hydrological Sciences Journal - Journal des Sciences Hydrologiques* 59(1): 1-28. DOI:10.1080/02626667.2013.857411.

# Climate change vulnerability risk assessment of a Small Infrastructure Project: Storm Sewer in City X

## Introduction

This example prepared by APEGBC serves to illustrate how the principles outlined in the *APEGBC Professional Practice Guidelines – Developing Climate Change Resilient Designs for Highway Infrastructure in British Columbia* may be applied to small infrastructure projects. The consideration of climate change and extreme weather events in this example is appropriate to the small scale of the project and would allow an engineer of record to complete the BCMoTI Design Criteria Sheet for Climate change resilience contained in the BCMoTI Technical Circular – Climate Change and Extreme Weather Event Preparedness and Resilience in Engineering Infrastructure Design.

## Project Description

City X is located in a remote location in British Columbia. The scope of the project was limited to designing a storm water pipe to convey the 5-year design flow from a site with the following design parameters:

- Landscaped Area ( $C^{13}=0.20$ ) = 1.00 ha;
- Parking Area ( $C=0.95$ ) = 0.50 ha; and
- Time of Concentration = 10 min for the area, and the pipe is concrete at 2% slope.

Given the limited scope of this project, the rainfall intensity was the single climate parameter considered for RCP 2.6, 4.5 and 8.5 using version 1.0.3892 of the IDF CC tool<sup>14</sup> developed by the University of Western Ontario.

## Climate Change Vulnerability Risk Assessment

Adapting methods used in the City of Barrie's Storm Drainage and Stormwater Management Policies and Design Guidelines (City of Barrie, 2009, p. 118), the following equations were applied to calculate flows pipe diameters from intensity rates generated using the IDF CC tool:

$$\text{Composite Runoff Coefficient} = \frac{\sum(Area_i)(Coefficient_i)}{\text{Total Area}}$$

$$i = \frac{A}{(t_d + B)^C}$$

$$Q = \frac{(C)(i)(A)}{360}$$

Using  $n=0.013$ , the following equation for pipe flow is used to calculate the pipe diameter,

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<sup>13</sup> Where C is the proportion of impervious area

<sup>14</sup> <http://www.idf-cc-uwo.ca/>

$$Q = \left[ \frac{0.312}{n} \right] (D)^{\frac{8}{3}} (S)^{\frac{1}{2}}$$

The full flow velocity was checked using the following equations,

$$V_{full} = \frac{Q_{full}}{A}$$

$$Q_{capacity} = Q_{full}$$

The following climate models were selected in the IDF CC tool as they are used by the Pacific Climate Impacts Consortium in the region of Western North America<sup>15</sup>:

CanESM2, CCSM4, CNRM-CM5, CSIRO-Mk3-6-0, GFDL-ESM2G, HadGEM2-ES, MIROC5, MRI-CGCM3 and MPI-ESM-LR.

The IDF data was projected under RCP 2.6, 4.5 and 8.5 to the 2080s time period using data from 2070 to 2099. For the future climate scenarios, the intensity, flow and pipe diameter was calculated for each of the mentioned models and then averaged across the models. The values for rainfall intensity, flow and pipe diameter calculated using historical IDF curves and IDF curves under climate change are shown by table 1.

	Historical IDF Data	IDF CC RCP 2.6 Data	IDF CC RCP 4.5 Data	IDF CC RCP 8.5 Data
Rainfall Intensity (mm/hr)	98.1	114.8	119.2	138.1
Flows (m <sup>3</sup> /s)	0.184	0.215	0.224	0.259
Pipe Diameter Required (mm)	335	355	360	380
Nominal Pipe Diameter (mm)	350	350/375	375	375/425

**Table 1:** A table showing the rainfall intensity, flows and pipe diameter required under current climate conditions and under RCP 2.6, 4.5 and 8.5 scenarios.

## Recommendation

The actual pipe diameter is 0.381m and as shown by table 1 the pipe diameter required under current rainfall intensities is 0.335m. It was noted that the actual diameter of the pipe exceeded the pipe diameter required under RCP 2.6, 4.5 and 8.5 scenarios. Therefore it was concluded that no adjustment in design was required and that the storm sewer pipe is already sufficient to accommodate flows across a range of future projections in rainfall intensities. It should be noted that the pipe diameter required

<sup>15</sup> <https://www.pacificclimate.org/data/statistically-downscaled-climate-scenarios>

under RCP 8.5 is just 0.001m smaller than the actual pipe diameter; therefore the owner of the storm sewer may wish to enhance their monitoring of the storm sewer pipe and revisit the option of upsizing the pipe diameter in the future.

## Discussion

There are a number of factors to consider when using the data produced by the IDF CC tool to inform the design of the storm sewer. It is important to note the inherent uncertainty in statistical downscaling from global climate models. As a result, as global climate models and the tools for calculating IDF curves evolve, it may be appropriate for the owner of the infrastructure to keep the IDF curves and the flood plain maps that could influence the design up to date.

Although for this small infrastructure project, the conclusion was that no changes should be made to the storm sewer design it is important that the IDF curves under projected climate change scenarios were considered in the design process in BCMoTI projects. As outlined by a study conducted by the Town of Creston, due to the high cost of overdesigning pipe diameter, alternative approaches that focus on runoff detention, temporary storage, infiltration and runoff may be considered (Town of Creston, 2015, p. 18). Alternative approaches that may be used include re-directing runoff water into swales, sand filters, detention ponds and wetlands. It should be noted that the performance of the design will only be assured with proper inspection and maintenance of the storm sewer during its service life. Regular inspection will detect any debris or vegetation that may block or partially block the conveyance of water through the sewer thus not allowing it to perform as it was designed.

Engineers may currently face challenges in understanding projected climate data and incorporating it into their design of public infrastructure. To facilitate the use of projected climate data in design, BCMoTI is working with the Pacific Climate Impacts Consortium to develop climate data that engineers can use in their design of public infrastructure.

## References

BC Ministry of Transportation. (June 2015). Climate Change and Extreme Weather Event Preparedness and Resilience in Engineering Infrastructure Design. *Technical Circular, T-06/15*. Retrieved from <http://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/technical-circulars/2015/t06-15.pdf> (Accessed January 3, 2016)

Pacific Climate Impacts Consortium, University of Victoria. (January 2014). *Statistically Downscaled Climate Scenarios*. Retrieved from <https://www.pacificclimate.org/data/statistically-downscaled-climate-scenarios> (Accessed January 3, 2016)

The City of Barrie. (2009). Example 1- Storm Sewer Design. In *Storm Drainage and Stormwater Management Policies and Design Guidelines* (Appendix C). Retrieved from <http://www.barrie.ca/Doing%20Business/PlanningandDevelopment/Documents/StormDrainageandStormwaterManagementPoliciesandDesignGuidelines.pdf> (Accessed January 3, 2016)



Elise Paré, WSP Canada. (September 2015). *Development of IDF Curves under a Changing Climate, Town of Creston*.

University of Western Ontario. (2014). *IDF CC Tool* (Version 1.0.3892) [Computerized Tool]. Retrieved from <http://www.idf-cc-uwo.ca/> (Accessed January 3, 2016)

## **University of Saskatchewan Assessment of the Engineering Building's Vulnerability to Climate Change: a Summary**

### **Introduction**

This memo summarizes the methods and findings from the University of Saskatchewan study; Assessment of the Engineering Building's Vulnerability to Climate Change<sup>16</sup>. The approach taken to conducting the climate change vulnerability risk assessment as outlined in this study may be applied to highway infrastructure projects. A similar method to the method detailed in this study may be applied to demonstrate that the appropriate standard of care as outlined in the *Professional Practice Guidelines – Developing Climate Change Resilient Designs for Highway Infrastructure* (Climate change resilience Guidelines) has been applied.

### **Project Overview**

This project was funded by the University of Saskatchewan (the University) and Engineers Canada to assess potential vulnerabilities of the University's engineering building to climate change. Associated Engineering conducted a risk assessment using the PIEVC Engineering Protocol for Climate Change Infrastructure Vulnerability Assessment (the Protocol<sup>17</sup>) developed by Engineers Canada and prepared a report on the impacts that future climate change may have on the existing engineering building and on the proposed building expansion. The scope of the project included the current design, construction operation and management of the infrastructure in addition to planned upgrades or major rehabilitation projects in the planning stages. This project aimed to provide information that the University can use in its planning and policy development.

The University of Saskatchewan College of Engineering Building was constructed in 1912 and additions and upgrades were made to the building between 1925 and 2000. The building is used by administration, faculty, researchers, students and maintenance and operations staff.

### **Risk Assessment Process**

To conduct the risk assessment, this project used the Protocol which consists of the following steps:

1. Project Definition;

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<sup>16</sup> <http://pievc.ca/assessment-university-saskatchewan-current-engineering-building-and-new-addition>

<sup>17</sup> <http://pievc.ca/protocol>



2. Data Gathering and Sufficiency;
3. Risk Assessment;
4. Engineering Analysis;
5. Recommendations.

As emphasized in the Protocol and in the Climate change resilience Guidelines, a multi-stakeholder approach is recommended when conducting a risk assessment. In this study the multi-disciplinary project team was comprised of individuals from the University of Saskatchewan, Engineers Canada, Associated Engineering, Summit Environmental, MWH Global and a Project Advisor Committee (PAC).

The project team used steps 1 and 2 to set initial boundary conditions for the study by determining the infrastructure components to be assessed and the climate parameters under consideration. For the first step of the Protocol, “Project Definition”, the team collected general information and identified infrastructure components. Site visits, background reports, drawings and interviews were used to gather data to identify components of the infrastructure for the study. In the second step, “Data Gathering and Sufficiency”, the team defined infrastructure components and documented the current age, capacities, loads and design basis for each component. Record drawings, condition assessments and anecdotal knowledge provided sufficient information to gain and understanding of the function of the infrastructure components to be investigated.

The proposed building expansion was still in the conceptual stage and infrastructure components had not been defined yet. As the age, capacities, loads and design basis for the expansion was not available, the project team extracted components from the conceptual expansion design and conducted a “risk sensitivity analysis”. This approach allowed the University to note and reduce possible negative impacts of the climate on planned installations.

Historical and projected climate data was obtained for: temperature and temperature derived parameters; precipitation and precipitation derived parameters; and other parameters including wind and extreme weather.

To establish climate conditions for the 1971-2000 baseline period, the team gathered observational weather data from Environment Canada’s Canadian Climate Normal and the Canadian Daily Climate Data from the Saskatoon Diefenbaker International Airport station.

Projected climate data was obtained for the 2020s, 2050s and the 2080s from Climate WNA<sup>18</sup>, the Canadian Climate Change Scenario Network (CCCSN)<sup>19</sup>, the Pacific Climate Impacts Consortium (PCIC)<sup>20</sup> and various literature sources. An ensemble of Global Climate Models (GCMs) for the A2 emissions scenario from the fourth assessment report from the International Panel on Climate Change (IPCC) were used for the engineering analysis.

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<sup>18</sup> <http://cfcg.forestry.ubc.ca/projects/climate-data/climatebcwna/>

<sup>19</sup> <http://ccds-dscc.ec.gc.ca/?page=main&lang=en>

<sup>20</sup> <https://www.pacificclimate.org/analysis-tools/regional-analysis-tool>

To conduct the risk assessment, the project team used the PIEVC Worksheet 3 to develop a risk assessment matrix to examine the interactions between the infrastructure components and climate events. This worksheet allowed the project team to assess risk in terms of the probability and severity of the climate/infrastructure interactions and responses and to establish risk thresholds to determine infrastructure components that required further analysis.

The project team held a group interview with stakeholders at the University to get feedback on the risk assessment process. The results from these interviews informed the development of workshops and the risk assessment process. The project team held a workshop with representatives from various groups of the Facilities Management Division at the University to provide an overview and discuss the risk assessment. The project team compiled the information gathered during the workshops which was used in completing the finalized risk assessment.

### **Risk Assessment Findings**

The results of the risk assessment indicated how the structural infrastructure, electrical infrastructure and supporting systems would be impacted by the projected climate events. The various infrastructure climate interactions were ranked as low, medium or high risk based on the risk factor developed through the risk assessment process.

### **Engineering Analysis**

In the fourth step of the Protocol, the project team carried out further engineering analysis on the climate-infrastructure interactions that were assessed as “medium risk” during the risk analysis process.

### **Risk Sensitivity Analysis**

The Protocol is designed to assess the vulnerability of existing infrastructure and requires a range of information to conduct the assessment. The expansion of the University’s engineering building was in the conceptual stage so the required information for a PIEVC risk assessment was not available. The project team extracted components from the conceptual expansion design and conducted a “risk sensitivity analysis” to allow the University to minimize possible conflicts between climate effects and planned installations for the new building. Due to the number of common infrastructure components between the existing and propose expansion of the engineering building, the project team focused the risk sensitivity analysis on the components of the expansion that would be significantly different from the existing building.

The team then created a qualitative scale to assess the sensitivity of each of the new infrastructure components to climate change. A simplified scale where the sensitivity of the components to climate change was ranked as low, medium or high was used due to a lack of available information on the construction of the infrastructure components. The project team made recommendations to address sensitivity where there was medium or high sensitivity of the infrastructure component to climate change.

## Recommendations

The findings of this report are limited to the availability of data, the technology available for analysis and the time available to the team. The project team identified the following limitations of the report:

1. The engineering building functions as part of the University of Saskatchewan's campus which functions as a system;
2. In consideration of the time frame and the scope of the project, infrastructure components were grouped together;
3. There are a number of assumptions and uncertainties associated with using GCMs;
4. The model technology is evolving;
5. Further research is needed to develop predictions of extreme weather events;
7. There were limitations of analysis team knowledge of existing infrastructure; and
8. There were limitations due to the difficulty in completing a risk assessment for a building which has not yet been designed.

As a result of the risk assessment, the project team made a number of recommendations to the University of Saskatchewan Facilities Management Division. The recommendations arising from the study were grouped into remedial actions, management actions and additional study required. The project team identified a number of high priority building components that they recommended the University address immediately. The highest priority building components included: walkways; roofing; heating, ventilation and cooling adequacy; and reliability of the power supply to the building.

Additionally, as a result of the risk sensitivity analysis, the project team made a number of design recommendations to the proposed Engineering Building Expansion. These included recommendations to ensure that the structure is designed to account for the additional loading that will occur due to large increases in wind gusts and to ensure that the building drainage is adequately sized to handle large storm events.

## References

Associated Engineering. (2012). *University of Saskatchewan: Assessment of the Engineering Building's Vulnerability to Climate Change*. Retrieved from <http://pievc.ca/assessment-university-saskatchewan-current-engineering-building-and-new-addition>

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## **Development of IDF Curves under a Changing Climate in the Town of Creston: Executive Summary**

Columbia Basin Trust through its former Communities Adapting to Climate Change Initiative (CACCI) has supported the Town of Creston in this project.

This report presents the results of an update to the Intensity-Duration-Frequency (IDF) curves for the Town of Creston considering a range of climate change projections over three future time horizons. A comparative analysis of the effect on stormwater infrastructure design was then performed using the historical, current and future IDF curves for the 2020s, 2050s and 2080s.

IDF curves are an essential engineering design tool for all stormwater systems. Currently the practice of updating IDF curves is based on historical climate events and considers that extreme events will not vary significantly over time. The climate is changing. Extreme weather events such as high intensity rainfall are occurring more severely and frequently resulting in challenges for designing infrastructure that will be in place well into the future. If stormwater infrastructure continues to be designed based on historical climate events, there is an increased risk of infrastructure failure and flooding. Hence, adaptation measures for mitigation of the potential impacts of the climate change to the municipal infrastructure are extremely important for municipal governments. Consequently, the municipalities should consider development of the IDF curves under a changing climate as initial steps in minimizing municipal risk issues to the municipal stormwater infrastructure.

The projected IDF curves were generated with the web based Intensity-Duration-Frequency under a Changing Climate (IDF CC) Tool by inputting local historical climate station data for Creston. Outputs from the tool for all three Representative Concentration Pathways (RCPs), low (2.6), medium (4.5), and high (8.5) were generated, however as the current global emissions trajectory is tracking higher than the worst case scenario, all subsequent infrastructure analysis was limited to the results from the RCP 8.5 output. Without substantive socio-political action in support of emissions reduction, it is very unlikely that the current emissions pathway could be redirected to the low or even medium trajectory within the next 35 years. The risk of overdesign by choosing the RCP 8.5 over the RCP 2.6, would result in a 30% increase in intensity in the 2080s time period.

Rainfall intensity increases above historical values associated with RCP 8.5 (all return periods and all durations) were developed using the model ensemble. The average increases are 16%, 26% and 42% respectively for the 2020s, 2050s and 2080s.

The Town of Creston chose a culvert on Dodd's Creek crossing under 5th Avenue to test the effects of applying the results of the three future IDF curves in comparison to the historical and current design IDF curves. The flow at the culvert resulting from the projected 5 year storm in the 2080s is only 13% lower than flow from the 1983 100 year design storm. From the current IDF curve data to the 2020s, 2050s and 2080s, the

flows generated by the 5 year return period increases range from 15% to 36% and the 100 year return period increases range from 16% to 29%.

The impact to infrastructure design will vary dependent on specific situation and the type of infrastructure being assessed. The increase in 5-year and 100-year flows due to the future climate change predictions will result in increase of frequency and magnitude of flooding.

There is an inevitable level of uncertainty to consider in using climate modeling as it relies in part on our understanding of future greenhouse gas emissions (GHG) and in part on our understanding of how the earth's climate system will respond to the changes in GHG concentrations in the atmosphere. Additional uncertainty in the results presented in this work includes assumptions related to how projections of sub- daily extreme precipitation are extrapolated from daily information and the uncertainty associated with these assumptions is not adequately defined. These assumptions can result in underestimating the sub hourly intensities and therefore flows. The revised IDF curves will provide Town of Creston staff with advanced decision making capacities with respect to stormwater infrastructure design and flood control projects.

However, discretion should be used by designers where infrastructure must quickly handle peak flow events.

### Source

Elise Paré, WSP Canada. (September 2015). *Development of IDF Curves under a Changing Climate, Town of Creston.*

The full report can be accessed through the “Adaptation Case Studies” section of APEGBC’s Climate Change Information Portal: [www.apeg.bc.ca/climateportal](http://www.apeg.bc.ca/climateportal)

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## A Summary of PIEVC Risk Assessments conducted by the BC Ministry of Transportation and Infrastructure

To date the BC Ministry of Transportation and Infrastructure (BCMoTI) has applied the PIEVC Engineering Protocol to conduct a climate risk assessment of a number of highways and highway segments. This memo summarizes the climate parameters and infrastructure components assessed for the following highways and highway segments:

1. Coquihalla Highway – Hope to Merritt Section
2. Yellowhead Highway 16
3. Highway 20 in the Bella Coola Region
4. Highway 37A in the Stewart (Bear Pass) Region
5. Highway 97 in the Pine Pass Region

In 2010, the BCMoTI applied the PIEVC Engineering Protocol to identify components of the Coquihalla Highway Merritt South Road Section that were at risk of failure, loss of service, damage or deterioration due to the impacts of climate change (BC Ministry of Transportation and Infrastructure, 2010).

In 2011, the BCMoTI conducted a similar study for the Yellowhead Highway. In this study the BCMoTI applied the PIEVC Engineering Protocol to develop future climate risk profiles of transportation and infrastructure on a section of the Yellowhead Highway and analyzed components with high risk elements (BC Ministry of Transportation and Infrastructure, 2011)

The BCMoTI applied the lessons learned from the Coquihalla and Yellowhead Highway studies in 2014 to conduct an engineering vulnerability assessment of three highway segments. Using the PIEVC Engineering Protocol, the BCMoTI identified components at risk of failure, loss of service or damage in two coastal highway segments: Highway 20 in the Bella Coola region, highway 37A in the Stewart (Bear Pass) region and one interior highway segment: highway 97 in the Pine Pass region (BC Ministry of Transportation and Infrastructure et al., 2014).

