

COMPETENCY PROFILE:

# <sup>Z</sup> WASTEWATER ENGINEER

## ROLE OVERVIEW

Wastewater engineers oversee and design projects involving the treatment, collection and disposal of wastewater, sewage systems, pollution prevention planning, and stormwater management systems. Occasionally, they are engaged in concept planning, engineering design selection, and project management of engineering consultants. Wastewater engineers also provide technical support during project planning, design and implementation regarding underground and drainage infrastructure repair, maintenance, and rehabilitation.

Wastewater engineers are proficient in various design activities relating to detailed drawings, reports, document preparation and treatment processes. They are expected to lead, manage, and supervise junior technicians as well as external consultants during the implementation of water projects. Wastewater engineers often interact with public and private sector clients for business development and relationship management, as well as multidisciplinary project teams, to execute project needs.

## ALSO KNOWN AS:

- Water Engineer
- Utilities Engineer
- Wastewater System Engineer
- Wastewater Engineering Specialists
- Water Projects Engineer

## NATIONAL OCCUPATIONAL CLASSIFICATION:

- 21300 – Civil engineers

## EDUCATION AND EXPERIENCE

- A bachelor's degree, preferably in civil engineering, is often required, providing the necessary theoretical and technical foundation.
- A minimum of years of related work experience demonstrating the practical application of engineering principles in wastewater management is often required.
- Software proficiency in geographic information systems, WaterCAD, Personal Computer Storm Water Management Model (PCSWMM), and other relevant engineering software for designing and analyzing wastewater systems.
- In specific locations, such as Alberta and Canada, licensure through a professional association, such as the Association of Professional Engineers and Geoscientists of Alberta (APEGA), may be necessary, adhering to professional and ethical standards.
- A licensed member of a registered professional association ensures adherence to industry standards and continuous professional development.

## TECHNICAL



### Scientific Research

Applies scientific methods and techniques using empirical and/or measurable observations in their research to improve, correct, or increase knowledge in a field of study to solve specific problems.

- Collects environmental data on specific areas to gain a more holistic interpretation of an area's environment to support program delivery.
- Conducts research and provides consultation on the processes and determinants of environmental occurrences to manipulate and predict their changes.
- Plans and executes scientific studies to gain information on a specific matter.
- Conducts research with the social science, engineering, and economic communities to create suitable strategies for mitigating environmental risks.

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### Budget and Cost Management

Develops comprehensive plans to create, monitor, and evaluate operational budgets and costs to account for all project activities and spending so that operations are financially sustainable.

- Monitors the operating cost and budget metrics of site processes, procedures, and performance to ensure operations remain viable.
- Provides senior leadership with input in developing a cost management plan to manage project costs, possibilities, and limitations.
- Documents all resource and financial costs to ensure accurate accounting of project stages.
- Documents and reports on the site operations costs and budget metrics to communicate potential profits and losses to external stakeholders and internal decision-makers.

- Leads the development of a cost management plan to establish procedures and documentation to manage project costs throughout the project lifecycle.
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## **Field Surveys**

Conducts field surveys to collect information on the area's ecosystem, landscape, or organisms to determine the viability of projects and the impacts of human activity on the ecosystems.

- Specifies a survey's aim, range, and goals to gather essential data while reducing the study's effects on the local environment.
  - Applies appropriate techniques to conduct field surveys to ensure data is accurate, reproducible, and relevant to the survey plan.
  - Uses survey equipment and instrumentation to collect and analyze samples and data to identify the site's natural characteristics.
  - Analyzes data gathered and formulates site-specific conclusions to improve the environment.
  - Identifies any potential contamination or pollution and develops plans to eliminate contamination and restore the site to its natural state.
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## **Database Administration**

Organizes and maintains databases to ensure that information is available and accessible to the organization to facilitate analysis, research, and decision-making.

- Maintains or modifies existing relevant databases to query and modify stored data to assess observed changes in data over time.
  - Compiles complex assessment data, conducts data gap analyses and prepares conceptual site models to communicate research findings and ensure that projects meet required criteria.
  - Provides technical support to users or clients to maintain, develop, or operate GIS databases or applications.
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## **Data Analysis**

Uses established statistical methods to analyze and interpret data, revealing trends, patterns, and opportunities that inform strategic decisions.

- Confirm data is sufficient and valid before analysis to ensure data collection within the current requirements of legislation, survey plans, and/or specifications.
- Uses appropriate methodologies and techniques to analyze field survey data to produce accurate, reliable, and unbiased results.
- Applies mathematical and scientific models to analyze and derive solutions to specific problems.
- Seeks feedback from other technical specialists to confirm interpretations and ensure all conclusions are aligned with the project plan.
- Prepares technical and research reports on observations, findings, and/or impacts to communicate results to stakeholders, industry, government, or the public.

