PROFESSIONAL ENGINEERS & GEOSCIENTISTS NEWFOUNDLAND & LABRADOR
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Practice Guideline for Areas of Practice Spanning Engineering and Geoscience

Professional Engineers & Geoscientists

Newfoundland and Labrador

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1.0 Introduction

1.1 PEGNL

Professional Engineers and Geoscientists Newfoundland & Labrador (PEGNL) is mandated to regulate the practices 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 must be registered and in good standing with PEGNL. In addition, companies (including sole proprietorships) offering engineering and geoscience services outside of their organizations (i.e., to any natural or legal entity external to their company) also require a PEGNL Permit to Practice.

The Newfoundland and Labrador ***Engineers and Geoscientists Act, 2008*** and the associated ***Engineers and Geoscientists Regulations, 2011*** under that Act govern the practices of engineering and geoscience in the Province. PEGNL is the authority that licenses practitioners and companies under the Act, administers all aspects of that legislation and strives to ensure the ethical conduct of all professional members and permit holders.

Under Section 36 of the Regulations, PEGNL has the power to produce publications for the purpose of: (a) promoting high standards of professional services; (b) outlining the scope of professional services which shall define for clients the services to be expected from a consulting engineer or geoscientist; and (c) assisting clients in the selection of professional engineers and geoscientists for professional services."

PEGNL produces such documents to inform and educate its professional members, permit holders, and the public, in matters of professional practice and to:

- make PEGNL professional members and permit holders aware of their duties in performing specific components of their professional roles in accordance with the current *Act, Regulations and By-Laws*; and
- help the public, especially clients, contractors and suppliers, understand the role of PEGNL professional members and the responsibilities they have when performing professional services.

Professional members adhering to this document are following best practices in conforming to the legislation and ethical practices applicable to this document.

This Guideline seeks to advise what is normally expected of a reasonable and prudent professional engineer or geoscientist. However, it is not a comprehensive list of what constitutes substantive engineering or geoscience practice. This is an area of responsibility which will remain fully that of the professionals.

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

1.2 Purpose of this Guideline

The purpose of this document is to provide guidance on potential areas of overlap between geotechnical or geological engineering and engineering geology, and to emphasize the need for collaboration from both professions in certain situations to ensure that the primary mandate of public protection is met.

Geotechnical engineering, a sub-discipline of civil engineering, has been described[1] as one phase on the "GeoSpectrum" of professional practice that has engineering and geology as end members (Figure 1).