As illustrated by the table in appendix A, there is variation in the infrastructure component-climate parameter interactions that each study examined. This table serves as a quick summary of the PIEVC risk assessments conducted by BCMoTI. The full reports can be accessed through the links in the references section of this memo or in the “Adaptation Case Studies” section of APEGBC’s Climate Change Information Portal which can be accessed at: [www.apeg.bc.ca/climateportal](http://www.apeg.bc.ca/climateportal).

**Table 1:** A table summarizing the infrastructure component-climate parameter interactions that have been examined in BCMoTI studies

## References

BC Ministry of Transportation and Infrastructure, Nodelcorp Consulting Inc. and Pacific Climate Impacts Consortium. (2014). *Climate Change Engineering Vulnerability Assessment of Three British Columbia Highway Segment*. Retrieved from [https://www.th.gov.bc.ca/climate\\_action/documents/hwy20\\_bella\\_coola-hwy37A\\_Stewart-hwy97\\_Pine%20Pass.pdf](https://www.th.gov.bc.ca/climate_action/documents/hwy20_bella_coola-hwy37A_Stewart-hwy97_Pine%20Pass.pdf)

BC Ministry of Transportation and Infrastructure and Nodelcorp Consulting Inc. (2010). *Climate Change Engineering Vulnerability Assessment: Coquihalla Highway (B.C. Highway 5) Between Nicolm River and Dry Gulch*. Retrieved from [http://pievc.ca/sites/default/files/coquihalla\\_highway\\_nicolum\\_river\\_and\\_dry\\_gulch\\_final\\_report\\_web.pdf](http://pievc.ca/sites/default/files/coquihalla_highway_nicolum_river_and_dry_gulch_final_report_web.pdf)

BC Ministry of Transportation and Infrastructure and Nodelcorp Consulting Inc. (2011). *Climate Change Engineering Vulnerability Assessment: B.C. Yellowhead Highway 16 Between Vanderhoof and Priestly Hill*. Retrieved from [http://pievc.ca/sites/default/files/bcmoti\\_yellowhead\\_highway\\_-\\_vulnerability\\_report\\_web.pdf](http://pievc.ca/sites/default/files/bcmoti_yellowhead_highway_-_vulnerability_report_web.pdf)

**Table 1:** A table summarizing the infrastructure component-climate parameter interactions that have been examined in BCMoTI Studies. This table summarizes the infrastructure component-climate parameter interactions that have been examined in BCMoTI PIEVC risk assessment studies. Interactions marked with a “C” were examined in the Coquihalla Highway study, interactions marked with a “Y” were examined in the Yellowhead Highway study, interactions marked with a “BC” were examined in the Bella Coola study, interactions marked with an “S” were examined in the Stewart study and interactions marked with a “PP” were examined in the Pine Pass study. Interactions marked with an “all” were examined in all of the studies listed in this memo.

Infrastructure Components	High Temperature	Low Temperature	Average Temperature	Temperature Variability	Freeze/Thaw	Frost Penetration	Frost	Total Annual Rainfall	Extreme High Rainfall	Light Substantial Rainfall	Heavier Substantial Rainfall	Sustained Rainfall	Snow (Frequency)	Snow Accumulation	Rain on Snow	Freezing Rain	Rain on Frozen Ground	Snow Storm/Blizzard	Rapid Snow Melt	Snowmelt Driven Peak Flow Events	Magnitude of Storm Driven Peak Flow Events	Frequency of Storm Driven Peak Flow Events	High Wind/Downburst	Hail/Sleet	Ground Freezing	Ice/ Ice Jams
Surface – Asphalt	C, Y	C, Y		C	C, Y	C	C		C				C	C		C		C			C	C			Y	
Pavement Marking	C, Y	C, Y		C	C, Y								C	C		C		C								
Shoulders (including gravel)	Y				Y				All	BC, S, PP	BC, S, PP	Y	BC, S, PP, C	BC, S, PP, C		C		C		PP	BC, S, PP, C	S, PP, C				
Barriers					C				Y				C	C				C								
Curb	C, Y	Y			C, Y				Y				BC, PP, C	C												
Luminaires													C	C		C	Y	C					Y			
Poles						Y							C	C		C	Y						Y			
Signage						C, Y							C	C		C	Y	C					Y			
Ditches				C	C, Y			Y	All	BC, S, PP	BC, S, PP	Y	BC, SS, PP, C	BC, S, PP, C	All		S	C	BC, S, PP, Y	BC, S, PP	BC, S, PP, C	BC, S, PP, C				S
Embankments/cuts	Y			C	C, Y	C	C	BC, S, PP, Y	All	BC, S, PP	BC, S, PP	Y	C	BC, S, PP, C	BC, S, PP, Y		S	C	BC, S, PP, Y	BC, S, PP	BC, S, PP, C	BC, S, PP, C				S
Hillsides	Y			C	C, Y			BC, S, PP, Y	All	BC, S, PP	BC, S, PP	Y	C	BC, S, PP, C	All		S		BC, S, PP, Y	BC, S, PP	BC, S, PP, C	BC, S, PP, C				S



Protection Works/Armoring								BC, SS, PP	BC, S, PP	BC, S, PP	BC, S, PP				BC, S, PP	BC, S, PP		S			BC, S, PP	BC, S, PP	BC, S, PP	BC, S, PP				BC, S, PP
Engineered Stabilization Works					C	C	C	BC, S, PP	S, C						BC, S, PP	S		S		BC, S, PP	BC, S, PP	BC, S, PP, C	BC, S, PP, C					S
Avalanche (Inc Protections Works)		C		C	C	C	C		C				C	C	C	C		C				C	C					
Debris Torrents (Inc Protection Works)	C			C	C	C	C		C				C	C	C							C	C					
Structures that Cross Streams	C, Y	C, Y		C	C, Y	C, Y	C	Y	All		PP	Y			BC, S, PP, Y	C	S, Y		BC, S, PP, Y	BC, S, PP, Y	BC, S, PP, C	BC, S, PP, C	Y					BC, S, PP, Y
Structures that Cross Roads	C, Y	C, Y		C	C, Y	C, Y	C		C, Y			Y			Y	C	Y				C	C	Y					
MSE Walls/Retaining Walls					C				S						S		S		S	S	C	C						S
Road Sub-Base											PP										BC, PP	BC, PP						
River Training Works (Rip Rap)		C		C				Y	C, Y			Y							Y	Y	C	C						Y
Pavement Structure		C		C, Y	C, Y	C, Y	C	Y				Y														Y		
Detail Drainage																					S	S						
Drainage Appliances					C, Y	C		Y	PP, C, Y		PP	Y		C	PP, C, Y	C	Y		Y	PP	C			Y				
Sub Drains		C, Y			C, Y	C	C	Y	C, Y			Y			Y						C							
Catch Basins				Y	C	C		Y	PP, C, Y		PP	Y		C	PP, C, Y	C	Y		Y		C	C		Y				
Grates																												
Culverts <3 meters		C, Y		C	C, Y			Y	All	BC, S, PP	BC, S, PP	Y			BC, S, PP, Y		BC, S, PP		BC, S, PP, Y	BC, S, PP, Y	BC, S, PP, C	BC, S, PP, C		Y			BC, S, PP, Y	
Culverts > 3 meters		C, Y		C	C, Y			Y	All	BC, S, PP	BC, S, PP	Y			BC, S, PP, Y		BC, S, PP		BC, S, PP, Y	BC, S, PP, Y	BC, S, PP, C	BC, S, PP, C					BC, S, PP, Y	
Asphalt Spillway and Associated Piping/Culvert	C, Y	C			C, Y			Y	C, Y			Y		C	C	C	Y		Y		C			Y				
Bridge End Fill									BC, S, PP		BC, S, PP				BC, S, PP				BC, PP	BC, S, PP	BC, S, PP	BC, S, PP						

3 <sup>rd</sup> Party Utilities									PP, C, Y		PP					C	Y			PP	PP, C	PP				
Railway								Y	PP, Y		PP	Y			Y		Y		Y	PP, Y	PP	PP				

## APPENDIX D: OVERVIEW OF CLIMATE CHANGE

### D.1 Background: Historical Climate Variability and Climate Change in BC

To provide context to future climate change effects in British Columbia, this section considers the degree of climate variability that has been experienced historically, in comparison with projected climate change. The data presented in this section serves to show trends in projected climate change. As the field of climate science as it relates to professional practice is evolving continuously, this section should be used only as a primer and should not be used to carry out *risk assessments* or inform infrastructure design.

British Columbia exhibits significant variability in climate, both spatially and over time. This variability is produced by the combined factors of:

- Highly varied topography,
- Geographic expanse (spanning approximately 12 degrees of Latitude, and 25 degrees of Longitude),
- Climate cycles, namely the El Nino Southern Oscillation (ENSO) and Pacific Decadal Oscillation (PDO).

Of these factors, topography and geography can be considered as stationary. However, the PDO and ENSO are phenomena that vary in effect over time, interact and produce short term climate variations.

#### ENSO

Notably, the ENSO and PDO produce identifiable cycles in temperature and precipitation over the entirety of the province.

The ENSO cycle is the fluctuations in ocean and atmospheric temperatures that occur in the eastern and central Equatorial Pacific. The ENSO cycle has opposing warm phases (El Niño) and cold phases (La Niña) The resulting deviations from normal ocean surface temperatures can greatly impact ocean processes, and significantly influence global weather and climate. The warm and cold phases of ENSO are typically of 9 to 12 months duration, though longer phases have been recorded, and occur on a frequency of 2 to 7 years<sup>21</sup>. Typical El Niño effects are likely to develop over North America during the following winter season. Those include warmer-than-average temperatures over western and central Canada, and over the western and northern United States.

#### PDO

The Pacific Decadal Oscillation (PDO) is similar to ENSO but occurs in the north Pacific, but over a much longer time scale, remaining in the same phase (warm or cool) for 20 to 30 years. The PDO warm and cool phases, like ENSO, greatly effect upper atmospheric winds. Shifts in the PDO phases can have significant impacts on global climate, influencing Pacific storm activity, the severity and

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<sup>21</sup> National Oceanic and Atmospheric Administration, National Ocean Service,  
<http://oceanservice.noaa.gov/facts/ninonina.html>

extents of droughts and flooding around the Pacific basin, the productivity of marine ecosystems, and global land temperature patterns<sup>22</sup>.

In addition, when the PDO and ENSO are in phase the effects are magnified, whereas when out of phase the effects are dampened.

The climatic variability produced by the PDO and ENSO can often be identified as short term trends (approximately 10 to 20 years) in climate data, with periods of mild warming or cooling when compared to long term climate normals. As such, they also tend to mask long-term historic trends in climate.

### Historical Climate Trends

When long term data is assessed, significant warming has already occurred in British Columbia. In general, increases in mean annual temperature of over 1 °C, and approaching 2 °C in northern regions of the province, are apparent over the period of 1901 to 2009. The increase is greater during the 1951 to 2009 period. Generally the observed increases in temperature are greatest in the winter<sup>23</sup>.

Trends in annual precipitation have not been as uniform across British Columbia as observed for temperature. Increases in annual precipitation vary greatly with location, but are more pronounced in regions with lower annual precipitation. There has been an increase in the occurrence of extreme wet and extreme dry conditions in the summer and a decrease in winter snowpack in the period of 1951 to 2009<sup>24</sup>.

### Projected Climate Change

On a province wide basis, climate change projections generally indicate warmer and shorter winters, with longer summer periods. Total precipitation will increase, with a greater proportion concentrated in the shorter winter periods. During the summer, precipitation will decrease. However, the magnitude of these changes is not uniform over the province, and can vary significantly even within a given region due to topographic or orographic effects and local influences. Table D.1 below summarizes the average projected temperature change by region, and the range in the projections. Table D.2 below summarizes the projected changes in key temperature/heat indices (growing and heating degree days, and frost free days), while Table 3 summarizes the projected changes in precipitation. Generally, the lower portion of the range for each parameter is associated with the milder climate change scenarios, such as B1 or RCP2.5, while the upper portion is associated with the more severe climate change scenarios, such as A2 and RCP8.5 (The significance of the different scenarios and their nomenclature is discussed later in this appendix).

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<sup>22</sup> <http://www.nwfsc.noaa.gov/research/divisions/fe/estuarine/oeip/ca-pdo.cfm>

<sup>23</sup> Pacific Climate Impacts Consortium, Climate Summaries for BC Regions, <https://www.pacificclimate.org/sites/default/files/publications/>, accessed on October 5, 2015

<sup>24</sup> <https://www.pacificclimate.org/sites/default/files/publications/Pike.WatershedHydrologyEn87.Mar2008.pdf>, accessed on October 5, 2015

Table D.1: Projected Mean Temperature Changes by 2050s, from 1961 to 1990 baseline, by Region

Region	Projected Temperature Change (°C)				
	Mean Annual		Season of Greatest Warming		
	Average	Range	Season	Average	Range
Cariboo	1.8	1.1 – 2.6	Summer	1.9	1.3 – 2.8
Kootenay / Boundary	1.9	1.2 – 2.8	Summer	2.4	1.5 – 3.2
Northeast	1.8	1.4 – 2.8	Winter	2.4	0.7 – 3.6
Omineca	1.8	1.3 – 2.7	All	1.8	1.3 – 2.7
Skeena	1.8	1.1 – 2.5	All	1.8	1.1 – 2.5
South Coast	1.7	1.1 – 2.5	Summer	2.0	1.4 – 2.8
Thompson / Okanagan	1.8	1.1 – 2.7	Summer	2.1	1.5 – 3.0
West Coast	1.4	0.8 – 2.2	All	1.4	0.8 – 2.2

Pacific Climate Impacts Consortium, Climate Summaries for BC Regions,  
<https://www.pacificclimate.org/sites/default/files/publications/>, accessed on October 5, 2015

Table D.2: Projected Change in Temperature Indices by 2050s, from 1961 to 1990 baseline, by Region

Region	Temperature Indices					
	Growing Degree Days		Heating Degree Days		Frost Free Days	
	Mean	Range	Mean	Range	Mean	Range
Cariboo	+283	+162 to +444	-632	-930 to -398	+23	+13 to +34
Kootenay / Boundary	+295	+168 to +434	-675	-997 to -425	+24	+15 to +35
Northeast	+226	+148 to +392	-659	-997 to -483	+16	+9 to +23
Omineca	+223	+136 to +379	-642	-975 to -459	+19	+11 to +30
Skeena	+226	+142 to +353	-645	-918 to -418	+22	+12 to +34

South Coast	+336	+205 to +506	-593	-896 to -372	+24	+14 to +36
Thompson / Okanagan	+319	+183 to +482	-654	-962 to -403	+24	+14 to +35
West Coast	+327	+204 to +306	-534	-816 to -318	+22	+13 to +32

Pacific Climate Impacts Consortium, Climate Summaries for BC Regions,  
<https://www.pacificclimate.org/sites/default/files/publications/>, accessed on October 5, 2015

Growing degree days (GDD), are an expression of heat accumulation commonly used in agriculture to estimate plant and animal development rates. It is the sum of the average temperature in excess of a threshold temperature (generally 5 °C in Canada) for each day, over the duration of a growing season.

Source: <http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/610cd0b8-4791-5374-8245-a12a053bcd4a.html>, accessed February 15, 2016.

Heating degree days are the sum of the absolute value difference between the daily average temperatures on days where heating is required and the threshold for heating (generally 18 °C in Canada), over the duration of either a “heating season” or an entire year. It is a quasi-quantitative means of expressing the total required effort for heating over a year. Source:

<http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/fd8efb83-b73d-5442-ab60-7987c824f5fd.html>, accessed on February 15, 2016.

Frost free days are the nominal length of the growing season. It is measured between the last frost in spring, and the first frost in the fall. Source: <http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/06e57002-0e06-53d0-be90-639df73a0d39.html>, accessed February 15, 2016.

Table D.3: Projected % Change in Precipitation by 2050s, from 1961 to 1990 baseline, by Region

Region	Precipitation					
	Annual		Summer		Winter	
	Mean	Range	Mean	Range	Mean	Range
Cariboo	+6%	-1% to +13%	-7%	-15% to -5%	+7%	-3% to +14%
Kootenay / Boundary	+5%	-3% to +10%	-6%	-18% to 0%	+8%	-2% to +17%
Northeast	+6%	0% to +16%	+4%	-6% to +13%	+11%	-6% to +22%
Omineca	+8%	+2% to +15%	+1%	-8% to +9%	+9%	-2% to +18%
Skeena	+7%	+3% to +13%	+2%	-5% to +11%	+9%	-1% to +16%

South Coast	+6%	-2% to +11%	-14%	-23% to +3%	+6%	-4% to +14%
Thompson / Okanagan	+6%	-1% to +11%	-9%	-19% to +1%	+7%	-4% to +15%
West Coast	+6%	+0% to 11%	-10%	-18% to +2%	+6%	-2% to +12%

Pacific Climate Impacts Consortium, Climate Summaries for BC Regions,  
<https://www.pacificclimate.org/sites/default/files/publications/>, accessed on October 5, 2015

### **D.1.1 Temperature**

Overall projections are that there will be higher average temperatures throughout the province, with a greater likelihood of extreme warm periods than was historically experienced, or occurs currently. Increased fire risk is expected, especially when combined with the effects of reduced summer precipitation, and reduced summer soil moisture (see below). Extreme high temperatures may place a greater thermal stress on structures and accelerate the deterioration of asphaltic pavements.

Winter temperatures will be higher, with a corresponding reduction in the accumulation of precipitation as snow. A greater proportion of winter precipitation will run off and will not be retained in watersheds for release during the spring melt (freshet) or contribute to soil moisture during the summer. Freezing elevations will be higher. Warmer temperatures during the winter, combined with a general increase in precipitation may increase the occurrence of fog. An increased frequency of freeze-thaw cycles will produce greater risk of “black-ice” conditions on roadways, and the occurrence of ice accumulations in drainage systems. Increased freeze-thaw cycles will also accelerate degradation of paving materials on roads, and deterioration of road subgrades.

Due to warmer winter temperatures, a significant decrease in heating-degree days is expected, representing a decreased use of energy to heat structures, representing a beneficial effect. Similarly, an increase in frost free days is expected, accompanied by an increase in growing-degree days represent longer growing seasons and the possibility of greater agricultural yields and utilization of farmland. However, this benefit to agriculture may be negated by changes in summer precipitation and reduced winter snowpack, as discussed below.

Pacific Climate Impacts Consortium, Climate Summaries for BC Regions,  
<https://www.pacificclimate.org/sites/default/files/publications/>, accessed on October 5, 2015

### **D.1.2 Precipitation**

Average annual precipitation is generally projected to increase throughout B.C. Extreme precipitation events will increase in magnitude and frequency. Accordingly, localized flooding and overland flow will occur where drainage systems are not upgraded to address the increased severity of extreme events.

A greater proportion of total annual precipitation will occur in the winter, which, when combined with generally higher average winter temperatures, will increase winter runoff and reduce storage of

water as snowpack. Increased soil moisture may increase the potential for slope instability in poor draining soils. Increased loading on engineered soil retaining structures may result.

Reduced summer rainfall, as well as reduced snowpack storage will increase the magnitude and severity of water shortages over the summer months, reducing drinking and irrigation water storage at the onset of the summer season, and increasing demands due to domestic and irrigation requirements.

Pacific Climate Impacts Consortium has also completed studies on hydrologic impacts of climate change in several river basins of BC. Several key hydrologic changes in the river basins include, but are not limited to early snowmelt and freshet, changes in the seasonal distribution of streamflow, and changes in low-flow and peak flow return periods.

Pacific Climate Impacts Consortium, Climate Summaries for BC Regions, <https://www.pacificclimate.org/sites/default/files/publications/>, accessed on October 5, 2015.

### **D.1.3 Sea Level**

Historically, sea level rise has been documented at an average rate of 1.7 mm/yr over the period of the late 19<sup>th</sup> Century and through most of the 20<sup>th</sup> Century, as observed on a global scale. Since 1993, an accelerated rate of 3 mm/yr has been recorded globally. On the British Columbia coast, recorded average sea level rise has generally been less than experienced at the global scale, i.e., less than 1 mm/yr, and varies by location<sup>25</sup>.

