



# Water Resources Engineer

## Job Description

Water Resource Engineers, also known as Hydraulic Engineers, manage and design projects to support community water supply systems. These engineers work closely with dams, bridges, canals, and other water-related infrastructure. Hydraulic engineers use their expertise to prevent flooding, enhance drainage systems, recommend improvements, and fix equipment.

## Salary

Entry — \$48,000  
Middle — \$78,000  
Top — \$90,000+

## Core Tasks

- Analyze watersheds and river flows with statistical analysis and Excel sheets
- Develop an understanding of local watersheds using detailed mapping softwares
- Research and design hydraulic equipment to support existing infrastructure
- Use modeling software to anticipate water supply trends and impacts on communities
- Survey flood zones, watersheds, dams, and other regions

## Workplace / Environment

- **Work hours**  
**Approx. 40 hours/week**  
(At key milestones overtime work may be required to meet deadlines)
- **Environment**  
Majority of time spent in the **office** using modeling software, with **occasional site visits** to understand water trends
- **Travel**  
Occasional travel to regions most impacted by **water supply systems** and **hydraulic equipment**

## Education / Prerequisites

### Education Level

Bachelors or Masters in Civil Engineer, with a focus on hydrology or water resources

### Licensing

P.E. (Professional Engineer) License usually required

### Pre-Job Preparation

Courses in water resources and hydrology, as well as experience with modeling and analysis softwares

## Experience

### Soft Skills

- Communication
- Organization
- Attentive Listening

### Technical Skills

- Ability to use modeling software such as HEC-RAS
- Proficiency in Microsoft Excel



## Career Path: Sonja Michelsen

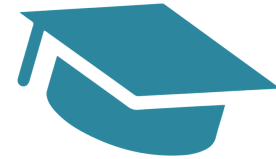
### About Me

Hydraulics Engineer for U.S. Army Corp of Engineers

Bachelors in Ecological Engineering at Oregon State University

### Education Choices

"One piece that has felt really important to me is what I studied in school. I went to Oregon State University for my Bachelor's degree and studied **Ecological Engineering**, which is kind of a unique program. It's sort of like Civil Engineering and Environmental Engineering, with more Biology and Ecology. Making the decision to study that was really helpful for me to understand broader systems and **focus more on water**. I had a lot of opportunities to take **classes** in water resources, as well as **work with professors and graduate students** to learn what they were studying."



"Although I didn't know exactly what I wanted to do when I started college, or even what I wanted to do with that major, entering Ecological Engineering really opened my eyes to the **ways to be an engineer**. I also feel like I learned what was going on in the environment, and not working exclusively with the grey built world, but more with the **green built space**."

### College Experiences



"I was really involved with **Engineers Without Borders** in college. Although I learned interesting technical skills there, it was really the **communication** and learning how to think about **projects on a bigger scale** that was helpful for me. I was president one year, and I did get to travel. The chapter I was involved with had a clean drinking water project in **Kenya**. Engineers Without Borders tries to be very intentional in how to help people. They are really trying to do right by these communities and provide the services that they want and need. It's a **long-term partnership**."

## Into the Workforce

"My time with the **Corps of Engineers** has been very impactful in my professional development —that has been my first major job after I got out of college. I **continue to learn a lot on the job** and to think critically about **watersheds** in interesting ways."

"Today, I am a **Hydraulic Engineer** for the Army Corps of Engineers, and so I get to work on a lot of different projects, but all of our projects are really focused on serving the public. I focus specifically on **flood risk reduction** and flood protection projects. This has included developing flood inundation maps, essentially where water might be in case of a flood, as well as making decisions on how much water to store behind a dam.

"It's also things like water management. The Corps of Engineers operates a lot of dams, and we provide flood risk reduction to try to protect people and property. We need to make day-to-day decisions in considering how much water we hold back behind the dam and how much water we release into the river. I'm involved with the **decision-making process**. We have to narrow down all of the natural variability in the world and conflicting stakeholder needs to make decisions around water."

