

COMPETENCY PROFILE:

ENVIRONMENTAL ENGINEER

ROLE OVERVIEW

Environmental engineers apply principles from various disciplines, such as science and engineering, to address environmental challenges. Their main objective is to safeguard human health and the environment by creating solutions for pollution control, waste management, and resource conservation. They work to mitigate or prevent air, soil, and water contamination, study potential environmental impacts, and develop solutions to reduce them.

Joint environmental engineering projects include land reclamation, water and wastewater treatment, greenhouse gas reduction, carbon capture and sequestration, dams, reducing air pollutants, and many more. Environmental engineers play a critical role in safeguarding the environment and promoting sustainability by addressing complex environmental challenges innovatively.

ALSO KNOWN AS:

- Conservation Engineer
- Environmental Engineering Specialist
- Pollution Engineer
- Sanitary Engineer
- Water Pollution Engineer

NATIONAL OCCUPATIONAL CLASSIFICATION:

- 21300 – Civil engineers

EDUCATION AND EXPERIENCE

- Specifically, bachelor's degrees in chemical or environmental engineering are often required due to their focus on environmental issues.
- Broad coursework includes water and air pollution control, waste management, sustainable design, and pollutant studies, providing a comprehensive understanding necessary for the field.
- Depending on the role, a few years of relevant work experience may be necessary to apply theoretical knowledge to practical environmental challenges.
- Gaining work experience through internships, co-op programs, or entry-level positions in environmental engineering can help develop hands-on skills and industry knowledge.

TECHNICAL



Data Analysis

Adheres to established organizational best practices for processes to maintain quality in data collection, analysis, and management.

- Evaluates operational data to evaluate environmental operations, processes, or products to ensure efficiency.
 - Maintains historical information on operational environmental/contaminant data to reference and track overall trends.
 - Works with environmental/safety teams to ensure that the environmental data and their intended use are appropriate
 - Translates environmental monitoring reports for determining the impacts of tested results on the environment.
 - Analyzes environmental performance data for air, water, and soil to ensure regulatory compliance.
 - Monitors and develops trends and compares against the region's benchmark or environmental quality parameters.
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Engineering Planning

Identify the applicable codes and standards and understand their implications to conceptualize ideas into practical solutions cost-effectively.

- Effectively plans for resources, including workforce, budget, and logistics, for smooth execution of environmental projects.
- Timely identifies the environmental permit requirements for the new and retrofit projects.
- Identifies internal and external stakeholders who may have an interest or be impacted by projects.
- Plans for environmental studies and assessment as appropriate for the jurisdiction.
- Creates a plan to monitor the environment, ensuring the project or operations comply with environmental regulations.
- Organizes assessments of environmental aspects and impacts and prepares the scope of work and requests for quotations.

- Lists various options and conducts tests to determine their feasibility and effectiveness.
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Engineering Design and Development

Designs and develops the technical and environmental aspects of engineering project[s] to ensure the project is environmentally friendly, timely, and safe.

- Write a preliminary assessment report explaining the rationale behind the proposed option and the plan.
 - Designs and implements environmental compliance and management systems for the company and project.
 - Develops environmental training for staff and contractors to ensure a standard of knowledge.
 - Prepares environmental compliance requirements and modifies technical specifications and drawings to ensure operational and environmental compliance and controls for a facility and projects.
 - Considers risk-based and best practices to design effective engineering solutions for environmental problems.
 - Designs and implements systems and processes to mitigate pollution and manage waste.
 - Designs and develops wastewater treatment and recycling solutions to improve operations.
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Engineering Review and Analysis

Reviews and analyzes relevant technical design and complex system information to develop appropriate solutions.

- Conducts site-specific environmental audits and risk assessments of the work area, identifying environmental hazards and implementing the required corrective and preventive measures.
 - Conducts studies and analyzes air, water, and soil quality data to determine what contaminants or pollutants may be present.
 - Evaluates environmental data to assess the environmental performance and identify areas for improvement for the facility or project.
 - Provides feedback and input for environmentally friendly solutions to ensure functionality and cost-effectiveness for the proposed solutions.
 - Ensures the accuracy of environmental monitoring equipment, performs, or arranges for calibration, and maintains records and systems to ensure fit-for-purpose usage of equipment
 - Conducts studies and analyzes air, water, and soil quality data to determine what contaminants or pollutants may be present.
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Quality Assurance and Control

Adheres to processes guided by national and international environmental regulations, codes, standards, and industry best practices to uphold quality across all operations and projects.