Climate Change related sea level rise is driven by:

Release of water stored as ice in the polar ice caps, continental ice sheets, and glaciers,

Bulk expansion of water in the oceans due to warming and reduced salinity,

Water level increases due to regional scale changes in major atmospheric currents or wind systems, and alteration of large scale ocean currents.

Geophysical processes can affect the relative rate and magnitude of sea level rise, with uplift offsetting the effect of absolute sea level rise and subsidence magnifying the effect of absolute sea level rise. Tectonic processes produce subsidence in subduction zones along the Strait of Georgia, and uplift on the West Coast of Vancouver Island. Alluvial soils in the Fraser River Delta are subject to subsidence as consolidation occurs, while long term rebound occurs in soils relieved of confining pressures due to glacial retreat.

For the B.C. coast, projected sea level rise to the year 2100 due to the more severe climate change scenarios varies between 0.8 m and 1.2 m depending on location<sup>26</sup>.

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<sup>25</sup> Sea Level Rise Adaptation Primer, B.C. Ministry of Environment, January 2013, [http://www.civicinfo.bc.ca/Library/Reports\\_and\\_Briefs/Sea\\_Level\\_Rise\\_Adaptation--Climate%20Action%20Secretariat%20--2013.pdf](http://www.civicinfo.bc.ca/Library/Reports_and_Briefs/Sea_Level_Rise_Adaptation--Climate%20Action%20Secretariat%20--2013.pdf), Accessed on October 14<sup>th</sup>, 2015

<sup>26</sup> Projected Sea Level Changes for British Columbia in the 21st Century, December 2008, <http://www2.gov.bc.ca/assets/gov/environment/climate-change/policy-legislation-and-responses/adaptation/sea-level-rise/sea-level-changes-08.pdf>, Accessed on October 14<sup>th</sup>, 2015



Increased sea levels, relative to local land elevations, will exacerbate salt water intrusion into aquifers, affecting the quality of groundwater used for agricultural, industrial and domestic purposes. Increased soil saturation will also occur, and higher average groundwater tables will place a greater stress on drainage systems in low lying coastal areas.

During extreme storm conditions, wave run up and storm surge effects, which are secondary effects relative to temperature and rainfall and that cannot be predicted with certainty at this point, will be magnified, increasing the risk of overtopping of sea dykes, damage to coastal infrastructure and flooding of low lying areas.

#### **D.1.4 Other Climate Impacts**

Other potential changes in climatic conditions are not as readily quantified. However, more extreme storm events as represented by increases in the magnitude and frequency of precipitation, will likely be accompanied by an increase in extreme winds. Increased wind intensity and frequency will result in more frequent and extensive power outages as well as increased structural damage.

As warmer conditions prevail, the frost line will move northward, and permafrost will be more susceptible to melting. Reduced ground stability due to disruption of permafrost conditions, will likely lead to foundation challenges, as well as slope stability issues in more northern areas of BC, as well as the Yukon, Nunavut and Northwest Territories.

### **D.2 Implications for infrastructure Design**

Climate change will result in an increased stress on *highway infrastructure*. Very few benefits to *highway infrastructure* are apparent. In the absence of the incorporation of climate change adaption or resilience measures the following effects are likely:

- Reduced levels of service over time, as climatic conditions change
- Interruptions in service due to extreme events,
- Shorter service life due to increased wear and tear,
- Increased likelihood of significant failure under extreme conditions,
- Increased operating costs,
- Increased maintenance in response to “over loading”.

Example scenarios where climate change has been addressed are provided in Appendix B.

### **D.3 Climate Projections**

Incorporating climate change effects into infrastructure design and management requires that suitable data and information on potential future climate conditions be identified, and the required parameters extracted in a form useful to the design professional. In order to responsibly undertake such an effort, a basic understanding of the process of climate modelling is essential. This section provides a primer in emissions projections, modelling and data extraction (downscaling). However, the professional should engage a climate specialist for complex assignments to ensure that climate

projection inputs are properly understood and applied. It is also the responsibility of the design professional to obtain and use the most recent climate projection data applicable.

### D.3.1 Climate Models

Two major types of climate models are used to assess future climate changes. Global Climate Models (GCMs) are the most common, and have been in use the longest. GCMs are used to simulate the impacts over time of changing GHGs concentrations on the climate. GHG scenarios are an input determined externally from the GCM, and the GCM does not internally track GHGs as part of the modelling process. Recently, more comprehensive Earth System Models (ESMs) have become established. ESMs incorporate the same functionality as GCMs, but also simulate the carbon cycle, and chemical and biological processes in the biosphere. As a result, they are able to account for changes in GHGs that may result as a consequence of climate change impacts, such as CO<sub>2</sub> released from melting permafrost.

Of the recent models considered in the IPCC's Coupled Model Intercomparison Project 5 (CMIP5), PCIC has identified 12 that ordered in Table D.4 below in terms of being most applicable to western North America (i.e. BC). Each model is generally run with a number of emissions scenarios (discussed later), and over multiple runs. The ordering, which differs by region, is selected to provide the widest spread in projected future climate for smaller subsets of the full ensemble. It may be useful to note that all climate models in CMIP5 are ESMs.

Table D.4 Climate Models Applicable to BC

	Model Name	Institute ID	Modeling Center (or Group)
1	CNRM-CM5-R1	CNRM-CERFACS	Centre National de Recherches Météorologiques / Centre Européen de Recherche et Formation Avancée en Calcul Scientifique
2	CanESM2	CCCMA	Canadian Centre for Climate Modelling and Analysis
3	ACCESS1-0-R1	CSIRO-BOM	Commonwealth Scientific and Industrial Research Organization (CSIRO) and Bureau of Meteorology (BOM), Australia
4	INM-CM4-r1	INM	Institute for Numerical Mathematics
5	CSIRO-Mk3-6-0-r1	CSIRO-QCCCE	Commonwealth Scientific and Industrial Research Organization in collaboration with Queensland Climate Change Centre of Excellence
6	CCSM4	NCAR	National Center for Atmospheric Research
7	MIROC5-r3	MRI	Atmosphere and Ocean Research Institute (The University of Tokyo), National Institute for Environmental Studies, and Japan Agency for Marine-Earth Science and Technology
8	MPI-ESM-LR-R3	MPI-M	Max-Planck-Institut für Meteorologie (Max Planck Institute for Meteorology)

9	HadGEM2-CC-r1	MOHC	Met Office Hadley Centre
10	MRI-CGCM3-r1	MRI	Meteorological Research Institute
11	GFDL-ESM2G-r1	NOAA-GFDL	NOAA Geophysical Fluid Dynamics Laboratory
12	HadGEM2-ES-r1	MOHC	Met Office Hadley Centre (additional HadGEM2-ES realizations contributed by Instituto Nacional de Pesquisas Espaciais)

Source: <https://www.pacificclimate.org/data/statistically-downscaled-climate-scenarios>, accessed on 01/28/2016

### D.3.2 Downscaling

Most *highway infrastructure* projects are local or regional in scope, and are carried out at spatial scales far smaller than the resolution of GCMs. Also most GCM output has temporal resolution on the order of days. For infrastructure design or assessment purposes, finer resolution (both spatial and temporal) data is required. Accordingly, a valid process for extracting relevant data from the coarse scale GCM results is required.

The process of producing higher resolution data suitable for analysis and design at a local scale is referred to as Downscaling. Two techniques are used to downscale from large scale GCM output, the first is Statistical downscaling, and the second is dynamic downscaling using regional climate models.

Statistical downscaling makes use of historical climate data at both the global and local scale, and output data produced at a coarse scale by a GCM for the same period.

Typically, the downscaling technique attempts to adjust for any biases evident in the GCM over the historical period using either an explicit bias correction process, or using statistical based methods such as quantile mapping. The primary assumption (which has been tested by PCIC for their statistical downscaling technique) is that the relationship between coarse scale and local scale climate data developed based on past data will remain valid for future climate conditions.

The second approach to downscaling is a dynamic approach using regional climate models (RCMs). Similar to GCMs, RCMs are based on physical processes but produce higher resolution output at regional and local scales, and often include additional parameters such as land use, vegetation and topography. As a result they are more computationally intensive. While RCMs will reproduce locally important climatic processes such as sea breezes or lake effects, they are potentially subject to inaccuracy due to large scale errors in the future condition GCM output data which provides the boundary conditions for the RCMs. These issues are generally addressed by additional correction by statistical processes.

### D.3.3 Greenhouse Gas Emissions Scenarios

Climate projections require that a forcing effect be incorporated into a GCM, which is generally provided by a GHG emission scenario. Each GHG emissions scenario is an estimate of potential future releases of greenhouse gases, aerosols and other anthropogenic gases into the atmosphere. A GHG emissions scenario is developed from a particular combination of input parameters related to greenhouse gas production that includes economic activity, technological progress, as well as

potential efforts to curtail GHG production. These inputs are used to estimate the resulting GHG emissions associated with the particular scenario. Each scenario is internally consistent (i.e. does not contain contradictory parameters), and is physically plausible.

Two different sets of emissions scenarios have been used in climate change projections. Developed in 2000 by the IPCC for the Third Assessment Report on climate change, the SRES (Special Report on Emissions Scenarios) scenarios were employed until 2010. The SRES scenarios were then superseded by the RCP (Representative Concentration Pathway) scenarios. Each set is described briefly below.

## **SRES Scenarios**

The SRES scenarios were intended to represent future changes in the global environment related to emissions of greenhouse gases and aerosol precursors. There are four general scenario families, A1, A2, B1 and B2, each representing differing paths of demographic, social, economic, technological, and environmental development that diverge widely as time progresses.

The A1 scenarios represent very rapid economic growth, a global population that peaks in the mid-21<sup>st</sup> century and then begins to decline, coupled with a rapid progress to new and more efficient technologies.

The A2 scenarios represent a future with generally slower and regionally biased economic growth, continually increasing global population and lacking consistent technological progress.

The B1 scenarios represent a future where population peaks and then declines similar to the A1 family, but economic activity rapidly shifts from a production economy to a service economy with the introduction of clean and efficient technologies.

The B2 scenarios represent a future in which there is moderate economic development with continuously increasing population, at a rate lower than A2, but economic, social and environmental issues are managed at a local or regional scale.

Of these four, the A2 family produced the more severe GHG emissions, and was representative of the world proceeding on a status quo path.

## **RCP Scenarios**

RCP scenarios are based on GHG concentration pathways, which could result from a number of different combinations of economic, technological, social and policy changes, rather than particular emissions scenarios. Each RCP is defined by the resulting radiative forcing by the year 2100. Radiative forcing is an expression of the cumulative measure of the effect of human emissions of GHGs from all sources expressed in Watts per square meter, and is the change in the balance between incoming and outgoing radiation. Each RCP covers the 1850-2100 period, and extensions have been formulated for the period thereafter up to 2300 (van Vuuren et al. 2011). These new greenhouse gas scenarios specify concentrations rather than emissions. The range of equivalent emissions covered by the set of RCPs is similar to the range covered by SRES, except on the lower end where RCP2.6 represents

aggressive greenhouse gas emissions reductions. There are four RCPs, summarized in the table below.

**Table D.5 RCP Scenario Description**

Scenario	Description
RCP8.5	Rising radiative forcing pathway leading to 8.5 W/m <sup>2</sup> in 2100.
RCP6	Stabilization without overshoot pathway to 6 W/m <sup>2</sup> at stabilization after 2100
RCP4.5	Stabilization without overshoot pathway to 4.5 W/m <sup>2</sup> at stabilization after 2100
RCP2.6	Peak in radiative forcing at ~ 3 W/m <sup>2</sup> before 2100 and decline

Source: IPCC Data Distribution Center, [http://sedac.ipcc-data.org/ddc/ar5\\_scenario\\_process/RCPs.html](http://sedac.ipcc-data.org/ddc/ar5_scenario_process/RCPs.html), accessed on December 9, 2015

Generally, the most relevant scenario for infrastructure design and assessment is RCP8.5, which is the worst of the four scenarios and is consistent with current trends in GHG emissions (status quo). The other scenarios generally produce less extreme outcomes, but may be applicable in specific situations.

Notably, the current level of GHG emissions equals or exceeds the most extreme current scenarios.

Source: ASCE, Committee on Adaption to a Changing Climate, “Adapting Infrastructure and Civil Engineering Practice to a Changing Climate”, 2015.

#### **D.3.4 Projected Climate Data Characteristics**

Climate projection data is available in a variety of levels of detail, degree of complexity and formats. The selection of the applicable form of climate projection data greatly depends on the requirements of the project, the level of knowledge of the user, and in some cases, data availability. From a simple perspective, projected climate data can be divided into 3 categories on the basis of its characteristics, detail, complexity and ease of application:

1. Basic
2. Intermediate
3. Detailed

Source: Charron, I. (2014). A Guidebook on Climate Scenarios: Using Climate Information to Guide Adaptation Research and Decisions. Ouranos, 86 p.

Generally, the more advanced the category of climate projection data, the greater the complexity and the effort required to make use of the data. In addition, more support from a climate expert will likely be required with the higher categories.

The category of a required dataset can be defined by three criteria:

1. The purpose or application of the data,
2. The type of climate variable involved,
3. The level of detail in space and time, in terms of scale and resolution.

All three criteria are important to consider in ensuring the data is appropriate for the assignment at hand, and to facilitate its proper use. The format in which the data is presented is also an important consideration in making the climate projection data suitable for use. Climate data can be provided in a variety of formats that may contain the same information, but that may ease or hinder its use. A range of formats are possible, including digital data files for use as inputs to other analyses or models, or as summarized or consolidated data in the form of tables, maps or figures that are directly interpreted by a user.

Source: Charron, I. (2014). A Guidebook on Climate Scenarios: Using Climate Information to Guide Adaptation Research and Decisions. Ouranos, 86 p.

The typical characteristics of each category are discussed briefly below:

#### Basic category

1. Purpose: Often intended high level assessments of potential climate change risks, such as an assessment of infrastructure sensitivity to changes in design conditions due to climate change.
2. Climate variables: Generally requires simple climatic variables such as precipitation and temperature, and may involve simplified climate projection outputs, such as estimated increase of a design rainfall event at a certain time horizon.
3. Spatial and temporal resolution: A coarse resolution and limited scale for the projected change is sufficient. A single general value on a regional scale, at a non-specific point in time is adequate. For example, a projected increase in mean winter temperatures in the Okanagan for the 2050s, representing a coarse envelope in both space and time.

#### Intermediate category

1. Purpose: Generally required for a more detailed evaluation considering a range of varying climate outcomes and potential impacts to identify risks and opportunities. Used to quantify the interaction between climate with people and/or infrastructure. Also used to identify critical thresholds in climate change, and when and to what degree systems become vulnerable.
2. Climatic variables: Moderately complex climate indices data is needed, and is generally a product of further analysis (such as modelling) of basic climate indices such as temperature and precipitation. Often, specific future values are required, rather than a relative change in the climate indices in question.
3. Spatial and temporal resolution: Generally a finer resolution and scale is required than for simpler assignments, though this may vary.

#### Detailed category

1. Purpose: The focus is often on a detailed assessment of climate change impacts, considering a range of impacts, identifying the most important impacts, and development of detailed adaption actions and priorities.
2. Climatic variables: Required climate variables can vary greatly between assignments, but several climate variables may be involved including ones that are themselves derived from other data. Efforts to estimate climate extremes often require complex climate data, including time series data sets, incorporating several variables. Outputs are often developed indirectly from climate inputs. For instance, modelling to estimate drought occurrence, changes in stream flow characteristics or occurrence of extreme storm events usually requires complex data inputs.
3. Spatial and temporal resolution: Usually requires fine spatial resolution and scales, while temporal resolution and scale may depend on the particulars of an assignment, such as the planning horizon.

#### **D.3.5 Uncertainties and Likelihoods**

There are three main sources of uncertainty in the climate projection outputs of emissions scenarios and climate modelling:

- 1) The inherent natural variability of climate in both temporal and spatial scales.
- 2) A simplified and potentially incomplete or inaccurate representation of climatic processes, and the particular parameters employed within climate models, results in uncertainty in any given model's response to natural and anthropogenic forcing inputs.
- 3) Scenarios for forcing inputs, such as emissions, and various natural or anthropogenic factors.

Although climate model projections are really simulations from first principles, it is difficult to assign probabilities or likelihoods to any given climate projections. An ensemble of climate models, even when using the same forcing inputs, will produce a range in projected climatic conditions. Moreover, probabilistic estimates of impacts based on ensembles of model outputs are not representative of an actual range of outcomes. In particular, the probability distribution of climate model projections could underestimate the degree of uncertainty, as climate models contain biases, and have limitations in their resolution at both temporal and spatial scales. The model outputs are not true random samples and their distribution does not necessarily have the true future climate as its mean. In addition, a finite number of models, with a limited set of climate scenarios are only able to encompass an unknown proportion of all potential climate outcomes. It appears likely that the range of climate outcomes resulting from model ensembles represents a minimum representation of future climate uncertainty.

Source: ASCE, Committee on Adaption to a Changing Climate, "Adapting Infrastructure and Civil Engineering Practice to a Changing Climate", 2015.

#### **D.3.6 Climate Extremes**

Recent observations, both anecdotal and quantitative, combined with climate model outputs, indicate that the range of climate extremes will increase. Individual extreme events will become greater in magnitude and occur more frequently. By extension, events of a particular magnitude, that have been associated with a frequency of occurrence based on historic data, will now occur more frequently. Effectively the service level of existing infrastructure, designed on the basis of events of a certain magnitude occurring at an expected frequency, will be reduced, potentially significantly. New and refit infrastructure will need to account for the increase in extreme events, with large events occurring more often over the life of a facility.

Source: ASCE, Committee on Adaption to a Changing Climate, “Adapting Infrastructure and Civil Engineering Practice to a Changing Climate”, 2015.

## **D.4 Climate Resources**

The following organizations, resources and tools are potentially useful for engineering applications. The QP and EOR should monitor for improvement to the existing tools as well as the availability of new tools and information that may be applicable.

### **D.4.1.1 - Pacific Climate Impacts Consortium (PCIC)**

PCIC is a not for profit corporation at the University of Victoria and is a center that undertakes applied research and quantitative assessments of climate change variability, effects and impacts for the Pacific and Yukon regions. PCIC’s efforts focus on three areas: Hydrologic impacts, Regional Climate Impacts, and Climate Analysis and Monitoring. PCIC is a primary resource for climate change information for British Columbia.

<https://www.pacificclimate.org/>

### **D.4.1.2 - Intensity-Duration-Frequency - Climate Change (IDF CC) Tool**

The IDF-CC is an analysis tool that provides estimates of IDF curves under future climate conditions. IDF curves can be generated using all the major climate models, and the four standard emissions scenarios, allowing the user to assess IDF data for a variety of outcomes. The IDF-CC tool was developed at the University of Western Ontario, in the Faculty for Intelligent Decision Support. The current version of IDF-CC makes use of the most recent Environment Canada IDF datasets, which were revised in December, 2014. There are a number of uncertainties associated with the method that the tool uses to produce sub-daily projections; therefore it is recommended that this tool should be used for exploratory rather than for design purposes.

<http://www.idf-cc-uwo.ca/>

### **D.4.1.3. - Environment Canada, Engineering Climate Datasets**

Environment Canada provides three types of climate data that have particular application to engineering. These datasets include:



1. The most recent short duration IDF data for many locations across Canada, as well as historic IDF data.
2. The Canadian Weather Energy and Engineering Datasets (CWEEDS) that provide long term hourly data for 21 different weather parameters that are applicable for estimating heating and cooling requirements for structures, among other uses
3. The Canadian Weather year for Energy Calculation (CWECE) datasets are a subset of CWEEDS where 12 Typical Meteorological Months are selected by statistically identifying an individual month that has mean values for several parameters that are closest to the monthly means obtained from the long term CWEEDS data set. The parameters covered are daily total global radiation, mean, minimum and maximum dry bulb temperature, mean, minimum and maximum dew point temperature, and mean and maximum wind speed.

