



Performance Task: Stormwater Engineers



PART 1: RESEARCH

Student Directions:

Your assignment:

Engineers are a key to problem solving in our environment. You will watch two informational videos about stormwater management and read the job description for a stormwater engineer, taking notes on these sources. Then you will respond to three research questions and write an article explaining the important work of a stormwater engineer.

Steps you will be following:

To plan and write your essay, you will do all the following:

1. Watch two videos and read a job description for a stormwater engineer.
2. Answer three questions about the sources.
3. Plan and write your article.

Directions for beginning:

You will now watch two videos and read a job description, taking notes from these three sources. You may use these notes in responding to the three questions and in writing your article. You can refer to any of the sources as often as you like.

Source Information:

Source #1: **Stormwater Runoff 101 (3:07)**
Video #1 <https://www.youtube.com/watch?v=V6DggjiWrTs>

Source #2: **Water Resources Engineer CAREERwise Education (4:50)**
Video #2 <https://www.youtube.com/watch?v=jQCKhGVp8c0>

Source #3
Reading City of Happyville Stormwater Engineer Job Posting



NOTE TAKING TOOL

Video #1: Stormwater 101

Video #2: Water Resource Engineer

Reading #1: Job Posting

What stormwater is	Why stormwater pollution is a problem	Ways to manage stormwater pollution
What a Stormwater Engineer does	Why this job is important	Key Qualifications

Job Posting: Stormwater Engineer

Department: Public Works, City of Happyville, USA
Start Date: Immediately After Hiring
Salary Range: \$64,776 to \$85,356

Job Description:

The stormwater engineer is responsible for designing solutions to complex stormwater management problems. This person will provide leadership for managing surface water runoff including designing gray and green stormwater solutions. Gray solutions may include storm drains, culverts, and pervious pavement; green solutions may include rain gardens, green roofs and bioswales to name a few. The stormwater engineer will manage all projects within the local watershed including watershed planning and stream restoration.

Qualifications:

Candidates must have knowledge of the following:

- Stormwater drainage systems and erosion control
- Gray and Green stormwater solutions
- Federal, state, and local laws and codes related to stormwater management including water quality standards and the Endangered Species Act
- Water quality testing methods
- Best Management Practices (BMP's) for maintaining a clean and healthy environment
- Computer programs including computer aided drafting and design software and Geographic Information Systems (GIS)
- Principles of environmental science
- Office software programs such as Outlook, Word, Excel, and PowerPoint

Skills and Abilities:

- The ability to analyze problems and come up with creative solutions (Complex Thinker)
- Exceptional communication and interpersonal skills, both written and verbal (Effective Communicator)
- The ability to read and interpret civil engineering plans and designs (Effective Communicator)
- The ability to work as a member of a team (Collaborative Worker)

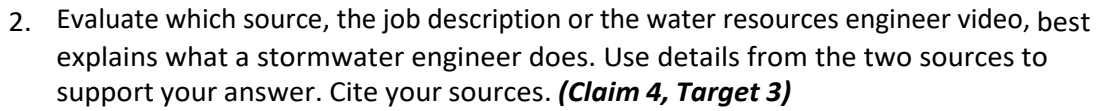
Education and Experience:

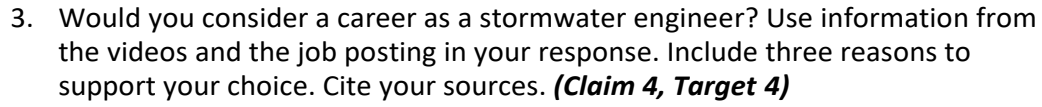
- Bachelor's Degree in Civil Engineering or Environmental Science or other education and training that results in the ability to demonstrate the knowledge and skills outlined in this job description
- Two years prior experience working in a public works or stormwater environmental department



1. Explain the importance of stormwater management. Use details from at least two of the three sources to support your answer. Cite your sources. **(Claim 4, Target 2)**

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.







PART 2: FIELD INVESTIGATION

Teachers are encouraged to engage the students in mapping the school campus for grey and green stormwater solutions. Directions for mapping the campus can be found in Drain Rangers *Engineering Solutions* published by PEI and free to download from the website. This guide provides lessons in stormwater engineering where students design solutions for stormwater problems on their school campus.