- Analyze environmental proposals and specifications to determine what needs to be done to protect the environment.
- Directs testing activities for environmental components and equipment under designated conditions to ensure operational performance meets environmental standards with proven reliability.
- Regularly tests the efficacy of designed solutions to ensure they continue to work as intended.

- Review operational data to assess the efficiency of operations, processes, or products.
 - Maintains historical information on operational data to reference and corresponding sources.
 - Applies appropriate processes to trace and record the data to understand its movements within the organization.
 - Works with environmental/safety teams to ensure new chemicals are logged, necessary data attached, and proper labelling is affixed.
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Project Management

Works within a team of professionals to effectively and efficiently produce the required environmental outputs to ensure project[s] are completed on time and within budget.

- Contributes to developing project plans and setting milestones to facilitate successful completion.
- Implements technical solutions and other corrective actions to ensure timely project delivery.
- Ensures that available resources are appropriately allocated to ensure optimal efficiency.
- Documents and shares insights gained from project execution to enhance future efforts in minimizing environmental contaminant risks efficiently
- Manages tasks according to the approved scope of work to deliver quality reports on schedule and within budget.



Attention to Detail

Reviews completed work by monitoring and checking information and organizing tasks and resources efficiently to achieve objectives.

- Catches and corrects errors or omissions, where applicable, to reduce future performance issues so that products, systems, or applications operate as expected.
- Reassures the accuracy of the information and technical specifications to provide accurate and consistent work.
- Ensures the accuracy of calculations in designing and implementing engineered solutions.
- Identifies key variables in environmental projects to develop precise and effective solutions.
- Establishes procedures or processes to validate environmental information to minimize disruptions to ensure the project meets deliverables.

Communication

Positively directs outcomes by delivering communication that better understands goals and objectives, captures interest, and gains support for immediate action.

- Explains novel or complex engineering concepts and related facts appropriately to communicate aspects of the design process and/or proposal to an audience.
- Actively listens to team members to address concerns and integrate ideas, values, and new information, where appropriate.
- Communicates manufacturing capabilities, product development schedules, or other information to facilitate production processes.
- Utilizes unambiguous language for communication to aid team members in accomplishing their objectives more efficiently or effectively.

Problem-Solving

Identifies problems and uses logic, judgment, and evidence to evaluate alternative scenarios and recommend solutions to achieve a desired goal.

- Conducts root cause analyses to identify issues or failures to develop innovative solutions.
- Analyzes problems and relevant information, including any data, to evaluate environmental operational challenges and identify solutions to prevent recurrence.
- Considers several possible explanations or alternatives for a situation that anticipates potential obstacles and develops plans to overcome them.
- Uses a mix of logic and creativity to devise innovative and thoughtful solutions for environmental issues.



Regulatory Compliance

Adheres to specific regulations, codes, and legislation within a defined jurisdiction to ensure the health and safety of others.

- Review applicable laws, regulations, and standards to guarantee project compliance.
- Participates in developing internal policy and procedures to ensure assessments are conducted as per all legal requirements.
- Applies engineering codes and statutes of the relevant jurisdiction to design environmental solutions to ensure the design meets environmental and safety standards.
- Conducts environmental impact assessments for projects to guide pollution control measures.



Environmental Assessments

Conducts field surveys to collect information on the area's ecosystem, landscape, or organisms to determine the impacts of human activity and the intra-ecosystem relationships.

- Writes reports on field findings, including soil, air, and water quality, to summarize and disseminate observations.
- Uses survey equipment and instrumentation to collect samples and data to identify site characteristics.
- Analyze observed data to assess the environmental impact during project life cycles and propose cost-effective and viable solutions.
- Applies appropriate techniques to conduct field surveys to ensure data is accurate, reproducible, and relevant to the survey plan.

Environmental Remediation

Implements and monitors engineered systems and utilizes equipment and sensor technologies to identify and mitigate contaminants or other pollutants in different environments and gauge the effectiveness of remediation activities.

- Recommends and advises on environmental remediation engineering technologies to incorporate diverse perspectives and backgrounds into proposed solutions.
- Develop environmental remediation strategies.
- Leads environmental site assessments, including remediation and associated reporting, to assess the impact of human activities.
- Performs geotechnical studies, field tests, and analysis to provide expert engineering advice and recommendations for environmental projects.