[http://climate.weather.gc.ca/prods\\_servs/engineering\\_e.html](http://climate.weather.gc.ca/prods_servs/engineering_e.html)

#### D4.1.4 - Natural Resources Canada - Climate Adaptation Website

The Impacts and Adaptation website of Natural Resources Canada includes the Adaption Platform, an initiative to promote collaboration between government, industry and professional organizations to identify adaption priorities for a broad range of economic sectors, regions and disciplines. This site also provides access to several high level assessments of climate change impacts and potential adaption strategies.

<http://www.nrcan.gc.ca/environment/impacts-adaptation/10761>

#### D4.1.5 - Fraser Basin Council - BC Regional Adaptation Collaborative Program

The Fraser Basin Council (FBC) has participated in several climate change adaption related initiatives, including the BC Regional Adaptation Collaborative Program (BC-RAC). The key FBC climate change initiative is the BC RAC program, undertaken jointly with the BC Ministry of Environment – Climate Action Secretariat, and funded by Natural Resources Canada. The BC-RAC program focuses on “Preparing for Climate Change — Securing British Columbia’s Water Future.”, and has developed tools and resources for planning climate change adaption, identifying risk, issues of concern, collaboration opportunities and potential options for adaption measures.

[http://www.fraserbasin.bc.ca/ccag\\_bcrac.html](http://www.fraserbasin.bc.ca/ccag_bcrac.html)

In addition, the Fraser Basin Council website provides a portal to other climate change adaption resources:

[http://www.fraserbasin.bc.ca/ccag\\_bcrac\\_resources.html](http://www.fraserbasin.bc.ca/ccag_bcrac_resources.html)

#### D4.1.6 - CLIMDEX

CLIMDEX is a project undertaken by the University of New South Wales (Australia), with support from several organizations including PCIC and Environment Canada. The purpose of the CLIMDEX project is to develop a comprehensive dataset of indices that are used to quantify extreme climate conditions. The global datasets are both climate station based (in-situ) and gridded land based covering 27 key indices of extreme climate.

The datasets are useful for assessing global and regional variability in climatic extremes, and global climate model output. Detailed background information on each dataset's source, model and processing software, time series and estimates of uncertainty are also available. Generally, CLIMDEX is for expert users and care must be taken in selecting appropriate datasets.

<http://www.climdex.org/overview.html>

For a more extensive list of the tools and resources available to engineers and geoscientists for climate change adaptation, please visit APEGBC's Climate Change Information Portal ([www.apegb.bc.ca/climateportal](http://www.apegb.bc.ca/climateportal)). Engineers Canada PIEVC Website [www.pievc.ca](http://www.pievc.ca) is a resource for infrastructure vulnerability reports using the PIEVC protocol as well as information on the Protocol itself.

## **APPENDIX E: Tools and Resources for Climate Change Adaptation**

For an up to date list of tools and resources for climate change adaptation, please visit [www.apeg.bc.ca/climateportal](http://www.apeg.bc.ca/climateportal)

Final Draft

## APPENDIX F: AUTHORS AND REVIEWERS

<b>Name</b>	<b>Organization</b>	<b>Role</b>
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<b>Glen Skhurhan, P.Eng.</b>	Senior Engineer, Partner, Urban Systems	APEGBC Internal Review Team Member
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<b>David Lapp, P.Eng., FEC</b>	Practice Lead, Engineering and Public Policy, Engineers Canada	Expert Review Provider
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<b>Elise Paré, P.Eng.</b>	Senior Engineer, WSP Canada Inc.	First-level reviewer
<b>Eric Morris, P.Eng., M.A.Sc.</b>	Water Supply and Treatment, Kerr Wood Leidal	Contributor/Reviewer
<b>Zane Sloan, P.Eng.</b>	ISL Engineering and Land Services Ltd.	Contributor/Reviewer
<b>Jim Barnes</b>	BC Ministry of Transportation and Infrastructure Engineering Branch	Project Manager
<b>Harshan Radhakrishnan, P.Eng., M.A.Sc.</b>	Practice Advisor, APEGBC	Project Manager



# Canadian Environment Experience Project

September 9, 2016

Update to Council



Professional Engineers  
and Geoscientists of BC

# Project Overview

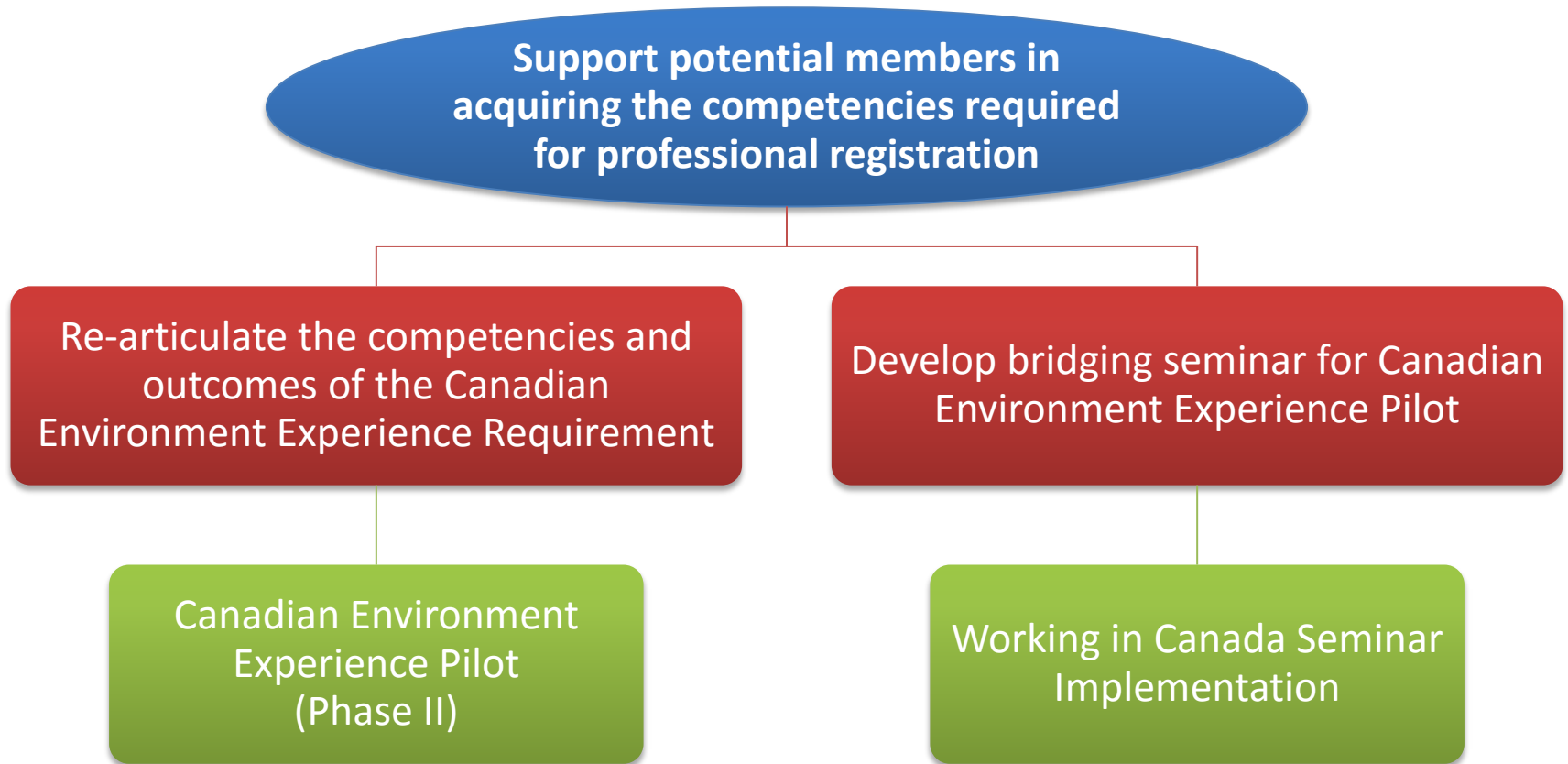
# Canadian Environment Experience Project

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- **The Current Canadian Environment Experience Requirement**
  - A minimum of 12 months of Canadian environment work experience is a requirement for P.Eng. Licensure in every jurisdiction in Canada.
- **The Canadian Environment Experience Project is a pilot program to:**
  - Clearly define the Canadian environment experience competencies required for current and prospective P.Eng. applicants.
  - Address human rights concerns that the time-based requirement creates a barrier of entry for internationally trained engineers (ITEs), as identified by the Ontario Human Rights Commission.
  - Explore alternative methods and processes that are defensible and robust to meet the Canadian environment experience requirement.
  - Protect the intent of the Canadian environment experience requirement.

# Strategic Plan

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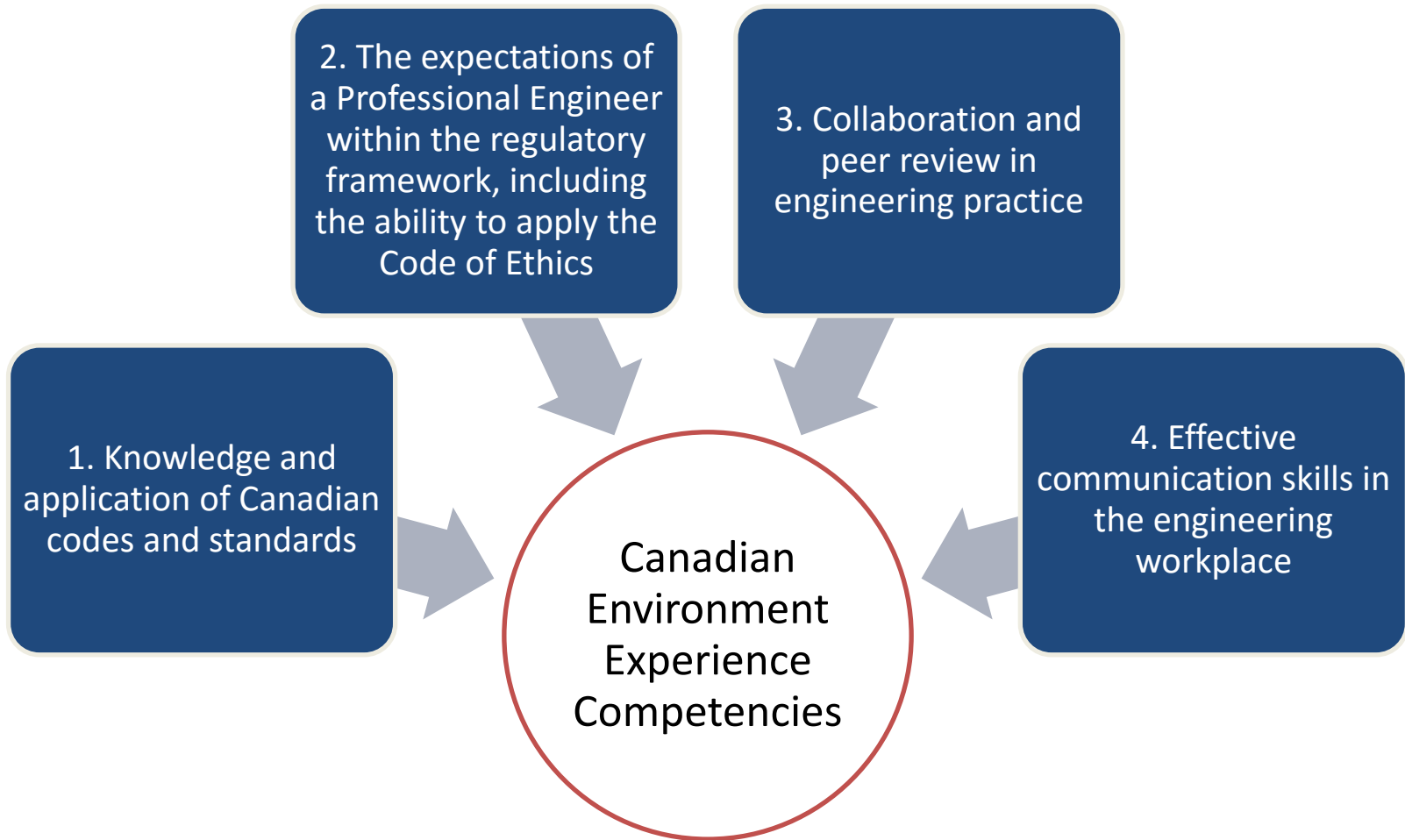
# KPI Summary

Objectives	FY2017 KPI		Status (as of September 2016)
	Canadian Experience Requirement re-articulated to identify competencies required and methods of achieving them resulting in time-based requirement being eliminated	June 2016  (Extended to May 2017)	✓ Competencies and alternative methods identified  Pilot implementation extended to May 2017 to allow for more applicant assessments and robust data.
	Develop bridging seminar (Working in Canada Seminar) for Canadian Environment Experience Pilot.	December 2016	✓ Full seminar development complete  Pilot implementation in progress (Aug to Dec 2016)

# Canadian Environment Experience Competencies



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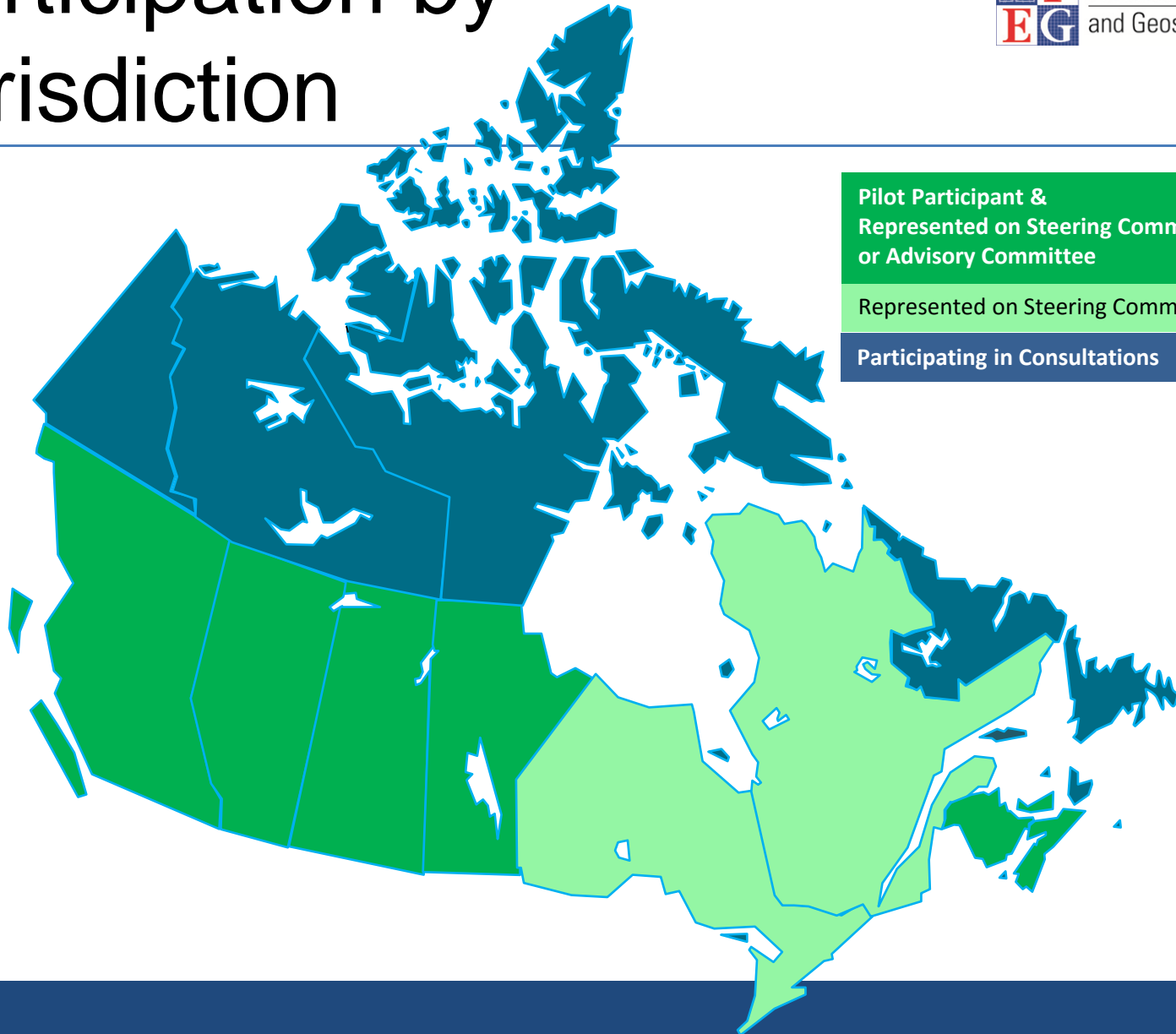


# Proposed Alternative Methods

- A combination of the following may be assigned, depending on qualifications and competencies demonstrated during review:



# Participation by Jurisdiction



# Project Partners and Collaborators

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- **BC Ministry of Jobs, Tourism and Skills Training**
- **National Steering Committee (Phase I & II)**
- **National Admissions Officials Group**
- **All 12 Constituent Associations in various capacities**
- **Engineers Canada**
- **Working in Canada Advisory Committee**
- **Various immigrant-serving agencies**
- **Various Employers**
- **Professional engineering members and applicants across Canada**



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# Project Updates

From September 2015 to Present

# Canadian Environment Experience Pilot (Phase II)

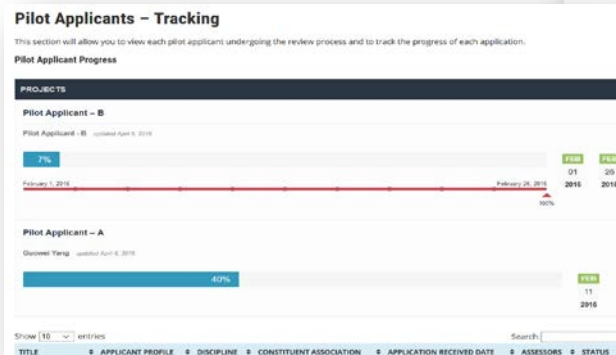


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- **Pilot Website Launched:**  
<http://experienceincanada.ca>

- Online Application System
- Secure Committee Portals for pilot monitoring
- “Check Eligibility” feature
- Information and resources for applicants and assessors

The screenshot shows the homepage of the Canadian Environment Experience Pilot website. The header is blue with the title "Canadian Environment Experience Pilot" and the subtitle "Alternative Pathways for Professional Engineering Licensure". Navigation links include "For Applicants", "For Assessors", "For Participating CEs", "For the Steering Committee", and "Contact". A search bar is also present. The main content area has a "Login or Register" section with fields for email and password, and a "Remember Me" checkbox. A "Welcome" section explains the pilot's purpose and provides a link to "Check Your Eligibility". A red warning box states: "Please note that we are currently revising the format of the online self-assessment form based on feedback that we have received from pilot participants. We highly suggest waiting for the updated form before completing the current application form." At the bottom, there are logos for Canada and British Columbia, and a copyright notice for 2016 APEGBC and the Province of British Columbia.



# Pilot Online Application System



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The image displays three overlapping screenshots of the 'Canadian Environment Experience Pilot -- Applicant Self-Assessment Form'.  
The leftmost screenshot shows the 'Apply Now' button and 'Step 1 of 8 - Applicant Information'. It includes a red warning box stating: 'Please note that we are currently revising pilot participants. We highly suggest waiting'. Below this is the 'APPLICANT INFORMATION' section with fields for 'Date of Application' (07/13/2016), 'Applicant Name' (First, Last, Email), and 'Provincial Regulator'. The 'SPECIFICS OF PRACTICE' section has a 'Discipline' field.  
The middle screenshot shows 'Step 2 of 8 - Employment Timeline' with a 12% progress bar. It features an 'EMPLOYMENT TIMELINE' table with columns for 'EMPLOYMENT DATES', 'EMPLOYER NAME', and 'LOCATION'. Navigation buttons 'Previous', 'Next', and 'Save and Continue Later' are at the bottom.  
The rightmost screenshot shows 'Step 3 of 8 - Key Competency #1' with a 20% progress bar. It includes a 'COMPETENCIES' section with instructions to discuss how competencies are fulfilled. Below is the 'Knowledge and Application of Canadian Codes and Standards' section, followed by a dropdown for 'Number of Examples for Competency 1' and a table for 'Example #1' with columns for 'Employer', 'Location of Work', and 'Time of Employment'.