"The cool thing about water is that there are **unique challenges** and questions everywhere. I worked in **Omaha, Nebraska** for a little while and I grew up in the **desert**. It's pretty interesting to get to know an area and all of the unique challenges that it presents."

## About My Job

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"I get to use science and ecology to study landscapes as a paying job."

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### Pros

- "I'm a federal employee, so I get to **serve the public**, which I think is really unique compared to other private industry people who are also working on water issues."
- "I also like being able to work on a really **wide range of projects**. It's a lot of things, largely focused on understanding the natural world, but also dam operations, where water is during a flood, and how to protect communities."
- "I enjoy **communicating** with the public. We get to communicate in public meetings and explain what we're doing on rivers."

### Cons

- "I really appreciate working for a public service agency, but it can **move more slowly** than other other groups."
- "Sometimes there's **red tape**, or **bureaucracy**, or just so many **acronyms** when working for the government —there is some truth behind those stereotypes. That can be challenging sometimes."

## Fieldwork

- "Some of my work includes going out and doing **surveying work**. I've gotten to go survey sandbars in the Missouri River at one point for a project."
- "We go out **after a flood** because we want information about where the water flowed. We survey high watermarks or places where floodwater was to make sure our models and real-world conditions line up."
- "My job has included various dam and levee **inspections**, because the Corps of Engineers has a lot of public infrastructure. I get to go out and do inspections of those to make sure that they're safe and operating correctly."

## Skills

- "I think it comes up a lot with almost any job, but **communication** is super important—being able to communicate verbally and then also in written form. In my job, there are a lot of projects in which we **collaborate and communicate with various stakeholders** across the region. Communication is a skill that will set you apart in any field that you're in."
- "Being able to **synthesize information** well—it's easy to just fire off an email or a message, but including all of the pertinent pieces in a clear way is really important for success."
- "**Listening** and **curiosity** to really understand a situation is important. Don't assume that you fully know what's going on, especially in environmental or naturally variable systems. It's important to be **willing to explore and learn**, knowing that it's an ongoing process."

## Office Work

- "Despite occasional fieldwork, I spend **most of my time in the office**."
- "My work includes math, statistical analysis, and computer modeling. It's important to have an understanding of statistics and be really proficient in Excel, or even higher level **data analytic programs**."
- "We also utilize **hydraulic or hydrologic models**— I use computer models to understand how much rain will runoff into a river, where that river water goes, and even compare reservoir operation scenarios. "

## Education/Experience

- "I got my **Bachelor's** and then I got my **PE—professional engineering—license**. With my co-workers in the federal public service, I would say that about half of folks have a higher level degree versus just having a Bachelor's degree."
- "Experience with **Geographic Information Systems (GIS)** has been super helpful for me. I think in a lot of environmental or sustainability-focused work you want to understand the landscape."
- "I was able to take a bunch of different **water resource classes** as an undergrad. Civil engineering can be so broad, but I was able to really **specialize**."
- "My **computer modeling** experience has been really helpful. That really set me apart when I was applying for jobs. For my position, that's things like HEC-RAS, and some other **software tools** from the Corps of Engineers that are used across the industry."

# The Future of **Water Resources Engineering**

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"We can do so much more with computers"

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"One consideration for the future is incorporating **climate change** in analysis and decisions. Climate, **rainfall** and **river flow**—it's all really tied together. Most of the work we do assumes stationarity or assumes that what we've seen in the past is the same as what we'll see in the future. That's not the case. Trying to capture all that change and uncertainty is a really big field and focus."

"The second big opportunity is really capturing the **computer and modeling advancements**. We can do so much more with computers. A lot of the work I do focuses on forecasting and trying to understand what will happen in the future. Previously, you'd have one forecast, but now it is possible to use a bunch of different models—a bunch of different possible futures—to capture a **bigger range of possibilities**. The work that I see moving forward is trying to capture and explain all that variability in a creative new way."