PROFESSIONAL ENGINEERS & GEOSCIENTISTS NEWFOUNDLAND & LABRADOR
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Practice Guideline for the Use of AI in Professional Work

Professional Engineers & Geoscientists

Newfoundland and Labrador

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1.0 Preface

Professional Engineers and Geoscientists Newfoundland & Labrador (PEGNL) supports the responsible, transparent, and confident use of artificial intelligence (AI) across engineering and geoscience. AI-enabled tools are already part of practices of professional members and permit holders and will continue to advance. PEGNL's regulatory approach welcomes the adoption of suitable AI tools while ensuring that public safety, professional accountability, and ethical conduct remain paramount.

Professional members and permit holders who use AI tools in their professional work remain fully responsible for the outcomes of that work. Choosing to use an AI tool does not transfer or reduce professional accountability.

PEGNL recognizes that many AI systems are complex, non-transparent, and sensitive to misuse or misinterpretation. The use of AI in engineering designs, geoscience, mineral, or environmental investigations, or in any reporting that carries technical or ethical implications — including risks of algorithmic bias, privacy and security issues, lack of accountability, or data fabrication — is a regulatory concern. Accordingly, professional members and permit holders are expected to demonstrate AI competency, commit to continuing education as AI tools evolve, and ensure that any AI tool used is trustworthy and fit for purpose.

2.0 Introduction

2.1 PEGNL

Professional Engineers and Geoscientists Newfoundland & Labrador (PEGNL) is mandated to regulate the practice of engineering and geoscience in the public interest. PEGNL exists so that there will be competent and ethical practice of engineering and geoscience in Newfoundland and Labrador, and to instill public confidence in the professions. To practice Engineering or Geoscience in Newfoundland and Labrador one is required to be registered, and in good standing, with PEGNL.

The Newfoundland and Labrador **Engineers and Geoscientists Act, 2008**, and the associated **Engineers and Geoscientists Regulations, 2024** under that Act, govern the practice of engineering and geoscience in the Province. PEGNL is the authority that licenses practitioners under the Act and administers all aspects of the legislation and strives to ensure the ethical conduct of all professional members and permit holders.

PEGNL Guidelines seek to advise what is normally expected of a reasonable and prudent Professional Engineer or Geoscientist. However, they do not comprise a comprehensive list of what constitutes substantive professional practice. This is an area of responsibility which will remain fully that of the Professional Engineers and Geoscientists.

Professional members and permit holders adhering to these Guidelines are following best practices established by PEGNL in conforming to the applicable legislation and related ethical practices.

Questions or concerns relating to this document should be addressed to the Professional Standards Director at PEGNL.

2.2 Purpose

This Practice Guideline establishes expectations for professional members and permit holders regarding the responsible integration of Artificial Intelligence (AI) tools and systems into their professional practice. It

affirms PEGNL's support for the adoption of appropriate AI tools and sets requirements that align AI use with core obligations of public safety, competence, accountability, transparency, equity, and ethical conduct.

2.3 Scope

This guideline applies to all professional members and permit holders under PEGNL who rely on AI tools in their professional work, including but not limited to: engineering designs; geoscience, mineral, or environmental investigations; monitoring and control systems; and automated or semi-automated reporting. Use of AI in safety-critical or materially impactful decisions is subject to heightened expectations for professional oversight, validation, and documentation to meet the regular standard of practice expectations. AI, for the purposes of this guideline, includes any system or tool that mimics human intelligence, such as machine learning models, generative AI (e.g., text or image generation), predictive analytics, or automated decision-making systems.

This guideline does not cover personal or non-professional use of AI tools unless such use impacts professional obligations or public perception of the professions.