# Canadian Environment Experience Pilot (Phase II)

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- **Applicant and Assessor Recruitment**
  - Assessor training session held in March 2016
  - To date, received 8 pilot applicants from across Canada
  - Applicant and assessor outreach efforts occurring on ongoing basis
  - Reviews of initial pilot applicants conducted
- **NAOG and CEQB Consultation and Feedback**
  - Canadian Environment Experience Requirement identified as high priority issue
  - Pilot extension to May 2017 approved to provide more time for assessments and robust data
  - Major revision to pilot application form in order to make clear expectations to all applicants involved

# Working in Canada Seminar



Professional Engineers  
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- **Curriculum Structure**

- Four units (56-64 hours total) that corresponds with each Canadian environment experience competency
- Unique “*Codes, Standards and Regulations*” module
- Online availability allows course completion prior to arrival in Canada
- Course is designed to allow instructor-led training if required

Unit 1 – The  
Regulation and  
Practice of  
Engineering in Canada

Unit 2 – Codes,  
Standards and  
Regulations

Unit 3 – Culture and  
Communication

Unit 4 – Collaboration  
and Peer Review

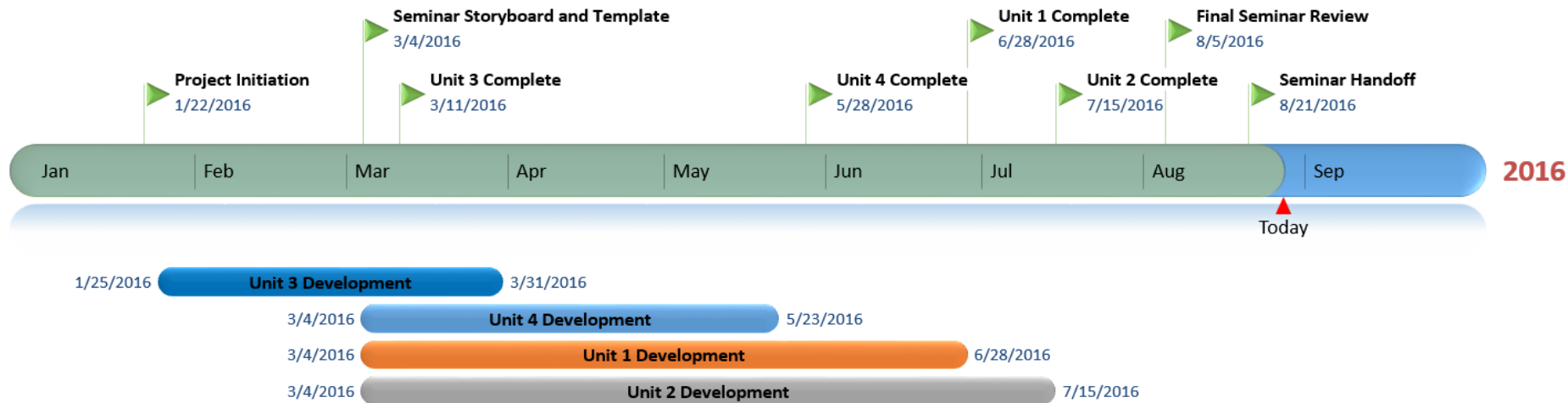
# Working in Canada Seminar



Professional Engineers  
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- **Development**

- Development of seminar content and modules completed in 6-month timeline
- Additional \$160,450 of funding was obtained from Ministry to initiate seminar development
- Subject matter experts, employers and volunteers involved in content development and review, including support from APEGBC's Ann English



# Working in Canada Seminar



Professional Engineers  
and Geoscientists of BC

- **Seminar Pilot Implementation (August to December 2016)**
    - Seminar pilot registration available for interested pilot users, focus group participants or subject matter experts
- <http://experienceincanada.com/working-in-canada-seminar-pilot>



# Outreach & Interest

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- **Communication and Outreach**
  - Pilot announced to recruit participants and volunteers on APEGBC website, Engineers Canada, Constituent Association Newsletters
  - Presentations to Constituent Associations, Office of Fairness Commissioner in Ontario, National Admissions Officials Group, Qualifications Board
- **Employers**
  - Interest from major companies, such as Fluor, COWI International, Siemens
  - Potential to integrate seminar with internal employee training plans
- **Government and Members of Parliament**
  - Inquiries from Members of Parliament regarding activities to support foreign qualifications recognition
- **Immigrant-serving Agencies**
- **Academic Institutions**
  - Continuing education providers interested in contributing to instructor-led modalities

# Next Steps

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- **Short-Term**

- Launch Learning Management System
- Continue assessment and recruitment of pilot applicants and assessors for Canadian Environment Experience Pilot
- Monitor and report pilot assessment results and outcomes
- Conduct focus group sessions for Working in Canada Seminar

- **Long-Term**

- Seminar Marketing and Distribution Plan
  - Explore strategies and opportunities for long-term seminar sustainability that may provide (but are not limited to):
    - Seminar access to all engineers residing within or outside of Canada
    - Individual pricing and corporate licensing options
    - Resource and cost-efficient course maintenance
    - Potential for instructor-led seminar support opportunities by APEGBC
    - A continuing professional development course offered by APEGBC

# Thank You

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- For questions or additional information:

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Registration Project Manager

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**Table of Contents: Registration Report – Admissions and Membership for Fiscal 2016**

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## Applications

### Application Growth in Fiscal 2016

- Application growth declined by 4% from Fiscal 2015 but maintained 2015 levels when Reinstatement/Return to Practice and Life Member applications are included Overall, the significant increase experienced in 2014 has been sustained.
- The proportion of Internationally-Trained first time Professional Engineer applicants decreased from 50% reported for Calendar 2015 to 41% in Fiscal 2016, resulting in a net decline in applications from Internationally Trained engineers of 174 applicants or 28%.
- 16 of the 19 Limited Licence applicants applying under Inter-Association Mobility were licensed in Alberta and 14 are resident in Alberta.
- The decline in applications – especially those for Professional Geoscientists may be attributed to the downturn in some engineering and geoscience sectors.

New Applications*			
Application Type	Fiscal 2015 ending June 30, 2015 Total	Fiscal 2016 ending June 30, 2016 Total	Increase over Prior Year
<b>First Time Applying in Canada</b>			
Professional Engineer <sup>1</sup>	1253	1105	-12%
Professional Geoscientist <sup>1</sup>	114	63	-45%
Engineer-in-Training	1251	1,339	7%
Geoscientist-in-Training	94	94	0%
Limited Licence	33	29	-12%
<b>Total First Time Applying in Canada</b>	<b>2745</b>	<b>2630</b>	<b>-4%</b>
<b>National Mobility Transfers</b>			
Professional Engineer	994	938	-6%
Professional Geoscientist	43	45	5%
Engineer-in-Training	130	132	2%
Geoscientist-in-Training	11	10	-9%
Limited Licence	5	19	280%
<b>Total National Mobility Transfers</b>	<b>1183</b>	<b>1144</b>	<b>-3%</b>
<b>Other</b>			
Designated Structural Engineer	8	6	-25%
<b>Total New Applications</b>	<b>3936</b>	<b>3780</b>	<b>-4%</b>
Total New Applications Prior Year	3350	3936	
Application Growth over Prior Year	15%	-4%	
	<b>3 Year (FY14 to FY16 Application Growth)</b>	<b>13%</b>	

<sup>1</sup> Includes Non-Resident Licence Applicants and P.Eng. Bridge Applicants

\*does not include reinstatement/ return to practice and Life Member applications

## Applications cont'd

### First-Time in Canada<sup>1</sup> P.Eng. and P.Geo. Applicants

#### Canadian vs Internationally Trained

<sup>1</sup> First time making this type of application in Canada: Excludes transfers from other Provinces

Application Type	Total	Internationally Trained		Canadian Trained	
Professional Engineer <sup>2</sup>	1105	452	41%	653	59%
Professional Geoscientist	63	23	37%	40	63%

<sup>2</sup> Includes Non-Resident Licence Applicants

#### Top 5 Source Countries

##### Professional Engineer Applicants

Country	Applicants	Percentage of Total Applicants
Iran, Islamic Republic of	113	10
United States	99	9
India	71	7
China	62	6
Australia	32	3
United Kingdom	32	3

##### Professional Geoscientist Applicants

Country	Applicants	Percentage of Total Applicants
United States	7	11
Iran, Islamic Republic of	3	5
South Africa	3	5
United Kingdom	3	5
New Zealand	2	3
Russian Federation	2	3
Turkey	2	3

### New Registrants/Licensees – First Licence in Canada –Fiscal 2016

#### Canadian vs Internationally Trained

Licence <sup>1</sup> Type	Total	Internationally Trained		Canadian Trained	
Professional Engineer	778	326	42%	452	58%
Professional Geoscientist	62	20	32%	42	68%

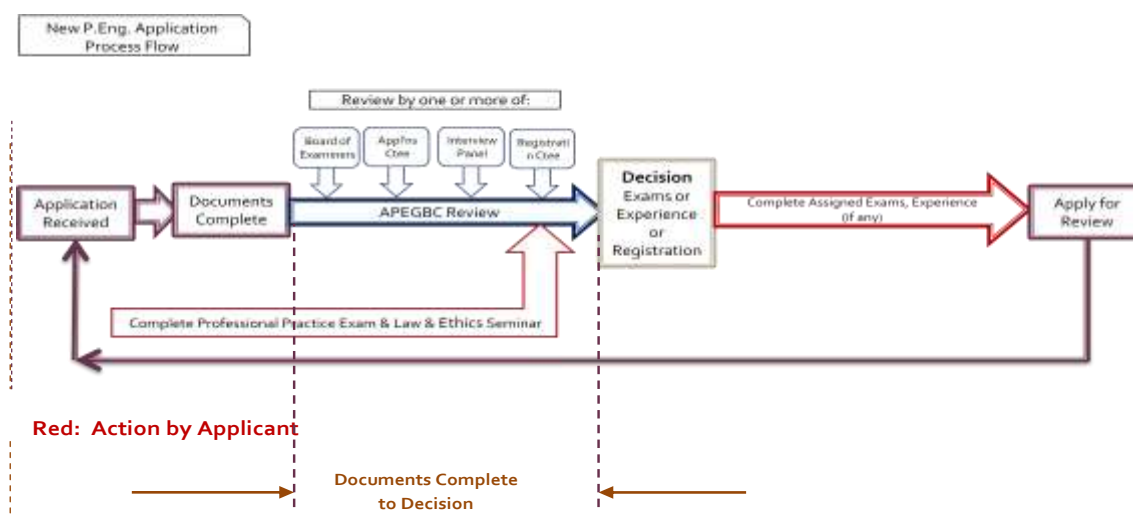
<sup>1</sup> Includes Non-Resident Licensees

## Processing Times: Documents Complete to a Decision

### Professional Engineer Applicants (first application in Canada)

The numbers below are estimates based on a limited data set, as the refinement of process tracking data in MRM is still under development. It is estimated that Council's decision targets were not met; largely due to an increase in the number of interviews resulting from the Calendar 2015 increase in for internationally trained applicants. The Registration Committee and Council have since developed and approved a modification to the Out of Discipline policies that allow and waiver of interviews for Low Risk applicants. During the coming year, staff and the Registration Committee will review other risk management policies currently in use to determine whether they can be modified to streamline additional parts of the process for lower-risk applicants.

	Calendar Days Elapsed at 85 <sup>th</sup> Percentile		Average Days Elapsed	
	Council Target FY 2016	Achieved (estimate)	Council Target FY2016	Achieved (estimate)
Canadian-Trained	80	92	50	46
Internationally- Trained	100	96	65	48
EIT to P.Eng.	80	85	50	42



## Membership

### Membership Growth June 2012 to June 2016

	12-Jun	13-Jun	14-Jun	15-Jun	16-Jun	2016 vs 2015	Average 5 year Growth
<b>Professional Members</b>							
Professional Engineer	20,381	21,007	21,750	22,532	23,266	3.3%	3.4%
Professional Geoscientist	1,526	1,603	1,663	1,706	1,753	2.8%	3.5%
Dual Registrant	79	79	85	87	91	4.6%	3.6%
Non-Resident Licence (PEng)	412	475	540	585	608	3.9%	10.3%
Non-Resident Licence (PGeo)	30	36	40	40	42	5.0%	9.0%
Provisional Member	12	6	7	5	3	-40.0%	-25.5%
<b>Members-in-Training</b>							
Engineer-in-Training	3,566	3,805	4,161	4,445	4,892	10.1%	8.2%
Geoscientist-in-Training	230	249	275	304	326	7.2%	9.1%
<b>Limited Licensees</b>							
Limited Licence (EngL)*	82	95	109	126	140	11.1%	14.3%
Limited Licence (GeoL)	5	5	7	9	9	0.0%	17.1%
<b>Total Membership</b>	<b>26,323</b>	<b>27,360</b>	<b>28,637</b>	<b>29,839</b>	<b>31,130</b>	<b>4.3%</b>	<b>4.3%</b>

\*Does not include 18 Professional Geoscientists who also hold an EngL

### Membership by Gender

	Fiscal 2015			Fiscal 2016		
<b>A. Practising and Non-Practising</b>	<b>Total Members</b>	<b>Female</b>	<b>%Female</b>	<b>Total Members</b>	<b>Female</b>	<b>%Female</b>
P.Eng. Registrants & Licensees	23243	2,195	9.4%	24,014	2,380	9.9%
P.Geo. Registrants & Licensees	1842	347	18.8%	1,895	366	19.3%
EIT & Provisional (Eng)	4450	871	19.6%	4,895	946	19.3%
GIT & Provisional (Geo)	304	127	41.8%	326	133	40.8%
<b>TOTAL</b>	<b>29,839</b>	<b>3,540</b>	<b>11.9%</b>	<b>31,130</b>	<b>3,825</b>	<b>12.3%</b>
<b>B. Practising and Active Only (not including Life Members)</b>	<b>Total Members</b>	<b>Female</b>	<b>%Female</b>	<b>Total Members</b>	<b>Female</b>	<b>%Female</b>
P.Eng. Registrants & Licensees	20488	2137	10.4%	21,128	2,315	11.0%
P.Geo. Registrants & Licensees	1750	330	18.9%	1,821	359	19.7%
EIT & Provisional (Eng)	4450	864	19.4%	4,892	945	19.3%
GIT & Provisional (Geo)	304	127	41.8%	326	133	40.8%
<b>TOTAL</b>	<b>26,992</b>	<b>3,458</b>	<b>12.8%</b>	<b>28,167</b>	<b>3,752</b>	<b>13.3%</b>

## Membership cont'd

### Membership by Degree Origin

	Total at June 30 2016	Canadian Bachelors	% Cdn	Non-Canadian Bachelors	% Int'l
<b>Professional Membership</b>					
Professional Engineer	23266	16,683	71.7%	6,583	28.3%
Professional Geoscientist	1753	1,385	79.0%	368	21.0%
Dual Registrant	91	74	81.3%	17	18.7%
Non-Resident Licence (PEng)	608	4	0.7%	604	1400.0%
Non-Resident Licence (PGeo)	42	0	0.0%	42	100.0%
Provisional Member	3	0	0.0%	3	100.0%
<b>Members-in-Training</b>					
Engineer-in-Training	4892	4,100	83.8%	792	16.2%
Geoscientist-in-Training	326	309	94.8%	17	5.2%
<b>Licensees</b>					
Limited Licence (EngL)*	140	126	90.0%	14	10.0%
Limited Licence (GeoL)	9	6	66.7%	3	33.3%
<b>Total Membership</b>	<b>31,130</b>	<b>22,687</b>	<b>72.9%</b>	<b>8,443</b>	<b>27.1%</b>



**MEMORANDUM OF AGREEMENT**  
**BETWEEN**  
**THE ASSOCIATION OF PROFESSIONAL ENGINEERS AND GEOSCIENTISTS OF THE**  
**PROVINCE OF BRITISH COLUMBIA**  
**AND**  
**THE SOCIETY OF INTERNATIONALLY TRAINED ENGINEERS OF BRITISH COLUMBIA**

**WHEREAS**

The Association of Professional Engineers and Geoscientists of the Province of British Columbia (APEGBC) and the Society of Internationally Trained Engineers of British Columbia (SITE BC) have common goals regarding:

- the establishment and expansion of relationships with professional communities;
- the facilitation and promotion of professional development and networking opportunities for their members;
- the promotion of the skills, knowledge and talent of their mutual members;
- the provision of information and guidance to internationally trained engineers to promote their integration into the profession of engineering in British Columbia;

**THEREFORE**

APEGBC'S Council has agreed to permit the use of the word 'engineer' in the SITE BC's name, on the following conditions:

SITE BC will:

- A. ensure that its members trained in engineering:
  1. are registered with APEGBC (PEng, EIT, Provisional Member); or
  2. possess a bachelor's degree or higher in an engineering discipline and have a minimum of four years of experience;
- B. ensure that its members trained in engineering have signed an undertaking acknowledging that:
  1. they understand and agree to abide by the Prohibition on Practice legislation and all other provisions in the Engineers and Geoscientists Act; and
  2. if they are not a member of APEGBC, they will apply for membership with APEGBC as soon as they are employed in a supervised engineering capacity;
- C. provide, in a prominent place on its website, appropriate disclaimers and explanations as to its role versus that of APEGBC, with Prohibition on Practice information displayed, and appropriate links to the APEGBC's website; and
- D. recognize the legislated mandate of APEGBC; and will not represent itself nor permit its members to represent it in any way that can lead the public to assume that all of SITE BC's members are Professional Engineers or members of APEGBC, or that SITE BC in any way is responsible for the qualification, certification or regulation of engineers in British Columbia

This Memorandum of Agreement represents a commitment by APEGBC and SITE BC to work in good faith to support each other's goals and mandates.

This Memorandum of Agreement will be reviewed every five years by the Association and SITE BC and may be terminated by either party at any time.