- Uses data to generate solutions aligned with organizational goals.
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### **Project Coordination**

Coordinates components of program activities to improve the day-to-day functions within an organization's environmental programs.

- Consult and engage with expert, multidisciplinary technical team members to incorporate all relevant knowledge, data, and findings into the project.
  - Confers with other technical staff to disseminate field survey results to implement project activities.
  - Contributes to a multidisciplinary team to plan, implement and execute survey work to facilitate further project activities.
  - Meets with clients and/or stakeholders to discuss technical specifications, customized solutions, or operational problems to coordinate solutions and activities considering the project budget.
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### **Project Planning and Integration**

Develops a comprehensive project management plan outlining the execution, monitoring, and control of the project, incorporating all related plans needed to carry out essential actions and processes for completion.

- Defines the scope, strategy, and objectives for the technical aspects of projects and programs to establish parameters and deliverables.
  - Develops a work breakdown structure to provide the project team and relevant stakeholders with a detailed overview of the deliverables.
  - Tracks the progress of operational plans to adjust, assess the success of strategic objectives, incorporate lessons learned, and acknowledge contributions.
  - Maintains cost management of the project budget across all project planning and integration of activities throughout the project life cycle to ensure effective implementation.
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### **Risk Assessment and Management**

Identifies and analyzes project task risks to develop risk management policies and procedures to control hazards and mitigate risks.

- Engages stakeholders to gather diverse perspectives and insights to ensure comprehensive risk identification.
- Makes well-informed decisions based on the results of risk assessments to weigh potential benefits and drawbacks of alternative courses of action.
- Seeks input from stakeholders and peers to pinpoint improvement areas and apply necessary enhancements.
- Develops risk mitigation strategies and action plans to address specific risks and their root causes.
- Evaluate identified risks based on their likelihood of occurrence, potential impact, and relevance to organizational goals to mitigate existing risks effectively.



## Collaboration

Engages in professional collaborative efforts with other team members, including sharing information and expertise, utilizing input from others, and recognizing others' contributions to work towards a common goal.

- Ensures tasks are completed most efficiently to optimize workplace output.
- Works in partnership with other internal and external practitioners to execute projects.
- Shares relevant and valuable knowledge, experience, or expertise to aid team members in accomplishing their objectives more efficiently or effectively.
- Seeks input from other team member experts, subject to the complexity of a problem, to better analyze and achieve a more favourable, well-rounded resolution.

## Communication

Positively directs outcomes by delivering communication (both written and verbal) that results in a better understanding of goals and objectives captures interest, and gains support for immediate action.

- Interprets and presents data results to stakeholders and senior management to facilitate decision-making.
- Asks questions when assigned unfamiliar tasks to ensure understanding and accuracy.
- Prepares documentation for existing and upcoming products to describe functionality and composition and communicate technical specifications in plain language to a broad audience.
- Uses non-technical language to communicate effectively with team members of all experience levels.

## Problem-Solving

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

- Considers the impact on the organization and environment when analyzing specific project objectives and goals.
- Analyze data collected from the site to devise solutions that balance environmental considerations with the organization's requirements.
- Analyzes data to evaluate operations and understand trends and potential areas of concern to take appropriate action where required.
- Analyze project metrics to understand trends and potential areas of concern to take appropriate environmental actions where required.



## Regulatory Compliance

Evaluates the sustainability of an organization's policy(s) to develop suitable alternatives to support sustainable business practices.

- Identifies sustainability policies that align with organizational values to support the development of sustainable practices.
- Recommends valid policy alternatives to draw clear and measurable insights to evaluate new policy.
- Determine critical metrics to assess the effectiveness of current policies and practices and pinpoint areas needing enhancement.
- Combines research on best practices with stakeholder feedback to assess the current policy's effectiveness.

## Health, Safety and Environment (HSE) Compliance

Conduct inspections, oversee site remedial projects, and generate site reports to ensure that the operation complies with regulatory requirements, internal policies, and procedures, as well as client expectations.

- Implements regulatory monitoring applications to monitor regulatory changes to provide proactive compliance solutions.
- Conducts workplace inspections to verify adherence to relevant regulations, internal policies, procedures, and client expectations.
- Participates in the entire process of opening and monitoring HSE files for non-compliance to ensure that remedial action is taken to resolve issues.
- Supports the organization in meeting HSE regulatory reporting and permit requirements to avoid compliance-related disruptions to the operation.
- Records and tracks HSE successes and failures for statistical and reporting purposes, publishes essential results, including performance against critical organizational performance indicators, and informs decision-makers on the site.

*This profile is a living document. If you have any feedback or would like to help us improve the profile, please reach out to [research@eco.ca](mailto:research@eco.ca).*