2.4 Definitions

Act:
The Newfoundland and Labrador *Engineers and Geoscientists Act, 2008*
Artificial Intelligence (AI):
A technological system that, using a model, makes inferences to generate outputs such as predictions, recommendations, or decisions in response to human-defined objectives; encompassing a wide range of methods including machine learning, where the system identifies patterns from large training datasets to perform professional work across diverse domains.
AI Competency:
Knowledge, skills, and judgment required to select, validate, deploy, and oversee AI systems within one's discipline, including understanding limitations and risks.
Bias:
Systematic error that results in unfair or disparate impacts across groups or contexts, arising from training data, model design, or deployment.
Complaints Authorization Committee (CAC):
The committee that considers complaints and determines whether there is sufficient evidence to determine if the member has engaged in conduct deserving of sanction as defined in the Act. Where AI is at issue, CAC may include a review of data provenance, validation steps, and oversight.
Discipline:
A specific field of practice within the professions governed by the Act (e.g., civil engineering, electrical engineering, geology, environmental geoscience, etc.).
Generative AI:
A subset of AI that creates new content, such as text, images, or designs, based on training data.
Large Language Model (LLM):
a deep-learning algorithm that uses massive amounts of parameters and training data to understand and predict text.
PEGNL:
Professional Engineers and Geoscientists Newfoundland and Labrador

Permit Holder:
A corporation or association of persons that holds a permit to practice under the *Act.* A permit holder has a *permit number* issued by PEGNL to engage in the practice of engineering and/or geoscience.
Person:
An individual, as well as a corporation, company, association, firm, partnership, society or other organization.
Professional document:
A document in any medium (e.g., paper, electronic or other) that contains or presents engineering or geoscience work as defined under the *Act.*
Professional Member:
A professional engineer, professional geoscientist, limited licensee (engineering), or limited licensee (geoscience) entitled to engage in the practice of engineering or geoscience under the *Act.*
Professional Work:
Activities performed under the scope of practice defined by PEGNL including design, analysis, review, and reporting.
Regulations:
The *Engineers and Geoscientists Regulations, 2024*
Retrieval-Augmented Generation (RAG):
A technique in which an AI system dynamically retrieves relevant information from an external or organization-specific knowledge source at inference time and incorporates that retrieved content into its generation process, enabling responses that are grounded in up-to-date or domain-specific data beyond the model's training knowledge.
Trustworthy Data Flow:
The end-to-end movement of data through an AI system — including collection, sharing with AI tools, processing, storage, and output — governed by documented controls that ensure input quality, relevance, representativeness, privacy, security, and lawful use, such that the integrity and accountability of data can be evidenced at each stage of the pipeline.

2.5 Responsibilities of Professional Members and Permit Holders

Professional members and permit holders are responsible for practicing in accordance with the Act, Regulations and By-laws made pursuant to the Act (which include the PEGNL Code of Ethics).

2.6 Liability

Liability is defined as a legal responsibility for some harm or loss caused to another person. PEGNL has no authority to determine legal liability, this authority rest with the courts.

PEGNL does have jurisdiction and responsibility to administer the Act, Regulations and By-Laws, including the development and enforcement of practice standards and guidelines. Not following PEGNL Practice Standards and Guidelines could lead to discipline.

3.0 Expectations of Professional Members and Permit Holders for the Use of AI

3.1 Data Quality and Fitness for Purpose

Professional members and permit holders should ensure that any AI tool they use relies on data that is complete, representative, and free from material bias. This guideline should apply at every stage of

professional work including how the problem is defined, how the model is designed and trained, how results are validated, and how outputs are interpreted.

3.2 Algorithmic Verifications

Professional members and permit holders must take reasonable steps to verify that an AI tool performs reliably and correctly for the professional work it is applied to. Algorithmic verification means confirming that the tool produces accurate, stable, and consistent outputs — and understanding where it does not. At minimum, this includes:

- Testing the tool against problems with known correct answers in the relevant professional domain
- Assessing sensitivity to changes in inputs and identifying edge cases or failure modes
- Checking for bias or inconsistent performance across relevant conditions or populations
- Documenting the scope and results of verification conducted
- Ethical requirements including CAN-ASC-6.2:2025- Accessible and Equitable Artificial Intelligence Systems - Accessibility Standards Canada
- Compliance with ISO/IEC 42001

For tools where internal logic cannot be inspected — including most LLM-based tools — full algorithmic verification in the traditional sense may not be practical. In these cases, professional members and permit holders are expected to apply enhanced professional oversight and treat AI outputs as requiring independent review before being relied upon.