SIGNED this 9<sup>th</sup> day of September, 2016

on behalf of APEGBC by:

on behalf of SITE BC by:

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Michael Wrinch, P.Eng., PhD, FEC, FGC(Hon)  
President, APEGBC

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Fernando Borja, P.Eng., MBA  
President, SITE BC

## Branding Initiative – Implementation Timeline and Resource Information

*(Timing assumes September 2016 approval)*

Details	Budget/Resource Required	Date
<b>Website:</b> Web domain secured with approved name. Backend work, planning, and updates to reflect new branding and launch in June 2017.	Within existing FY16/17 budget/resource allocation. (Reserved domain names <\$300, website reskin undertaken in-house).	July 2016-June 2017
<b>Stationary:</b> Limited amounts with current branding ordered. Intended to last until end of June 2017 to minimize waste.	Within existing FY16/17 budget/resource allocation. Minimal additional cost for initial set up of new artwork (<1k).	July 2016 – July 2017
<b>Promotional items:</b> Limited amounts with current branding for promotional items ordered. Intended to last until June 2017. Old branded items will be used until stock has been depleted. Items branded with new creative will be distributed after branch launch.	Within existing FY16/17 budget/resource allocation. (~\$20-\$25k)	July 2016 – July 2017
<b>Business name change:</b> Start process to initiate business name change and trademark.	Within existing FY16/17 budget/resource allocation (~5k).	September 2016
<b>Marketing collateral:</b> Create or update brochures, print materials, Graphic Standards Manual	Within existing FY16/17 budget/resource allocation. Addressed through regular annual renewal of collateral. (~\$20k)	September 2016 – June 2017
<b>Communications vehicles:</b> Create or update templates for key print and web-based communications products, e.g., website, newsletter, email. Publications or communications planned for distribution after June brand launch to be updated with new brand going forward.	Within existing FY16/17 budget/resource allocation. Minimal additional cost for initial set up of new artwork (<1k), some to be completed in-house.	September 2016 – June 2017
<b>Branded Hardware:</b> Banners, booth, building signage	Banners and booth renewed within existing FY16/17 budget/resource allocation (~\$12k), others to be renewed. Outdoor building signage	April 2017 - June 2017 July 2017

	(~\$25k – capital budget).	
<p><b>Launch brand:</b> Launch video, email, social media communications. Articles in enews and innovation, updated member induction ceremony.</p> <p>Launch to members at conference, video and booth to showcase the process.</p>	<p>Within existing FY16/17 budget/resource allocation. Uses existing communications vehicles, and video to be done in conjunction with strategic plan launch. (~\$6k)</p>	<p>June 2017</p> <p>October 2017</p>
<p><b>Photography:</b> Create an image bank of photography for marketing and communications materials.</p>	<p>Stock photography within existing FY16/17 budget/resource allocation (\$3-5k). Ongoing.</p>	<p>September 2016 – May/June 2017</p>
<p><b>Brand Identity promotional campaign:</b></p> <p><b>Option 1 – Status Quo</b> New brand identity, brand conviction ideas and visuals promote the organization and the professions through existing communications vehicles.</p> <p><b>Option 2 - Member Focused campaign</b> New brand identity, brand conviction ideas and visuals promote the organization and the professions through small scale advertising, and mobilizing members as brand ambassadors.</p> <p><b>Option 3 – Member + Public focused campaign</b> New brand identity, brand conviction ideas and visuals promote the organization and the professions using members as brand ambassadors and targeting key stakeholder groups.</p> <p><b>Option 4 – Extended Member + Public Campaign</b> New brand identity, brand conviction ideas and visuals promote the organization and the professions through a wide-reaching provincial media campaign.</p>	<p>To be proposed as a 2017-2020 Budget initiative.</p> <p><b>Option 1 – Status Quo</b> Within existing resources. No external advertising, social media, promoted through current annual initiatives (NEGM, conference) and earned media. (~\$20k)</p> <p><b>Option 2 – Limited Member Focused campaign</b> Targeted print ads across BC (major and local newspapers), digital ads (~\$75k)</p> <p><b>Option 3 – Member + Public focused campaign</b> Print ads across BC, digital ads, university indoor ads (poster and large format), Transit station ads, 1-2 min. online video (~\$150k)</p> <p><b>Option 4 – Extended Member + Public Campaign</b> Print ads across BC (major and local newspapers), 4 x billboards, transit station ads, Bus wraps, TV Ads – 13 week cycle (~\$600k)</p>	<p>July 2017-June 2018</p>



# ■ Policy and Procedure for Registration Hearings: Registrar Version

## PURPOSE

This policy and procedure was created to:

- Facilitate consistent and fair conduct of oral registration hearings to determine whether or not an applicant whose character or repute is in question is suitable for registration with the Association of Professional Engineers and Geoscientists of British Columbia (“APEGBC”); and
- Assist in the fair, just, and timely resolution of oral registration hearings (“registration hearings”).

## CREATED

BY:

Date:

Reference:

## POLICY

This policy and procedure is intended to apply to all oral registration hearings unless the Registrar orders that all or a portion of this policy and procedure shall be waived or varied in a particular case.

### Legal Representation

1. Parties to a registration hearing are APEGBC and an applicant for registration or licensure (an “applicant”). Any party may be represented by legal counsel at a pre-hearing conference and at a registration hearing.
2. The Registrar may retain independent legal counsel to obtain legal advice.
3. If an applicant is represented by legal counsel, the applicant shall provide APEGBC with written notice of the name and contact information of the legal counsel, via postal service or email. Upon receiving the name and contact information of the applicant’s legal counsel, any information that APEGBC is required to send to the applicant will be sent to the applicant’s legal counsel and will be considered as if it were sent to the applicant.
4. If an applicant’s legal counsel withdraws as the applicant’s legal counsel, the withdrawing counsel must provide written notice to APEGBC without delay.

### Disclosure

5. APEGBC shall provide the following to the applicant at least fifteen (15) days prior

to the beginning of the pre-hearing conference:

- a. A copy of every document that APEGBC intends to use as evidence;
  - b. A copy of any statement made by a person whom APEGBC intends to call as a witness;
  - c. A summary of any other relevant evidence in APEGBC's possession whether or not counsel intends to introduce that evidence at the registration hearing.
6. After initial disclosure has been made, it is incumbent upon APEGBC to provide timely disclosure of information subsequently obtained and information previously considered irrelevant, but whose relevance has subsequently become apparent.

### **Pre-hearing Conference**

7. A pre-hearing conference may be held, by notice, at the direction of the Registrar. The parties may request, in writing to the Registrar, that a pre-hearing conference be held.
8. If a pre-hearing conference is to be held, the Registrar shall, in consultation with the parties, schedule a date for the pre-hearing conference and shall notify the parties of the date, time and location of the pre-hearing conference.
9. The Registrar shall conduct the pre-hearing conference. A pre-hearing conference may be held in-person or by telephone conference.
10. The purpose of a pre-hearing conference is to:
  - a. Identify and simplify the issues;
  - b. Determine facts or evidence that are admitted or agreed upon;
  - c. Hear motions brought by either party;
  - d. Decide issues relating to disclosure and the exchange of information, including requiring and imposing time limitations and terms and conditions on the production and exchange of documents, admissions, agreed statements of facts, and written submissions;
  - e. Setting the order of and placing time limitations or other restrictions on any part of the inquiry including presentation of evidence, the examination or cross-examination of witnesses, or presentations of opening and closing submissions;
  - f. Setting the dates by which any steps in the proceeding are to be initiated or concluded;
  - g. Determining the estimated duration of the hearing; and

- h. Resolving any other matter that may assist in the just and expeditious disposition of the proceeding, including steps to ensure that the best interests of witnesses are protected.
- 11. The contents of the pre-hearing conference are not admissible as evidence in a registration hearing.

### **Motions**

- 12. A motion is an application to the Registrar for an interlocutory order in a particular proceeding.
- 13. A party who intends to bring a motion to be heard other than at a scheduled pre-hearing conference shall obtain available dates and times for the hearing of the motion from the Registrar.
- 14. A motion shall:
  - a. Be made in writing;
  - b. Set out the grounds for the motion;
  - c. Set out the relief requested; and
  - d. Be accompanied by any evidence to be relied upon.
- 15. The moving party shall deliver the motion and accompanying evidence to the Registrar and the other party at least ten (10) business days prior to the date set for the hearing of the motion.
- 16. The other party may prepare a reply to the motion in writing that shall be accompanied by any evidence to be relied upon.
- 17. The other party shall deliver the reply to the motion and accompanying evidence to the Registrar and the moving party at least (3) business days prior to the date set for the hearing of the motion.
- 18. Motions shall be heard in-person or by telephone conference at the discretion of the Registrar.

### **Adjournments**

- 19. A party to a registration hearing may apply to the Registrar for an adjournment.
- 20. An application for adjournment must state why the request is reasonable and why the request will not unduly prejudice the other party. A copy of the application for adjournment must be provided to the other party who may reply to the application for adjournment.
- 21. In considering a request for an adjournment, the Registrar may consider one or

more of the following:

- a. The reason for the adjournment;
- b. Whether the adjournment would cause an unreasonable delay;
- c. The impact of refusing the adjournment on the parties;
- d. The impact of granting the adjournment on the parties;
- e. The impact of the adjournment on the public interest.

22. Following an application for an adjournment, the Registrar may grant an adjournment, grant an adjournment with conditions, or refuse to grant an adjournment.

### **Conduct of a Registration Hearing**

23. Registration hearings are to be conducted by the Registrar.

24. If a registration hearing is not scheduled at the pre-hearing conference, the Registrar shall, in consultation with the parties, schedule a date for the registration hearing and shall notify the parties of the date, time and location of the registration hearing.

25. All registration hearings shall be open to the public, unless, in the opinion of the Registrar, it would be appropriate to hold some or all of a particular hearing in private.

26. A court reporter shall keep a record of a registration hearing.

27. At a registration hearing, both APEGBC and the applicant may:

- a. Present evidence;
- b. Reply to evidence;
- c. Call witnesses;
- d. Cross-examine the opposing party's witnesses;
- e. Re-examine witnesses;
- f. Make submissions; and
- g. Reply to the opposing party's submissions.

28. For a registration hearing conducted under s. 13(2)(a) of the *Engineers and Geoscientists Act* ("Act"):

- a. The onus is on APEGBC to establish, on a balance of probabilities, that the applicant has been convicted of an offence in Canada or elsewhere

that, if committed in British Columbia, would be an offence under an enactment of the Province of British Columbia or of Canada.

- b. If APEGBC is able to establish that the applicant has been convicted of an offence, the onus shifts to the applicant to establish, on a balance of probabilities, that he or she is of good character and good repute such that he or she meets the requirement under s. 13(1.1)(d) of the *Act* and is suitable for registration.

29. For a registration hearing conducted under s. 13(1.1)(d) of the *Act*, the onus is on the applicant to establish, on a balance of probabilities that he or she is of good character and good repute such that he or she meets the requirement under s. 13(1.1)(d) of the *Act* and is suitable for registration.

30. Nothing is admissible in evidence at a proceeding:

- a. That would be inadmissible in a court by reason of any privilege under the law of evidence; or
- b. That is inadmissible by any statute.

31. The Registrar may place reasonable limits on the length of oral submissions.

32. Any new evidence contained in closing submissions will not be accepted.

33. If a party does not attend a registration hearing, the hearing may proceed and a decision may be rendered in the absence of the party.

### **Witnesses**

34. Parties are responsible for arranging the attendance of their own witnesses.

35. Any witnesses testifying at a registration hearing shall give an oath or solemn affirmation before testifying, if competent to do so.

36. The Registrar may ask questions of any witnesses.

37. Witnesses shall not see or hear the testimony of other witnesses during the hearing, unless the witness is also a party to the hearing.

### **Decisions**

38. The Registrar shall give written reasons for his or her decision. In his or her written reasons, the Registrar must not disclose information that is subject to solicitor-client privilege or that is confidential.

## PROCEDURE

The standard procedure for a registration hearing shall be:

1. The Registrar will call the registration hearing to order and identify the panel members conducting the registration hearing and the official recorder appointed to record the proceedings.
2. The Registrar states that the hearing is being conducted under the *Engineers and Geoscientists Act* and that the purpose of the hearing is to determine the applicant's suitability for registration or licensing with APEGBC. The Registrar should clarify that the scope of the hearing will only cover issues related to the applicant's character and repute.
3. The Registrar will ask the parties in attendance to introduce themselves and identify themselves for the record.
4. The Registrar asks counsel for each party if they are ready to proceed.
  - a. If an applicant is not represented by counsel, the Registrar shall advise the applicant that they may be represented by a legal counsel and ask the applicant if he or she wishes to seek an adjournment in order to retain counsel.
  - b. If an unrepresented applicant does not wish to be represented, the hearing should proceed.
5. If the hearing is proceeding pursuant to s. 13(2)(a) of the *Act*, the Registrar will ask the applicant if he or she admits to the conviction.
  - a. If the applicant admits to the conviction, proceed to instruction 14;
  - b. If the applicant does not admit to the conviction, proceed to instruction 7.
6. If the hearing is proceeding pursuant to s. 13(1.1)(d) of the *Act*, proceed to instruction 14.
7. The Registrar will ask the parties for their opening statements, in the following order:
  - a. Counsel for APEGBC;
  - b. The applicant or his or her counsel, unless he or she chooses to wait until the opening of their own case to make an opening statement.
8. Following opening statements, the Registrar will ask Counsel for APEGBC to present evidence on whether the applicant has been convicted of an offence in Canada or elsewhere.

- a. Counsel for APEGBC may call witnesses and examine them.
  - b. Following examination of each witness by counsel for APEGBC, the applicant or the applicant's counsel may cross-examine each witness.
  - c. Following the cross-examination of each witness, counsel for APEGBC is given the opportunity to re-examine each witness.
  - d. Following cross-examination, or re-examination (if applicable), of a witness, the Registrar may ask questions of the witness. If members choose to ask questions, counsel for each party may ask further questions of the witnesses. Counsel for APEGBC shall be permitted to ask his or her questions last.
9. Once counsel for APEGBC is finished presenting evidence, the applicant or the applicant's counsel may:
  - a. Give his or her opening statements, if he or she elected not to do so earlier; or
  - b. Present evidence relevant to the issue of proof of the conviction, if the applicant or the applicant's counsel has already given opening statements.
    - i. The applicant or the applicant's counsel may call witnesses and examine them. The applicant may testify as a witness.
    - ii. Following examination of each witness by the applicant or the applicant's counsel, counsel for APEGBC may cross-examine each witness, including the applicant if he or she testifies).
    - iii. Following the cross-examination of each witness, the applicant or the applicant's counsel is given the opportunity to re-examine each witness.
    - iv. Following cross-examination, or re-examination (if applicable), of a witness, the Registrar may ask questions of the witness. If members choose to ask questions, counsel for each party may ask further questions of the witnesses. The applicant or the applicant's counsel shall be permitted to ask his or her questions last.
10. After the applicant or the applicant's counsel has finished presenting his or her evidence, counsel for APEGBC may make submissions.
11. After counsel for APEGBC has made submissions, the applicant or the applicant's counsel may make submissions.
12. Following the applicant's submissions, counsel for APEGBC may make submissions in reply to the submissions of the applicant.
13. The Registrar should adjourn the registration hearing so that he or she may consider the evidence with respect to the conviction and that he or she will provide the parties with the decision when it has been reached.

14. If:

- a. The applicant admits to a conviction;
- b. The Registrar determines the applicant has been convicted of an offence in Canada or elsewhere that, if committed in British Columbia, would be an offence under an enactment of the Province of British Columbia or of Canada; or
- c. The hearing is being conducted pursuant to s. 13(1.1)(d);

The applicant shall have the opportunity to present evidence, reply to evidence, and make submissions on whether the applicant is of good character and repute.

15. The Registrar will ask the parties for their opening statements in the following order:

- a. The applicant or the applicant's counsel;
- b. Counsel for APEGBC, unless he or she chooses to wait until the opening of APEGBC's case to make an opening statement.

16. Following opening statements, the Registrar will ask the applicant or the applicant's counsel to present evidence on whether:

- a. The circumstances of the offence render the applicant unsuitable for registration or licensing; and
- b. The applicant is of good character and repute.

17. The applicant or the applicant's counsel may call witnesses and examine them. The applicant may testify as a witness.

18. Following examination of each witness by the applicant or his or her counsel, counsel for APEGBC may cross-examine each witness, including the applicant if he or she testifies.

19. Following the cross-examination of each witness, the applicant or the applicant's counsel may re-examine each witness.

20. Following cross-examination, or re-examination (if applicable), of a witness, the Registrar may ask questions of the witness. If members choose to ask questions, counsel for each party may ask further questions of the witnesses. The applicant or the applicant's counsel shall be permitted to ask his or her questions last.

21. Once the applicant or the applicant's counsel is finished presenting evidence, counsel for APEGBC may:

- a. Give his or her opening statements, if he or she elected not to do so earlier; or
- b. Present evidence relevant to the circumstances of the offence and the



applicant's character, if he or she has already given opening statements.

22. Counsel for APEGBC may call witnesses and examine them.
23. Following examination of each witness by Counsel for APEGBC, the applicant or the applicant's counsel may cross-examine each witness.
24. Following the cross-examination of each witness, Counsel for APEGBC may re-examine each witness.
25. Following cross-examination, or re-examination (if applicable), of a witness, the Registrar may ask questions of the witness. If members choose to ask questions, counsel for each party may ask further questions of the witnesses. Counsel for APEGBC shall be permitted to ask his or her questions last.
26. After counsel for APEGBC has finished presenting his or her evidence, the applicant or the applicant's counsel may make closing submissions.
27. After the applicant or the applicant's counsel has made closing submissions, counsel for APEGBC may make submissions.
28. Following the applicant's submissions, counsel for APEGBC may make submissions in reply to the submissions of the applicant.
29. The Registrar should adjourn the registration hearing so that he or she may consider the evidence with respect to the circumstances of the conviction and the character of the applicant. The Registrar should inform the parties that he or she will provide the parties with the decision when one has been reached.

## CROSS REFERENCES

*Engineers and Geoscientists Act* s.13 Admission to Membership

*Bylaws of the Association*, Bylaw 6(b) Proceedings of Council

*Bylaws of the Association*, Bylaw 11(e) Registered Members

#52012—Procedure for Council Hearing Regarding Suitability for Registration Following Revocation of Membership

APEGBC Proposed Disciplinary Hearing Rules

*Law Society Rules 2015* Part 5—Hearings and Appeals

Guide for Registration Hearings at Professional Engineers Ontario

# Registration

## ● Policy

## ● Procedure

### ■ Policy and Procedure for Registration Hearings: **Council Version**

#### PURPOSE

This policy and procedure was created to:

- Facilitate consistent and fair conduct of oral registration hearings to determine whether or not an applicant whose character or repute is in question is suitable for registration with the Association of Professional Engineers and Geoscientists of British Columbia (“APEGBC”); and
- Assist in the fair, just, and timely resolution of oral registration hearings (“registration hearings”).

#### CREATED

BY:

Date:

Reference:

#### POLICY

This policy and procedure is intended apply to all oral registration hearings unless the Council President (the “President”) orders that all or a portion of this policy and procedure shall be waived or varied in a particular case.

#### Legal Representation

1. Parties to a registration hearing are APEGBC and an applicant for registration or licensure (“applicant”). Any party may be represented by legal counsel at a pre-hearing conference and at a registration hearing.
2. Council may retain independent legal counsel to obtain legal advice.
3. If an applicant is represented by legal counsel, the applicant shall provide APEGBC with written notice of the name and contact information of the legal counsel, via postal service or email. Upon receiving the name and contact information of the applicant’s legal counsel, any information that APEGBC is required to send to the applicant will be sent to the applicant’s legal counsel and will be considered as if it were sent to the applicant.
4. If an applicant’s legal counsel withdraws as the applicant’s legal counsel, the withdrawing counsel must provide written notice to APEGBC without delay.

#### Disclosure

5. APEGBC shall provide the following to the applicant at least fifteen (15) days prior to the beginning of the pre-hearing conference:

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- a. A copy of every document that APEGBC intends to use as evidence;
  - b. A copy of any statement made by a person whom APEGBC intends to call as a witness;
  - c. A summary of any other relevant evidence in APEGBC's possession whether or not counsel intends to introduce that evidence at the registration hearing.
6. After initial disclosure has been made, it is incumbent upon APEGBC to provide timely disclosure of information subsequently obtained and information previously considered irrelevant, but whose relevance has subsequently become apparent.

### **Pre-hearing Conference**

7. A pre-hearing conference may be held, by notice, at the direction of the President. The parties may request, in writing to the President, that a pre-hearing conference be held.
8. If a pre-hearing conference is to be held, the President shall, in consultation with the parties, schedule a date for the pre-hearing conference and shall notify the parties of the date, time and location of the pre-hearing conference.
9. The President shall appoint one (1) member of Council to conduct the pre-hearing conference. A pre-hearing conference may be held in-person or by telephone conference.
10. The purpose of a pre-hearing conference is to:
  - a. Identify and simplify the issues;
  - b. Determine facts or evidence that are admitted or agreed upon;
  - c. Hear motions brought by either party;
  - d. Decide issues relating to disclosure and the exchange of information, including requiring and imposing time limitations and terms and conditions on the production and exchange of documents, admissions, agreed statements of facts, and written submissions;
  - e. Setting the order of and placing time limitations or other restrictions on any part of the inquiry including presentation of evidence, the examination or cross-examination of witnesses, or presentations of opening and closing submissions;
  - f. Setting the dates by which any steps in the proceeding are to be initiated

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or concluded;

- g. Determining the estimated duration of the hearing; and
- h. Resolving any other matter that may assist in the just and expeditious disposition of the proceeding, including steps to ensure that the best interests of witnesses are protected.