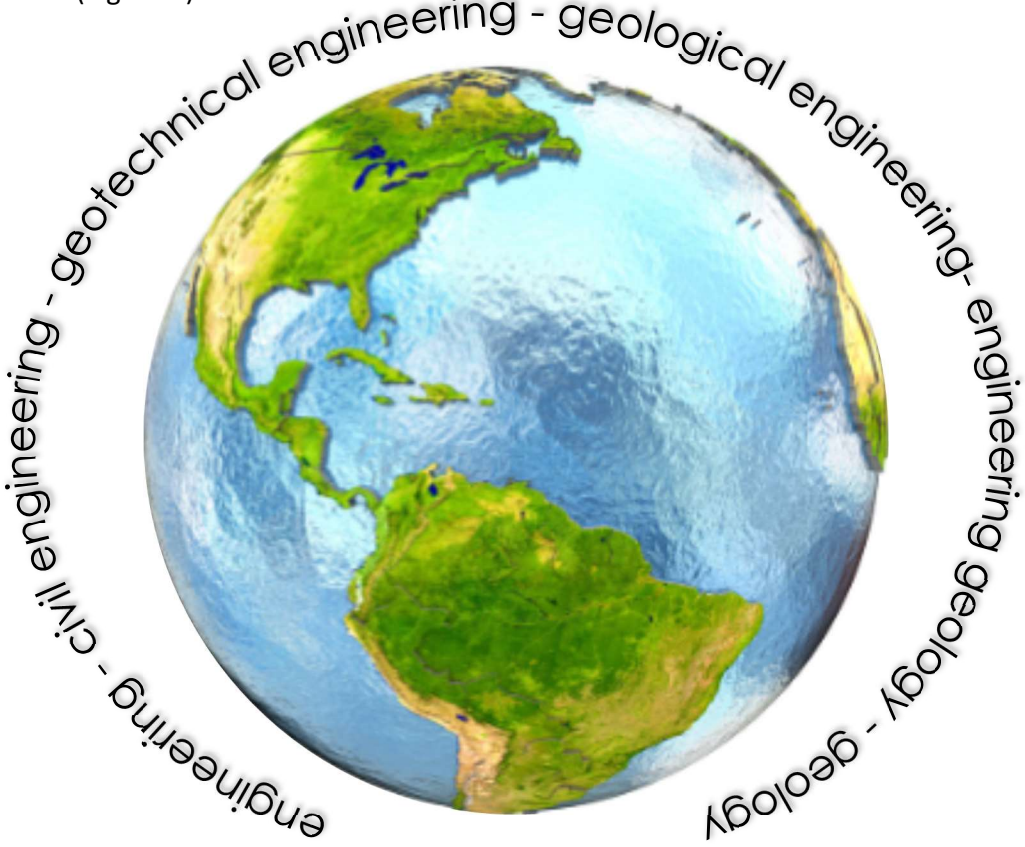


Figure 1: The GeoSpectrum

Groundwater is an important aspect in most of the practice areas in this GeoSpectrum, but is not identified as a specific practice area. Groundwater aspects are considered in this document only in terms of how they influence the interface between geotechnical engineering and engineering geology (e.g., relating to such factors as groundwater occurrence, pore pressure, hydraulic gradients and flow directions, seepage, drainage, or dewatering). Broader aspects of hydrogeology as a discipline (e.g., groundwater resources, aquifer management, contaminant hydrogeology, or groundwater aspects of energy production or transfer (geothermal or

[1] Motley View: Engineering Geology as a Vital Phase in the GeoSpectrum | Ed Medley

geoexchange)) are not considered here. If questions arise regarding professional practice in broader areas of hydrogeology, hydrotechnical engineering and hydrology, PEGNL's general rules of professional practice apply - professional members should adhere to the Code of Ethics and practice only in areas in which they are competent and licensed. If in doubt, consult PEGNL.

While there is a certain amount of overlap in the areas of practice that span the disciplines of civil engineering to geology, it is important to distinguish the practice of engineering from the practice of geoscience and ensure professional members only practice in the profession in which they are licensed and competent[2].

It is also important to recognize that engineers and geoscientists often must collaborate as an interdisciplinary team to ensure that geological factors regarding the location, design, construction, operation and maintenance of engineering works are recognized and accounted for.

1.3 Requirements for Acceptance into the Engineering and Geoscience Professions

In order to be eligible for registration as a professional engineer or geoscientist, the Engineering and Geoscience Regulations, 2011 require that all applicants "satisfy all academic and applicable experience requirements" for their respective designations. To meet these requirements, as detailed in sub-section 5(2) of the Regulations, an applicant must have:

(a) a degree in engineering or geoscience from a university program approved by the registration committee and at least four years of applicable work experience satisfactory to the registration committee in the practice of engineering or geoscience, 3 years of which shall be gained subsequent to the conferral of the degree;
(b) academic qualifications equivalent to a degree in engineering or geoscience demonstrated by successful completion of the confirmatory examinations that may be required by the registration committee and at least four years of applicable work experience satisfactory to the registration committee in the practice of engineering or geoscience subsequent to the attainment of those academic qualifications; or
(c) successfully completed the examinations that may be prescribed by the registration committee and have a total of at least six years of applicable work experience satisfactory to the registration committee in the practice of engineering or geoscience, one year of which shall be obtained subsequent to successful completion of the prescribed examinations.