3.3 Evidence Requirements by Tool Type

What professional members and permit holders must demonstrate depends on the type of AI tool used:

- Where the tool is a custom or in-house model, professional members and permit holders must be able to demonstrate:
    - **Data provenance** — where the data came from and how it was selected.
    - **Verification** — what steps were taken to check the data and outputs for accuracy
    - **Professional oversight** — how a qualified professional has reviewed and applied the results.
- Where the tool is built on a large language model (LLM) or foundational model — such as a commercial AI assistant or API-based tool — full data provenance may not be practical, as training data is typically proprietary and not disclosed by developers. In these cases, professional members and permit holders are expected to demonstrate:
    - **Vendor due diligence** — that the tool was developed by a reputable provider with publicly available responsible AI commitments, documented limitations, and known bias disclosures.
    - **Tool suitability** — that the tool is appropriate for the professional work it was applied to and that its known limitations were considered.
    - **Retrieval data provenance** — where the tool uses retrieval-augmented generation (RAG) or similar methods that draw on specific data sources, those sources must be documented and assessed for quality.
    - **Enhanced professional oversight** — given reduced upstream transparency, a higher degree of human review and independent verification of outputs is expected to compensate.

3.4 Transparency in Professional Documents and Reports

Proof of reliability must be demonstrated in all reports and professional documents that involved the use of AI. This requires traceable references to the tools used, the sources and data they drew upon, and the

verification steps taken. Professional members and permit holders must be transparent about the role AI played in producing any professional work product, so that reviewers, clients, regulators, and the public can assess the basis for conclusions reached.

Outputs must not be accepted uncritically. Professional members and permit holders are expected to apply independent professional judgment when interpreting and acting on AI-generated results, regardless of the tool used.

3.5 Complaints and Enforcement

Where a complaint involves the use of an AI tool, the Complaints Authorization Committee (CAC) will consider evidence of the above — proportionate to the type of tool used — when determining whether the member or permit holder met the applicable professional standards. This includes evidence of data provenance or vendor due diligence, verification steps taken, professional oversight applied, and transparency in reporting.

4.0 Guidance for the Use of AI

4.1 Background

The practice of professional engineering and geoscience relies increasingly on software tools that incorporate engineering and geoscience principles. Many programs are based upon or include assumptions, limitations, interpretations or judgments on engineering and geoscience matters that were made by or on behalf of an engineer or geoscientist when the program was first developed. Therefore, it is often difficult to determine, just by using a program or by being given a description of its function, the engineering and geoscience principles it incorporates. As a result, professional engineers and geoscientists bear an obligation to understand the underlying principles, assumptions, and limitations of any software they employ — ensuring that their professional judgment, not the program alone, remains the basis for their work.

4.2 Guiding Principles

Professional members and permit holders must adhere to the following principles when using AI in their practice:

1. **Public Safety**: The use of AI must not negatively impact the primary responsibility for the protection of the public, environment, and infrastructure.
2. **Competence:** They must understand the AI tools they use and their limitations.
3. **Accountability**: They remain fully responsible for all work products, including those generated or informed by AI.
4. **Transparency & Traceability:** The use of AI must be disclosed where it materially affects professional deliverables or decision-making and evidence (data sources, assumptions, parameters, and validation steps) must be traceable.
5. **Ethics:** AI use must comply with the PEGNL Code of Ethics, protecting the public and avoiding bias, discrimination, or harm.
6. **Human Oversight:** Critical decisions require professional review, challenge, and approval; AI must augment—not replace—professional judgment.

4.3 Practice Requirements

4.3.1 Risk Management

Professional members and permit holders must identify, understand and manage risks associated with AI use, including:

- Data quality and security/privacy (e.g., protecting confidential client information).
- Bias or inaccuracies in AI output (e.g., from flawed training data).
- Failure modes and human factors (over-reliance, automation bias).
- Potential failure of AI under edge-case scenarios.

Mitigation strategies (e.g., mandatory professional review/approval, manual checks, redundancy) must be implemented for high-risk applications such as structural design or geohazard assessment.