11. The contents of the pre-hearing conference are not admissible as evidence in a registration hearing.

### **Composition of Council**

- 12. Registration hearings are to be conducted by Council. A quorum of Council, as defined by Bylaw 6(b) of the Bylaws of the Association, is required to be present to conduct a hearing.
- 13. The President shall direct the hearing.
- 14. Any member of Council that conducted a pre-hearing conference for an applicant shall not participate in the decision of that same applicant's registration hearing.
- 15. Any member of Council that participated in the decision to refer the applicant to Council for a registration hearing shall not participate in the decision of that same applicant's registration hearing.
- 16. If a registration hearing is not scheduled at the pre-hearing conference, the President shall, in consultation with the parties, schedule a date for the registration hearing and shall notify the parties of the date, time and location of the registration hearing.

### **Motions**

- 17. A motion is an application to the President for an interlocutory order in a particular proceeding.
- 18. A party who intends to bring a motion to be heard other than at a scheduled pre-hearing conference shall obtain available dates and times for the hearing of the motion from the President.
- 19. A motion shall:
  - a. Be made in writing;
  - b. Set out the grounds for the motion;
  - c. Set out the relief requested; and

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- d. Be accompanied by any evidence to be relied upon.
- 20. The moving party shall deliver the motion and accompanying evidence to the President and the other party at least ten (10) business days prior to the date set for the hearing of the motion.
- 21. The other party may prepare a reply to the motion in writing that shall be accompanied by any evidence to be relied upon.
- 22. The other party shall deliver the reply to the motion and accompanying evidence to the President and the moving party at least (3) business days prior to the date set for the hearing of the motion.
- 23. Motions shall be heard in-person or by telephone conference at the discretion of the President.

### **Adjournments**

- 24. A party to a registration hearing may apply to the President for an adjournment.
- 25. An application for adjournment must state why the request is reasonable and why the request will not unduly prejudice the other party. A copy of the application for adjournment must be provided to the other party who may reply to the application for adjournment.
- 26. In considering a request for an adjournment, the President may consider one or more of the following:
  - a. The reason for the adjournment;
  - b. Whether the adjournment would cause an unreasonable delay;
  - c. The impact of refusing the adjournment on the parties;
  - d. The impact of granting the adjournment on the parties;
  - e. The impact of the adjournment on the public interest.
- 27. Following an application for an adjournment, the President may grant an adjournment, grant an adjournment with conditions, or refuse to grant an adjournment.

### **Conduct of a Registration Hearing**

- 28. All registration hearings shall be open to the public, unless, in the opinion of the President, it would be appropriate to hold some of all of a particular hearing in private.

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29. A court reporter shall keep a record of a registration hearing.

30. At a registration hearing, both APEGBC and the applicant may:

- a. Present evidence;
- b. Reply to evidence;
- c. Call witnesses;
- d. Cross-examine the opposing party's witnesses;
- e. Re-examine witnesses;
- f. Make submissions; and
- g. Reply to the opposing party's submissions.

31. For a registration hearing conducted under s. 13(2)(a) of the *Engineers and Geoscientists Act* ("Act"):

- a. The onus is on APEGBC to establish, on a balance of probabilities, that the applicant has been convicted of an offence in Canada or elsewhere that, if committed in British Columbia, would be an offence under an enactment of the Province of British Columbia or of Canada.
- b. If APEGBC is able to establish that the applicant has been convicted of an offence, the onus shifts to the applicant to establish, on a balance of probabilities, that he or she is of good character and good repute such that he or she meets the requirement under s. 13(1.1)(d) of the *Act* and is suitable for registration.

32. For a registration hearing conducted under s. 13(1.1)(d) of the *Act*, the onus is on the applicant to establish, on a balance of probabilities that he or she is of good character and good repute such that he or she meets the requirement under s. 13(1.1)(d) of the *Act* and is suitable for registration.

33. Nothing is admissible in evidence at a proceeding:

- a. That would be inadmissible in a court by reason of any privilege under the law of evidence; or
- b. That is inadmissible by any statute.

34. Council may place reasonable limits on the length of oral submissions.

35. Any new evidence contained in closing submissions will not be accepted.

36. If a party does not attend a registration hearing, the hearing may proceed and a

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decision may be rendered in the absence of the party.

### **Witnesses**

37. Parties are responsible for arranging the attendance of their own witnesses.
38. Any witnesses testifying at a registration hearing shall give an oath or solemn affirmation before testifying, if competent to do so.
39. Members of Council may ask questions of any witnesses.
40. Witnesses shall not see or hear the testimony of other witnesses during the hearing, unless the witness is also a party to the hearing.

### **Decisions of Council**

41. Decisions of Council are made by a majority vote.
42. Council shall give written reasons for its decision. In its written reasons, Council must not disclose information that is subject to solicitor-client privilege or that is confidential.

## PROCEDURE

The standard procedure for a registration hearing shall be:

1. The President will call the registration hearing to order and identify the panel members conducting the registration hearing and the official recorder appointed to record the proceedings.
2. The President states that the hearing is being conducted under the *Engineers and Geoscientists Act* and that the purpose of the hearing is to determine the applicant's suitability for registration or licensing with APEGBC. The President should clarify that the scope of the hearing will only cover issues related to the applicant's character and repute.
3. The President will ask the parties in attendance to introduce themselves and identify themselves for the record.
4. The President asks counsel for each party if they are ready to proceed.
  - a. If an applicant is not represented by counsel, the President shall advise the applicant that they may be represented by a legal counsel and ask the applicant if he or she wishes to seek an adjournment in order to retain counsel.

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- b. If an unrepresented applicant does not wish to be represented, the hearing should proceed.
5. If the hearing is proceeding pursuant to s. 13(2)(a) of the *Act*, the President will ask the applicant if he or she admits to the conviction.
  - a. If the applicant admits to the conviction, proceed to instruction 14;
  - b. If the applicant does not admit to the conviction, proceed to instruction 7.
6. If the hearing is proceeding pursuant to s. 13(1.1)(d) of the *Act*, proceed to instruction 14.
7. The President will ask the parties for their opening statements, in the following order:
  - a. Counsel for APEGBC;
  - b. The applicant or his or her counsel, unless he or she chooses to wait until the opening of their own case to make an opening statement.
8. Following opening statements, the President will ask Counsel for APEGBC to present evidence on whether the applicant has been convicted of an offence in Canada or elsewhere.
  - a. Counsel for APEGBC may call witnesses and examine them.
  - b. Following examination of each witness by counsel for APEGBC, the applicant or the applicant's counsel may cross-examine each witness.
  - c. Following the cross-examination of each witness, counsel for APEGBC is given the opportunity to re-examine each witness.
  - d. Following cross-examination, or re-examination (if applicable), of a witness, members of Council may ask questions of the witness. If members choose to ask questions, counsel for each party may ask further questions of the witnesses. Counsel for APEGBC shall be permitted to ask his or her questions last.
9. Once counsel for APEGBC is finished presenting evidence, the applicant or the applicant's counsel may:
  - a. Give his or her opening statements, if he or she elected not to do so earlier; or
  - b. Present evidence relevant to the issue of proof of the conviction, if the applicant or the applicant's counsel has already given opening statements.
    - i. The applicant or the applicant's counsel may call witnesses and



examine them. The applicant may testify as a witness.

- ii. Following examination of each witness by the applicant or the applicant's counsel, counsel for APEGBC may cross-examine each witness, including the applicant if he or she testifies).
  - iii. Following the cross-examination of each witness, the applicant or the applicant's counsel is given the opportunity to re-examine each witness.
  - iv. Following cross-examination, or re-examination (if applicable), of a witness, members of Council may ask questions of the witness. If members choose to ask questions, counsel for each party may ask further questions of the witnesses. The applicant or the applicant's counsel shall be permitted to ask his or her questions last.
10. After the applicant or the applicant's counsel has finished presenting his or her evidence, counsel for APEGBC may make submissions.
11. After counsel for APEGBC has made submissions, the applicant or the applicant's counsel may make submissions.
12. Following the applicant's submissions, counsel for APEGBC may make submissions in reply to the submissions of the applicant.
13. The President should adjourn the registration hearing so that Council may consider the evidence with respect to the conviction and that Council will provide APEGBC and the applicant with the decision when it has been reached.
14. If:
  - a. The applicant admits to a conviction;
  - b. Council determines the applicant has been convicted of an offence in Canada or elsewhere that, if committed in British Columbia, would be an offence under an enactment of the Province of British Columbia or of Canada; or
  - c. The hearing is being conducted pursuant to s. 13(1.1)(d);The applicant shall have the opportunity to present evidence, reply to evidence, and make submissions on whether the applicant is of good character and repute.
15. The President will ask the parties for their opening statements in the following order:
  - a. The applicant or the applicant's counsel;
  - b. Counsel for APEGBC, unless he or she chooses to wait until the opening of

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APEGBC's case to make an opening statement.

16. Following opening statements, the President will ask the applicant or the applicant's counsel to present evidence on whether:
  - a. The circumstances of the offence render the applicant unsuitable for registration or licensing; and
  - b. The applicant is of good character and repute.
17. The applicant or the applicant's counsel may call witnesses and examine them. The applicant may testify as a witness.
18. Following examination of each witness by the applicant or his or her counsel, counsel for APEGBC may cross-examine each witness, including the applicant if he or she testifies.
19. Following the cross-examination of each witness, the applicant or the applicant's counsel may re-examine each witness.
20. Following cross-examination, or re-examination (if applicable), of a witness, members of Council may ask questions of the witness. If members choose to ask questions, counsel for each party may ask further questions of the witnesses. The applicant or the applicant's counsel shall be permitted to ask his or her questions last.
21. Once the applicant or the applicant's counsel is finished presenting evidence, counsel for APEGBC may:
  - a. Give his or her opening statements, if he or she elected not to do so earlier; or
  - b. Present evidence relevant to the circumstances of the offence and the applicant's character, if he or she has already given opening statements.
22. Counsel for APEGBC may call witnesses and examine them.
23. Following examination of each witness by Counsel for APEGBC, the applicant or the applicant's counsel may cross-examine each witness.
24. Following the cross-examination of each witness, Counsel for APEGBC may re-examine each witness.
25. Following cross-examination, or re-examination (if applicable), of a witness, members of Council may ask questions of the witness. If members choose to ask questions, counsel for each party may ask further questions of the witnesses. Counsel for APEGBC shall be permitted to ask his or her questions last.
26. After counsel for APEGBC has finished presenting his or her evidence, the applicant

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or the applicant's counsel may make closing submissions.

27. After the applicant or the applicant's counsel has made closing submissions, counsel for APEGBC may make submissions.
28. Following the applicant's submissions, counsel for APEGBC may make submissions in reply to the submissions of the applicant.
29. The President should adjourn the registration hearing so that Council may consider the evidence with respect to the circumstances of the conviction and the character of the applicant. The President should inform the parties that Council will provide APEGBC and the applicant with the decision when one has been reached.

### CROSS REFERENCES

*Engineers and Geoscientists Act* s.13 Admission to Membership

*Bylaws of the Association*, Bylaw 6(b) Proceedings of Council

*Bylaws of the Association*, Bylaw 11(e) Registered Members

#52012—Procedure for Council Hearing Regarding Suitability for Registration Following Revocation of Membership

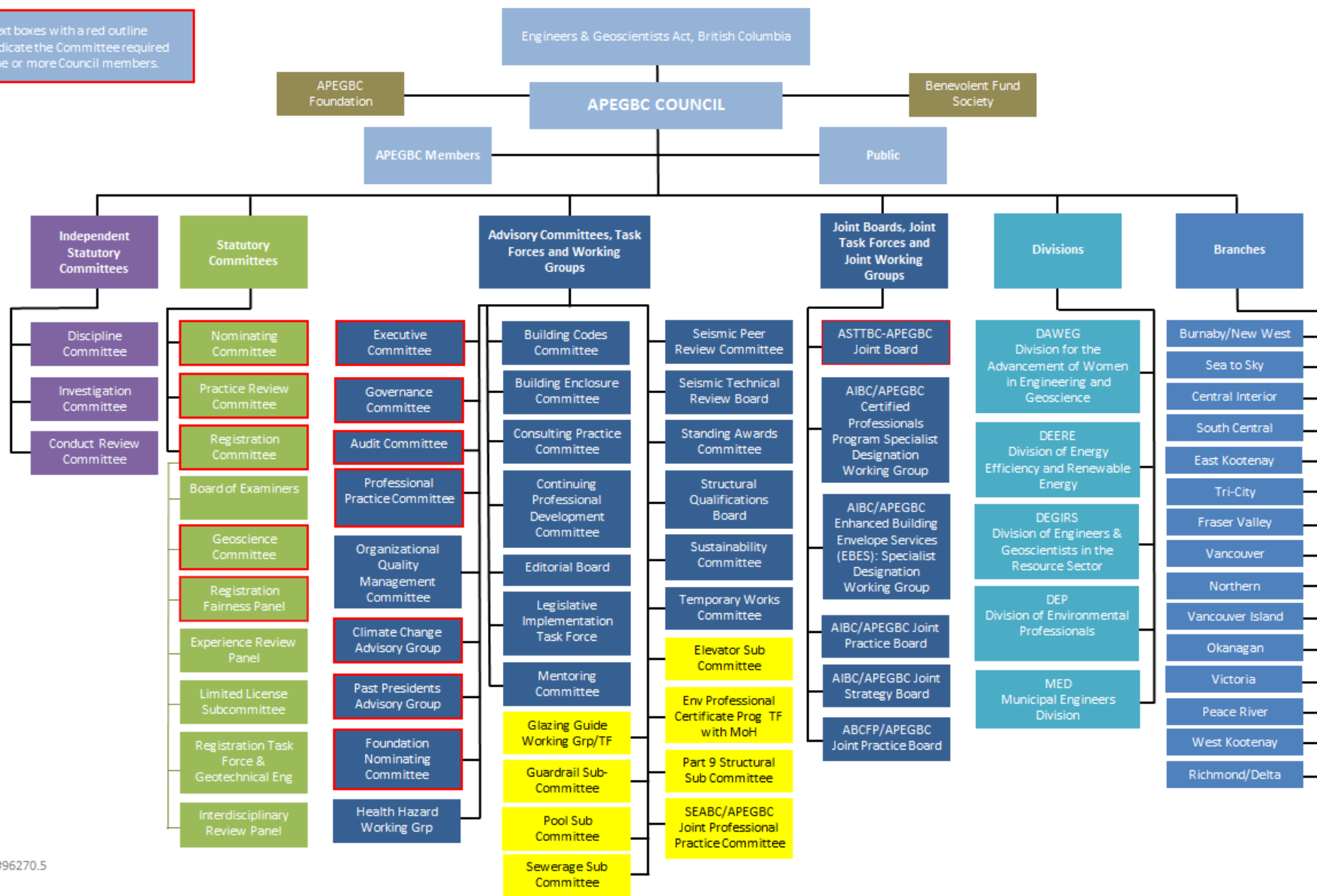
APEGBC Proposed Disciplinary Hearing Rules

*Law Society Rules 2015* Part 5—Hearings and Appeals

Guide for Registration Hearings at Professional Engineers Ontario

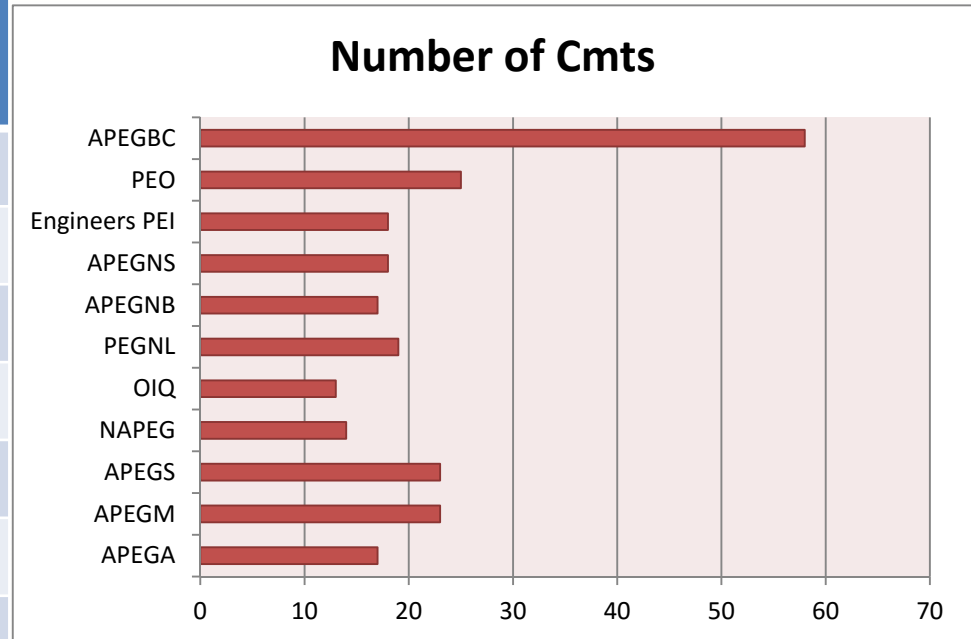
# Item 6.7.1 - Appendix A – APEGBC Volunteer Groups and Reporting Structure (April 23, 2015)

Text boxes with a red outline indicate the Committee required one or more Council members.




# Number of Committees

Association	Number of Cmts
APEGA	17
APEGM	23
APEGS	23
NAPEG	14
OIQ	13
PEGNL	19
APEGNB	17
APEGNS	18
Engineers PEI	18
PEO	25
APEGBC	58



Item 6.7.1 - Appendix C Assessing Volunteer Groups against the Developed Criteria

