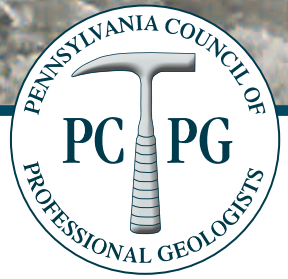


## What does a Professional Geologist do for

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# PA SOIL INVESTIGATIONS

A Professional Geologist (PG) works on soil investigations to determine suitability for various uses and to investigate potential environmental issues.

- A soil investigation may be a standalone project such as a geotechnical evaluation for a road/structure construction or part of a larger job for a landfill design, stormwater management, wetland mitigation, wastewater recycling or contamination event.
- The PG uses two distinct soil classification systems that are appropriate for different purposes. The United States Department of Agriculture (USDA) system is suitable for environmental and agricultural purposes while the Unified Soil Classification system (USCS) is for engineering and geotechnical uses.
- The PG defines the soil investigation area which may include the surrounding watershed drainage area or adjacent facilities and uses the Web Soil Survey to find the soil series mapped for the site.
- For a geotechnical investigation, the PG is responsible for appropriate soil sampling through soil probes, test pits or drilling, takes samples and classifies the soils using the USCS standard designations to describe grain size as sand, silt, or clay, the percent of each component and its angularity or roundness.
- The PG coordinates with a Geotechnical Engineer when needed and determines if geotechnical testing, whether in situ or laboratory, for load bearing, shear strength, compaction, or permeability is required based on the type of project.
- The PG interprets the results of all field soil tests based on the particular end use; for example, soil load-bearing properties for a building or infiltration amounts for an earthen dam.
- The PG provides oversight during design and construction of a stormwater or wastewater infiltration system to be certain that conditions on the site have not changed and that design parameters are met.
- The PG supervises soil permeability tests and profile descriptions using the USDA system which includes factors such as particle size distribution, structure, consistence, parent material, organic content, drainage classification and infiltration conditions.
- Based upon the results obtained, the PG may need to calculate the appropriate long-term application rates (LTAR) of stormwater or wastewater to avoid hydraulic overload. An understanding of permeability and groundwater mounding is valuable in this process.
- For a wetland investigation, the PG first reviews published data for wetland locations and does a field inspection to delineate the wetland boundaries.



A thorough soils investigation uses the right tools for the job including a Munsell color chart, spray bottle and a gps receiver; used here to describe soil developed in loess overlying fluvial deposits.



Soil descriptions are best done in situ to maintain context, such as here examining recent pyroclastic deposits now in the process of becoming soil.

- The PG determines if a Certified Professional Soil Scientist or a Wetland Scientist should be involved. The PG oversees a wetland scientist's delineations in accordance with Army Corps of Engineers methodology.
- Prior to any disturbance the PG obtains permits from the Pennsylvania Department of Environmental Protection (PADEP) and/or the Army Corps of Engineers depending on the size and nature of the project.
- The PG oversees any disturbances to the wetland to make sure the work is done properly to limit any impacts. When a wetland can't be avoided and needs partially or completely removed for the planned activity, the PG works to design and create another wetland in a nearby area as a habitat replacement.
- When a former industrial site is redeveloped for a new purpose, the PG conducts a Phase I Environmental Site Assessment which is a review of the current and past uses at the site to identify if there are any potential Contaminants of Concern (COC) that must be characterized.
- The PG reviews historical aerial photographs for previous site uses that may have impacted the soil.
- If COCs are identified the PG develops, implements and provides a Phase II Environmental Assessment to further characterize the site.
- The PG determines the appropriate areas for additional investigation and communicates with regulatory agencies (i.e. municipality, multi-municipal, county agency or PADEP) to determine the suitable testing.
- The PG collects soil, sediment, or soil gas samples to quantify the levels of COCs in the soil.
- The PG prepares a full report of the soil investigation and applies their professional seal to show they are responsible for the collected data, analysis and conclusions. The report is sent to the appropriate regulatory agency for review.
- If contamination is discovered, the PG communicates with the PADEP to plan, develop and coordinate a remediation plan including the Planning Modules required to be submitted.
- The PG oversees any soil clean-up during the remediation which may include removal and disposal at an approved facility, treatment through biological or other additives, or by extracting the soil vapor which pulls contaminants out of the soil matrix.

**The PG typically works with geotechnical engineers, soil scientists, wetland scientists, construction contractors, drilling contractors, biologists, remediation specialists, permitting professionals, PADEP and Sewage Enforcement Officers.**

### **Work Resources:**

Computers, AutoCAD/GIS, modeling and analysis software, historical reports, aerial photography.

### **Work Environment:**

Office and field work. Field work may entail irregular or evening/weekend hours depending on the type of project and working in varying outdoor conditions throughout the year.

### **Helpful Skills & Experience:**

Field soil testing methods, research skills, drilling techniques, ability to read engineering and construction drawings, an understanding of engineering design, construction equipment and methods, and negotiations with DEP.

### **Tools of the Trade:**

Cone penetrometers, soil probes, chain of custody documentation, hand auger, soil sampling drill rig, permeameters, and Munsell color charts.