4.3.2 Competence and Training

Professional members and permit holders must possess or acquire sufficient knowledge of any AI tool used in their work to evaluate its suitability, accuracy, and limitations. Before using an AI tool, professional members must :

- Review its documentation, intended use, and validation processes.
- Assess its applicability to the specific engineering or geoscience task.
- Complete relevant training if necessary.

4.3.3 Due Diligence and Validation

AI-generated outputs (e.g., designs, calculations, reports) must be independently verified by the professional members using traditional methods or professional judgment. Professional members must:

- Identify and evaluate data quality, representativeness, and bias, document sources, preprocessing, and limitations.
- Avoid over-reliance on AI where human expertise is required for critical decisions.

4.3.4 Documentation and Transparency

Professional members and permit holders must maintain auditable records, sufficient for internal review and, where applicable, CAC proceedings of:

- The specific AI tools used, including version and source.
- The role of AI in producing deliverables (e.g., data analysis, drafting, optimization).
- Validation steps taken to confirm accuracy and reliability.
- **Traceable references** to sources and aids used in AI-enabled analyses or reports.

Where AI materially influences a deliverable, professional members must disclose its use to clients, regulators, or stakeholders.

4.3.5 Ethical Use

Professional members and permit holders are obligated under the Code of Ethics By-Law to ensure that:

- AI is not used to misrepresent facts, plagiarize, or produce misleading deliverables.
- AI tools do not perpetuate discrimination or violate privacy laws (e.g., by mishandling personal data).

- Where generative AI is used (e.g., to draft reports, create visuals, etc.), originality and appropriateness of content is maintained.

4.3.6 Client and Stakeholder Communication

- Professional members and permit holders must inform clients of AI use when it influences, or was used to determine, project outcomes, timelines, or costs, ensuring informed consent.
- Contracts or agreements should clarify ownership of AI-generated intellectual property and liability for AI-influenced work in compliance with current legislation and case law.

4.4 Responsibilities of Professional Members

Regardless of the methods used to obtain results that are incorporated into a project, professional members remain fully responsible for the results of their work.

Software with engineering and/or geoscience principles built in cannot be blamed for the results produced by the professional member and cannot be used as a defense should discipline proceedings result from the professional member's work.

4.5 Responsibilities of Permit Holders

Firms must establish internal policies for AI use, including:

- Approved tools and workflows.
- Quality assurance processes for AI outputs.
- Regular audits of AI systems to ensure compliance with this guideline.

Firms are responsible for ensuring employees comply with this guideline and for addressing non-compliance. Firms employing AI tools must provide resources and training to ensure professional members understand all aspects of the use of AI tools.

4.6 Examples of Appropriate and Inappropriate Use

Appropriate use includes:

- Using AI to optimize manual structural designs, followed by manual verification of the AI result against codes and practice standards.
- Employing predictive AI for geotechnical risk assessment, with documented validation and professional interpretation.
- Revising preliminary reports with generative AI, reviewed and edited by the Professional.

Inappropriate use includes:

- Relying solely on AI for seismic analysis without Professional oversight (review/approval).
- Submitting unverified AI-generated drawings or environmental findings as final deliverables.
- Using AI to falsify data or bypass regulatory requirements.
- Allowing unqualified or unregulated operators to deploy AI tools in lieu of professional oversight.

5.0 Resources and Support

Engineers and Geoscientists British Columbia. November 2024. Practice Advisory on Use of Artificial Intelligence in Professional Work

Usage of AI Tools by Professional Geoscientists in Canada

Ordre des ingénieurs du Québec, 2025. 6 axes de vigilance pour une utilisation responsable de l'IA en génie.

Law Society of Alberta. January 2024. The Generative AI Playbook

Federation of State Medical Board. April 2024. Navigating the Responsible and Ethical Incorporation of Artificial Intelligence into Clinical Practice

Innovation, Science and Economic Development Canada. September 2023. Voluntary Code of Conduct on the Responsible Development and Management of Advanced Generative AI Systems.

6.0 Review and Updates

This guideline will be reviewed annually or as needed to reflect advancements in AI technology and emerging best practices.