In order to practice both professions, applicants must meet these requirements for both professions.

It is not considered practicing in the profession to provide advice to a professional counterpart when that professional counterpart is accepting responsibility for the work of their profession.

[2] Geological engineering is often considered a hybrid discipline that spans the professions of engineering and geoscience; accordingly, PEGNL **may** accept a registrant as qualified to be licensed in both professions if the registration committee accepts the academic and experience qualifications of the applicant.

It is only when a person is accepting professional responsibility for the work of both professions that the person must be licensed for both.

Where an engineer or geoscientist has gained competence in a specific area of practice of the other profession and would like to take responsibility for their work in that specific area, they must obtain a **limited license** in the profession for which they do not "satisfy all academic and applicable experience requirements" of sub-section 5(2) of the Regulations.

To qualify for a limited license, they must meet the academic requirements for a limited license as detailed in subsection 6(2) of the Regulations and have relevant experience, supervised by a fully qualified professional, within the limited area for which they are applying. Under a limited license, engineers or geoscientists can accept responsibility for the limited area of the other profession for which they have gained competence, as detailed in subsection 6(2) of the Regulations.

1.4 Definitions

Act
The Newfoundland and Labrador *Engineers and Geoscientists Act, 2008.*
PEGNL
Professional Engineers and Geoscientists Newfoundland and Labrador**.**
Discipline
A specific field of practice within the professions governed by the Act (e.g., civil engineering, electrical engineering, geology, environmental geoscience, etc.).
Engineering (as defined in the Act)
Means reporting on, advising on, evaluating, designing, preparing plans and specifications for or directing the construction, technical inspection, maintenance or operation of a structure, work or process that:

(i) is aimed at the discovery, except by the practice of geoscience, development or utilization of matter, materials or energy or is designed for the use and convenience of human beings; and
(ii) requires in the reporting, advising, evaluating, designing, preparation or direction, the professional application of the principles of mathematics, chemistry, physics or a related applied subject,

and includes providing educational instruction on the matters contained in this paragraph to a student at an educational institution, but excludes practicing as a natural scientist.
Geoscience (as defined in the Act)
Means reporting on, advising on, evaluating, interpreting, processing, geological and geophysical surveying, exploring, classifying reserves or examining activities related to the earth sciences or engineering geology that:

(i) is aimed at the discovery or development of oil, natural gas, coal, metallic or non-metallic minerals or precious stones, water or other natural resources or that is aimed at the investigation of geoscientific conditions; and

(ii) requires in the reporting, advising, evaluating, interpreting, processing, geoscientific surveying, exploring, reserve classifying or examining, the professional application of mathematics, chemistry or physics through the application of the principles of geoscience,

and includes providing educational instruction on the matters contained in this paragraph to a student at an educational institution.

Professional Member

An engineer, geoscientist, limited licensee (engineering), or limited licensee (geoscience) entitled to engage in the practice of engineering or geoscience under the *Act.*

Regulations

The *Engineers and Geoscientists Regulations, 2011.*

1.5 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 (which include the PEGNL Code of Ethics).

A permit holder is corporately responsible for the integrity of its projects. A permit holder is responsible to put in place a quality management system enabling engineering or geoscience practice to be carried out competently and ethically by professionals with appropriate training and experience, which includes facilitating their compliance with this guideline.

While PEGNL has no authority to determine legal liability, as that rests with the courts, PEGNL does have jurisdiction and responsibility to administer the Act, Regulations and By-Laws. Not following this guideline without the ability to provide documented, sound professional judgement may contravene the requirements of the Act, Regulations and By-Laws and could lead to discipline proceedings.

2.0 Areas of Overlapping Engineering and Geoscience Practice

2.1 Areas of Practice

While the definitions of engineering and geoscience in section 1.4 above form the basis for distinguishing between the professions in Newfoundland and Labrador, there are other definitions that will help inform the overlap that potentially exists between the professions.