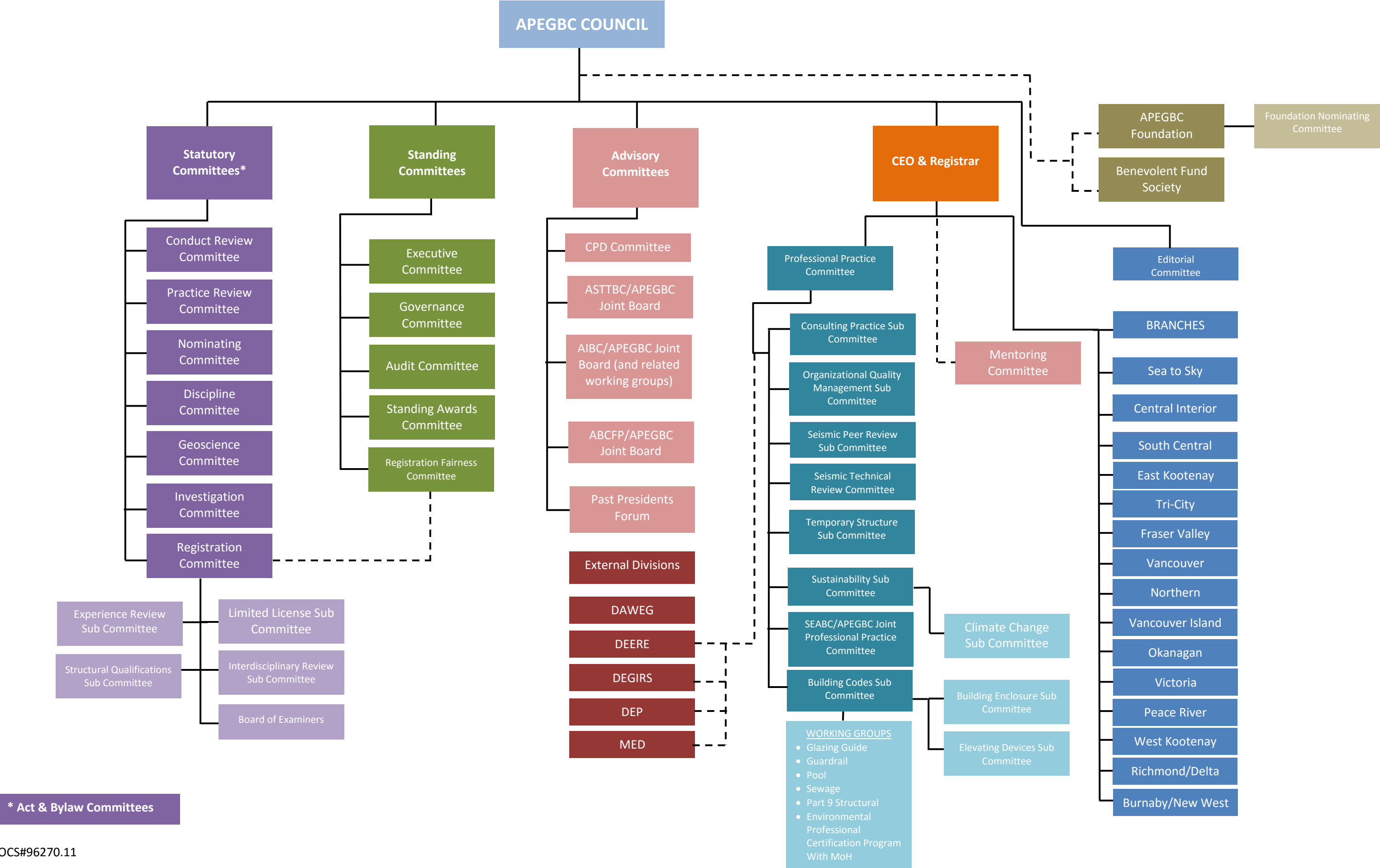
CRITERIA 	The Voluntary Group is required as per the Engineers and Geoscientists Act.	The Volunteer Group is required as per the APEGBC Bylaws.	The Volunteer Group performs the functions as described in the Act and/ or Bylaws.	Council has delegated its decision making authority to the Volunteer Group.	The Volunteer Group includes members appointed by other Regulators-Organizations.	The work of the Volunteer Group is of political or strategic significance which Council should remain engaged with to fully inform itself.	The Volunteer Group performs work for which the CEO and Registrar is held to account.	The work of the Volunteer Group requires member experts in the subject matter to address either on-going or one-time technical issues.	The work of the Volunteer Group is administrative and could be accomplished by other means (e.g. application of policy, automation).	Deliverables would still be met if this Volunteer Group ceased to exist.	Decisions
Volunteer Group (per Consultant Report)											
Under Council											
Statutory Committees											
Conduct Review Committee	Y	N	N/A	N/A	N	N, however, mentoring program itself is of strategic significance	N	N	N	N	
Practice Review Committee	Y	N	Y	N	N	N	N	N	N	N	
Nominating Committee	Y	Y	Y	Y	N	N/A*	N	N	N	N	
Standing Committees					N						
Executive Committee	N	N	N/A	Y (PARTIAL)	N	Y	N	N	N	N	
Governance Committee	N	N	N/A	N	N	Y	N	N	N	N	
Audit Committee	N	N	Y	N	N	N	N	N	N	?	
Standing Awards Committee	N	N	N/A	Y (PARTIAL)	N	Y	N	N	N	N	
Geoscience Committee	N	N	N	Y(PARTIAL)	N	Y	Y	N	N	N	
Registration Fairness Cmt	N	N	N	N	N	Y	N	N	N	N	
Professional Practice Cmt	N	N	N	N	N	N	Y	N	N	N	
Consulting Practice Cmt	N	N	N	N	Y (SEABC)	N	N	N	N	N	
OQM Sub Cmt	N	N	Y	N	Y (MOTI)	N	N	N	N	N	
Seismic Peer Review Sub Cmt	N	N	N	N	N	N	N	N	N	N	
Temporary Structure Sub Cmt	N	N	N	N	Y(WSBC)	N	N	SOMETIMES	N	N	
Building Codes Sub Cmt	N	N	N	N	Y (LOCAL GOVT)	N	N	SOMETIMES	N	N	
Building Enclosure Sub Cmt	N	N	N	N	Y (LOCAL GOVT)	N	N	SOMETIMES	N	N	
Elevating Devices Sub Cmt	N	N	N	N	Y(BCSA)	N	N	SOMETIMES	N	N	
SEABC/APEGBC Joint Professional Practice Cmt	N	N	N	N	Y (SEABC)	N	N	Y	N	N	
Sustainability Sub Cmt	N	N	N	N	Y (LOCAL GOVT)	Y	N	SOMETIMES	N	N	
Climate Change Sub Cmt	N	N	N	N	Y	Y	N	N	N	N	
Advisory Committees											
CPD Cmt	N	N	Y	N	N	Y	N	N, committee looks for broad representation, e.g. discipline, region, career stage	N	N	

Mentoring Cmt	N	N	N/A	N	N	N, however, mentoring program itself is of strategic significance	N	Y, preference is given to candidates that have previous knowledge or experience with mentoring programs	Y	Y	
ASTTBC/APEGBC Joint Board	N	N	N	N	Y	Y	N	N	N	N	
AIBC/APEGBC Joint Board	N	N	N	N	Y	Y	N	N	N	N	
ABCFP/APEGBC Joint Board	N	N	N	N	Y	Y	N	N	N	N	
Past Presidents Forum	N	N	N/A	N	N	Y	N	Y, only open to past presidents	N/A - this is a stakeholder group and input could be sought through surveys or meetings when required.	Y	
<b><u>Under the CEO &amp; Registrar</u></b>											
<b>Statutory Committees</b>											
Discipline Cmt	Y	Y	Y	Y	N	N	N	N	N	N	
Investigation Cmt	Y	N	Y	Y	N	N	N	SOMETIMES	N	N	
Registration Cmt	N	Y	Y	Y	N	Y	Y	SOMETIMES	N	N	
<i>Experience Review Sub Cmt</i>	N	N	PARTIAL	N	N	N	Y	SOMETIMES	N	N	
<i>Structural Qualifications Sub Cmt</i>	N	Y	Y	Y	N	N	Y	Y	N	N	
<i>Limited License Sub Cmt</i>	N	Y	Y	N	N	N	Y	Y	N	N	
<i>Interdisciplinary Review Sub Cmt</i>	N	N	Y	N	N	N	Y	SOMETIMES	N	N	
<b><u>Non Statutory Committees</u></b>											
Editorial Board	N	N	N/A	Y (Partial)	N	N, however the Ed Board sets the editorial policies of Innovation, which is the association's major communication channel to members	N	N	N - policy advice	Y	
<b><u>BRANCHES</u></b>											
Sea to Sky	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Central Interior	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	

South Central	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
East Kootenay	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Tri-City	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Fraser Valley	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Vancouver	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Northern	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Vancouver Island	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Okangan	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Victoria	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Peace River	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
West Kootenay	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
Richmond/Delta	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	



Burnaby/New West	N	N	N/A	N	N	Y, member outreach, networking, PD, career awareness, government relations	N	N	N	N	
<b><i>Council as Members</i></b>											
APEGBC Foundation	N	N	N/A	N	N	Y	N	Y	N	N	
Foundation Nominating Cmt	N	N	N/A	N	N	Y	N	N	N	N	
Benevolent Fund Society	N	N	N/A	N, Society is a separate entity with its own decision making authority. It reports to Members of the Society. Councillors are Members of the Society.	N	Y	N	Y, a specific skill set is sought for director volunteers (not technical expertise)	N	N	
<b><i>External Committees (DIVISIONS)</i></b>											
DAWEG	N	N	N/A	N	N	Y, the work provides value and support to members (networking, PD, resources)	N	Y	N	N	
DEERE	N	N	N/A	N	N	Y, the work provides value and support to members (networking, PD, resources)	N	Y	N	N	
DEGRIS	N	N	N/A	N	N	Y, the work provides value and support to members (networking, PD, resources)	N	Y	N	N	
DEP	N	N	N/A	N	N	Y, the work provides value and support to members (networking, PD, resources)	N	Y	N	N	
MED	N	N	N/A	N	N	Y, the work provides value and support to members (networking, PD, resources)	N	Y	N	N	





## TERMS OF REFERENCE

1. **Name:** Audit Committee
2. **Type/Reporting Relationship::**
  - 2.1 Type:  
Advisory Committee to Council
  - 2.2 Reporting Relationship:  
The Committee is appointed by Council and reports to Council.
3. **Purpose:**
  - 3.1 Primary responsibility for the Association's financial reporting, accounting systems and internal controls is vested in management and is overseen by Council.
  - 3.2 The purpose of the Audit Committee (the 'Committee') is to assist Council in fulfilling its oversight responsibilities by reviewing the financial information, which will be provided to the public and others, the systems of corporate controls which management and Council have established, enterprise-wide risk management and the external Audit process.
4. **Authorities of the Committee:**
  - 4.1 The Committee will have unrestricted access to Association personnel and documents and will be provided with the resources necessary to carry out its responsibilities. If required, the committee may engage outside legal or other professional advice.
5. **Function/Deliverables:**
  - 5.1 **Annual Financial Statements:**
    1. The Committee will review the annual draft financial statements and recommend their approval or disapproval to Council. The Committee will provide an explanation if it cannot recommend approval. The review must include:
      - a) Determining whether appropriate accounting policies and methods are being applied;
      - b) Discussing with management and with the external auditor all the proposed major changes in accounting policy, the import and presentation of all large risks or uncertainties, and all the estimates or judgments of management that may be material to financial reporting;

- c) Reviewing with management and the external auditor regarding significant financial recording or presentation issues that arose during the fiscal period and the manner of their resolution; and
  - d) Examining the draft audited annual financial statements in conjunction with the report of the external auditor, with particular reference to whether the statements:
    - i. Properly reflect the significant accounting policies selected,
    - ii. Reflect estimates and other financial statement elements that are reasonable and consistent,
    - iii. Adequately disclose all major transactions and issues,
    - iv. Disclose all post-year-end significant events, and
    - v. Are understandable, relevant, reliable and comparable.
- b) The committee will oversee the external audit, including:
- a) Reviewing the terms of the external auditor's engagement, and the appropriateness and reasonableness of the proposed audit fees;
  - b) Reviewing and approving, the external auditor's client service plan and the engagement letter;
  - c) Reviewing all proposed engagements for non-audit services to be provided by the external auditor's firm or an affiliate, together with estimated fees, and considering the implications of such an engagement for the independence of the external auditor;
  - d) Determining whether the performance of the external auditor is satisfactory and effective and meets the requirements of the Association;
  - e) Inquiring whether management has provided full and open disclosure to the auditor's enquiries;
  - f) If applicable, reviewing with the external auditor any concerns or issues that may arise from the audit with respect to restrictions imposed by management and/or significant accounting issues on which there may have been disagreement with management;
  - g) Reviewing the post-audit or management letter containing the recommendations of the external auditor and reviewing management's response and subsequent follow-up to all identified weaknesses;
  - h) Conducting an independent meeting between the audit committee and the external auditors and between the audit committee and the senior staff;
  - i) Recommending to Council the retention or replacement of the external auditor and, if the Committee recommends replacement, evaluating candidates for the appointment; and
  - j) Reviewing all the issues related to any change of external auditor and the planned steps for an orderly transition.

## **5.2 Accounting Systems and Internal Controls:**

1. Through discussions with management and the external auditor, the Committee will obtain reasonable assurance the Association's accounting systems are reliable and

internal controls are adequate. For this purpose the Committee may wish to direct the external auditor's examinations to particular areas and may request the external auditor to undertake special examinations.

2. Discuss with management, external auditors and others as appropriate, the security of computer systems and applications and the contingency plans in the event of breakdown, loss of power, or other such event.

### **5.3 Other Responsibilities:**

The Committee will:

1. Ensure controls are in place to prevent material potential errors, inefficiencies, and fraud and to detect these quickly if they occur;
2. Review the status of any pending or threatened litigation, and contingent liabilities;
3. Review the judgmental bases for evaluating assets, liabilities, contingent liabilities, litigation reserves and other commitments and contingencies;
4. Review before public disclosure, published financial reports and statements of the Association;
5. Draw to the attention of Council all financial matters of which the Committee has knowledge and which may materially affect the current or future position of the Association;
6. Determine whether policies and systems are in place to identify and monitor major business risks;
7. Verify the establishment of policies and procedures for monitoring compliance with applicable laws and with the Association's policies as to authorization of expenditures, leases and contracts and otherwise, and ascertain their adequacy and the levels of compliance; and
8. Verify that the appropriate insurance coverage is in place related to all liability (people, property and the Association itself) and protection of assets issues. In particular, verify that there is the appropriate Directors and Officers Liability insurance in place.
9. Receive for information, on a timely basis, the quarterly financial statements of the Association on a comparative basis to prior year and to budget.
10. Provide oversight of assessment, management, and mitigation of enterprise-wide risk.

### **6. Budget:**

- 6.1 Except as set out above and as allocated in the Association's annual budget, the Committee has no budget authority beyond reasonable expenses for travel, teleconference or ancillary expenses.

### **7. Membership:**

- 7.1 The Committee will be composed of five members of Council consisting of at least two non-elected members of Council and three members of Council who are not on the Executive Committee.
- 7.2 At least two of the members should have expertise in financial affairs and preferably have a professional accounting designation. If no members of

Council meet the criteria, the Audit Committee may appoint, subject to Council's approval, an independent external person to be an advisor to the Committee.

- 7.3 The Chief Executive Officer and the President may attend meetings by invitation of the Committee.

**8. Term of Office:**

- 8.1 The appointment term shall be for one year or until the Committee member's term on Council expires, whichever occurs first, and not for more than four consecutive years, with the term commencing upon appointment.

**9. Selection of Officers:**

- 9.1 Members of the Audit Committee will elect the Chair who is not a member of the Executive Committee by March 31.

**10. Quorum:**

- 10.1 A quorum will be three members of least one of whom will be a non-elected member of Council.

**11. Frequency of Meetings:**

- 11.1 The Committee will meet twice a year for prescribed requirements and additionally as called by the Chair.

**12. Conduct of Meetings:**

12.1 The Committee may meet in person and/or by telephone conference, webcast or other electronic communications media where all members may simultaneously hear each other and participate during the meeting. Generally the latest edition of Robert's Rules should be adopted for the conduct of meetings.

12.2 (*Standard statement*) On occasion, a Committee Chair may communicate with all members by e-mail and, with supporting information, propose and call for a consent resolution. At his or her discretion, the Committee Chair may or may not allow limited e-mail discussion on the matter. Beyond this, Committee members have the option of responding by moving, seconding or supporting the motion, or requesting that it be considered further at a meeting of the Committee. A consent resolution is deemed to have been achieved if there are no negative votes or calls for in-person discussion, and the number of support votes are equal to or greater than the number required for a quorum. In the case where a member so requests, the motion is not carried, but instead may be brought forward for consideration at a subsequent meeting of the Committee. (In the case of an urgent matter, this may occur at a special meeting conducted by telephone where the normal requirements for a quorum will prevail.) Any motion so carried is considered to take effect immediately, and is ratified at the subsequent Committee meeting and recorded in the minutes of that meeting.

**13. Minutes:**

- 13.1 Minutes, notes or recording of decisions are the responsibility of staff support.
- 13.2 Minutes of meetings can be distributed where appropriate and where not considered to be confidential (such as personnel matters).

**14. Periodic Reporting and Review of Terms of Reference:**

- 14.1 The Committee will report its discussions to Council by means of a report to Council and/or by distributing the minutes of its meetings where appropriate: and where not considered to be confidential (such as personnel matters), by oral report at the next meeting of Council of every major matter considered since Committee's last meeting.
  - 14.2 The Committee shall review its Terms of Reference on an annual basis and submit verification of review to the Governance Committee on a bi-annual basis.
- 15. Staff Support:**
- 5.1 The key Staff support for the Audit Committee is the Director of Finance and Administration. The administrative support for the Committee will be provided by a member of staff as designated for this purpose.

**APPROVED BY COUNCIL: October 22, 2004 (CO 04-119-4)**

**REVISED AND APPROVED BY COUNCIL: September 9, 2011 (CO-11-141)**

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**REVISED AND APPROVED BY COUNCIL: September 12, 2014 (CO-14-84)**



## TERMS OF REFERENCE

1. **Name:** Audit Committee
2. **Type/Reporting Relationship::**
  - 2.1 Type:  
Advisory Committee to Council
  - 2.2 Reporting Relationship:  
The Committee is appointed by Council and reports to Council.
3. **Purpose:**
  - 3.1 Primary responsibility for the Association's financial reporting, accounting systems and internal controls is vested in management and is overseen by Council.
  - 3.2 The purpose of the Audit Committee (the 'Committee') is to assist Council in fulfilling its oversight responsibilities by reviewing the financial information, which will be provided to the public and others, the systems of corporate controls which management and Council have established, **enterprise-wide risk management** and the **external** Audit process.
4. **Authorities of the Committee:**
  - 4.1 The Committee will have unrestricted access to Association personnel and documents and will be provided with the resources necessary to carry out its responsibilities. If required, the committee may engage outside legal or other professional advice.
5. **Function/Deliverables:**
  - 5.1 **Annual Financial Statements:**
    1. The Committee will review the annual draft financial statements and recommend their approval or disapproval to Council. The Committee will provide an explanation if it cannot recommend approval. The review must include:
      - a) Determining whether appropriate accounting policies and methods are being applied;
      - b) Discussing with management and with the external auditor all the proposed major changes in accounting policy, the import and presentation of all large risks or uncertainties, and all the estimates or judgments of management that may be material to financial reporting;



- c) Reviewing with management and the external auditor regarding significant financial recording or presentation issues that arose during the fiscal period and the manner of their resolution; and
  - d) Examining the draft audited annual financial statements in conjunction with the report of the external auditor, with particular reference to whether the statements:
    - i. Properly reflect the significant accounting policies selected,
    - ii. Reflect estimates and other financial statement elements that are reasonable and consistent,
    - iii. Adequately disclose all major transactions and issues,
    - iv. Disclose all post-year-end significant events, and
    - v. Are understandable, relevant, reliable and comparable.
- b) The committee will oversee the external audit, including:
- a) Reviewing the terms of the external auditor's engagement, and the appropriateness and reasonableness of the proposed audit fees;
  - b) Reviewing and approving, the external auditor's client service plan and the engagement letter;
  - c) Reviewing all proposed engagements for non-audit services to be provided by the external auditor's firm or an affiliate, together with estimated fees, and considering the implications of such an engagement for the independence of the external auditor;
  - d) Determining whether the performance of the external auditor is satisfactory and effective and meets the requirements of the Association;
  - e) Inquiring whether management has provided full and open disclosure to the auditor's enquiries;
  - f) If applicable, reviewing with the external auditor any concerns or issues that may arise from the audit with respect to restrictions imposed by management and/or significant accounting issues on which there may have been disagreement with management;
  - g) Reviewing the post-audit or management letter containing the recommendations of the external auditor and reviewing management's response and subsequent follow-up to all identified weaknesses;
  - h) Conducting an independent meeting between the audit committee and the external auditors and between the audit committee and the senior staff;
  - i) Recommending to Council the retention or replacement of the external auditor and, if the Committee recommends replacement, evaluating candidates for the appointment; and
  - j) Reviewing all the issues related to any change of external auditor and the planned steps for an orderly transition.

## **5.2 Accounting Systems and Internal Controls:**

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internal controls are adequate. For this purpose the Committee may wish to direct the external auditor's examinations to particular areas and may request the external auditor to undertake special examinations.

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5. Draw to the attention of Council all financial matters of which the Committee has knowledge and which may materially affect the current or future position of the Association;
6. Determine whether policies and systems are in place to identify and monitor major business risks;
7. Verify the establishment of policies and procedures for monitoring compliance with applicable laws and with the Association's policies as to authorization of expenditures, leases and contracts and otherwise, and ascertain their adequacy and the levels of compliance; and
8. Verify that the appropriate insurance coverage is in place related to all liability (people, property and the Association itself) and protection of assets issues. In particular, verify that there is the appropriate Directors and Officers Liability insurance in place.
9. Receive for information, on a timely basis, the quarterly financial statements of the Association on a comparative basis to prior year and to budget.
10. **Provide oversight of assessment, management, and mitigation of enterprise-wide risk.**

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~~12.1 The Committee may meet in person and/or by telephone conference, webcast or other electronic communications media where all members may simultaneously hear each other and participate during the meeting.~~

~~12.2 The Committee may also meet by fax, email or other electronic media where communication may not be simultaneous, provided all members of the Committee have access to the medium chosen and all communication to and from one member is broadcast to all other members of the Committee.~~

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