PEGNL defines engineering geology as: “The application of geologic data, techniques, and principles to the study of naturally occurring rock and soil materials or subsurface fluids. The purpose is to assure that geologic factors affecting the planning, design, construction, operation, and maintenance of engineering structures and the development of groundwater resources are recognized, adequately interpreted, and presented for use in engineering practice”.

The applicable disciplines of engineering and geoscience and their specialized practices are defined for purposes of this current guideline as follows:

- Geotechnical Engineering - A branch of professional engineering where practitioners have relevant education, training, and experience in the application of soil and rock mechanics, engaged within the GeoSpectrum in the investigation and engineering evaluation and analysis of the interaction between earth and man-made materials in the design and performance of civil engineering works.

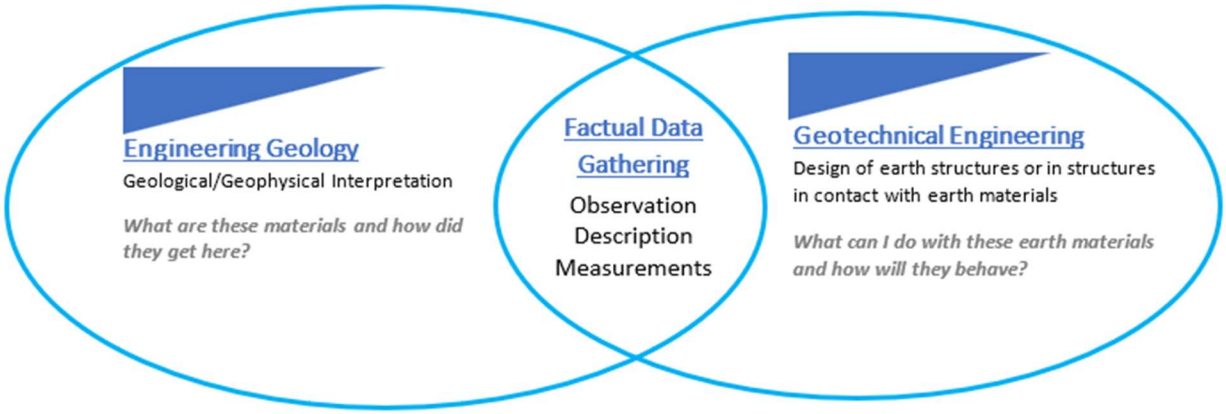
- Engineering Geology - A branch of professional geoscience where practitioners have relevant education, training, and experience in the identification of earth materials, including fluids, geologic processes, and geologic hazards, who applies geologic principles within the GeoSpectrum so that geologic factors are recognized, adequately interpreted, and presented for use by engineers in support of design and construction of civil engineering works.

2.2 Overlapping Areas of Practice

The GeoSpectrum that spans the disciplines of civil engineering and geology contains considerable overlap, and within the Engineers and Geoscientists Act there is no specific language addressing this overlap. *However, individual practitioners must not assume responsible charge of those practice areas in which they are not licensed*. The decision as to whether a practitioner is competent and qualified to perform a particular task must be made on an individual basis (as guided by PEGNL's Code of Ethics) and must reflect the practitioner's education, training, professional experience, and PEGNL-issued license. The term "responsible charge" used herein is defined as the licensed PEGNL member who conducts or directs the collection of field and laboratory data, evaluation, interpretation, analysis, modeling, and formulating conclusions and recommendations for the planning, design, and construction of the "built" and natural environments.

Figure 2 provides general guidance on those practice areas within the Geospectrum unique to either the engineering or geoscience professions, as well as potential areas of overlap of both professions.

Figure 2: General Guidance for Engineering Geology and Geotechnical Engineering within the GeoSpectrum.



Engineering Geology	Factual Data Gathering	Geotechnical Engineering
• Interpretation of origin/provenance • Nature & extent (depositional history) • Deformation history (kinematic or dynamic) • Glacial history (post-deposition effects) • Rationale for anisotropy & heterogeneity • Behavior under natural conditions (No direct interaction with the built environment)	• Factual information • Soil description (classification) • Water measurements (e.g., groundwater levels) • Geophysical monitoring (e.g., creep, pore pressure)	• Suitability for built environment/ specifications • Performance under changing artificial loads (factor of safety) • Behavior under artificial conditions • Modifications/amendments to earth materials • Design of structure made of, or in contact with, earth materials (e.g., earth dams, footings)

Taking into account the definitions given above and general guidance provided in the preceding Figure, the Tables 1, 2 and 3 have been developed to provide examples of common areas of practice within the GeoSpectrum under the general categories of:

- site characterization,
- analysis and design, and
- construction management, observation and documentation.

The examples shown in the Tables are considered by PEGNL as practice areas that fall within the profession of either engineering or geoscience. Some aspects of practice areas are recognized by PEGNL as being shared between both professions.

These examples do not constitute an exhaustive list of what exclusively constitutes engineering and geoscience practice within specific fields. For practice areas not included in these Tables, advice should be sought from PEGNL on a case-by-case basis.

Table 1: Site Characterization

Area Of Practice	Engineering	Geoscience
1. Site Characterization:		
Geologic Interpretation – Aerial Photography		✓
Geologic Mapping		✓
Geophysical Surveys		✓
Landslide Subsurface Exploration	✓	✓
Field Classification of Soil	✓	✓
Field Classification of Rock	✓	✓
Interpretation of Geologic Structure and Processes		✓
Characterizing groundwater occurrence (depth, gradient, flow directions)	✓	✓
Defining hydrostratigraphy and aquifer properties		✓
Assessing groundwater quality/hydrochemistry		✓

Table 2: Analysis and Design

Area Of Practice	Engineering	Geoscience
2. Analysis and Design:		
Seepage Analysis	✓	✓
Dewatering - System Criteria	✓	✓
Dewatering - Material/Equipment Design	✓	
Ground Deformation Analysis	✓	
Expansive/Collapsible Soil Analysis/Mitigation	✓	
Suitability Evaluation of Earth Construction Materials	✓	✓

Table 2: Analysis and Design (cont'd)

Area Of Practice	Engineering	Geoscience
2. Analysis and Design:		
Man-made Fill Quality Assessment	✓	
Slope Stability Analysis and Design – Earth and Rock Masses	✓	
Retaining Wall analysis and design	✓	
Soil or Rock Bearing Capacity Determination	✓	
Instrumentation Selection – Earth/Built Structure Interaction	✓	
Instrumentation Selection – Earth/Groundwater Analysis	✓	✓
Foundation Design	✓	
Effects of Groundwater (i.e. water content, flow, quality, pore pressures) on engineering analysis and design	✓	

Table 3: Construction Management, Observation and Documentation

Area Of Practice	Engineering	Geoscience
3. Construction Management, Observation and Documentation:		
Geologic Conditions		✓
Groundwater Control	✓	✓
Ground Improvement/Stabilization	✓	
Geo-Synthetics – specification and application	✓	

2.3 Interdisciplinary Collaboration

Professional members must ensure that they only accept professional responsibility for engineering or geoscience work for which they are qualified, competent and licensed. For certain complex, large-scale projects (e.g., dams, tunnels, underground mines) and areas characterized by complicated or problematic geology (e.g., marine settings, areas with known or suspected slope stability issues, areas containing sensitive marine clays, karstic terrain), professional engineers and geoscientists should work as a team to understand the site characteristics and geological setting so that these conditions are appropriately accounted for in the analysis and design of engineering works.

This collaborative effort shall be demonstrated through the authentication (signing and stamping) by those professionals (regardless of professional category) who jointly produce and co-author documentation for which they assume professional responsibility.