Discussion questions might include the following:

- What is stormwater runoff and how can we monitor this on our school campus?
- Why are stormwater engineers important to a community?
- Does our community have a stormwater engineer and if so, who is this person?
- How are engineers different from scientists?
- What can we as individuals do to support the goal of clean water?

In addition, teachers may want to consider one or more of the following field investigations:

- Engineering Solutions-Engineering Design Puget Sound Starts Here: <http://www.pugetsoundstartshere.org/drain-rangers>
- Aquatic WILD: Where Does Water Run? P44
- Permeability study: <http://www.pltwa.com/soils-as-sponges-fi-and-assessment.html>
- Seattle utilities: <http://www.seattle.gov/Util/EnvironmentConservation/Education/index.htm>

Other ideas for field investigations:



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PART 3: ESSAY

Student Directions:

Take time to review your notes and sources, and plan, draft, and revise your article. You may also refer to the answers you wrote to the questions in Part 1, but you cannot change those answers. Now read your assignment and the information about how your essay will be scored.

Your assignment:

You have been asked by the City of Happyville to write an article for hiring a stormwater engineer. Your article should explain what a stormwater engineer does and why this job is important to the wellbeing of the environment.

Include the following information:

- Problems we face from stormwater pollution
- Role of the engineer in solving these problems (stormwater solutions)
- Important qualities stormwater engineer needs to be successful in the job

Essay Scoring

How your essay will be scored:

The people scoring your essay will be assigning scores for

- Statement of Purpose/Focus*** – how well you clearly state and maintain your controlling idea or main idea
- Organization*** – how well the ideas progress from the introduction to the conclusion using effective transitions and how well you stay on topic throughout the essay
- Elaboration of Evidence*** – how well you provide evidence from sources about your topic and elaborate with specific information
- Language and Vocabulary*** – how well you effectively express ideas using precise language that is appropriate for your audience and purpose
- Conventions*** – how well you follow the rules of usage, punctuation, capitalization, and spelling

Now begin work on your essay.

Manage your time carefully so that you can:

- Plan your essay
- Write your essay
- Revise and edit for a final draft



**PLANNING MY
ESSAY**

Introduction—Statement of Purpose:

Problems we face from stormwater pollution:

Role of the engineer in solving these problems (stormwater solutions):

The most important qualities a stormwater engineer needs to be successful in the job:

Conclusion:



Scoring Notes: Stormwater Engineers



1. Explain the importance of stormwater management. Use details from at least two of the sources to support your answer. Cite your sources. (*Claim 4, Target 2*)

Analyze/Integrate Information Rubric (Claim 4, Target 2)	
2	<ul style="list-style-type: none">• The response gives sufficient evidence of the ability to gather, analyze, and integrate information within and among multiple sources of information.
1	<ul style="list-style-type: none">• The response gives limited evidence of the ability to gather, analyze, and integrate information within and among multiple sources of information.
0	<ul style="list-style-type: none">• A response gets no credit if it provides no evidence of the ability to gather, analyze, and integrate information within and among multiple sources of information.

Scoring Notes:

- **Video #1:** Stormwater management helps to prevent pollution in the waters, keeping people healthy and the economy strong. It also leads to creating ways to collect the water before it becomes polluted like rain barrels and permeable concrete.
- **Video #2:** Stormwater management helps to prevent urban flooding. Stormwater management also keeps our environment healthy for the future. Tools used help to monitor the water quality.
- **Job Description:** Stormwater management keeps our water safe, helps to control erosion, and protects the environment from pollution. The stormwater manager also designs solutions for stormwater runoff. (Other possibilities on job description)

2 Points:

- Provides two specific details that explain the importance of stormwater management.
- References two of the three sources.
- Names the sources.

1 Point:

- Provides one detail from one or two of the sources that explains the importance of stormwater management.
- May or may not name the source.

0 Points:

- No connection is made to stormwater management
- No relevant details are provided.
- Off topic response



Scoring Notes: Stormwater Engineers



Sample 2 Point Responses:

Example #1: From video #1 it says that stormwater management is important because it tries to stop the rain from getting polluted and makes things like concrete that absorbs water and putting barrels underneath gutters so that they collect the water. From the text, it says that the stormwater management is responsible for designing solutions to complex stormwater problems. This includes water runoff. From video #2, it says that stormwater management is supposed to make the water clean and healthy using tools like the turbidity tool for monitoring and make it so the water doesn't overflow the streams.

Example #2: Stormwater management is important to our community. In Video #1, rainwater hits our pavements and gets into our storm drains and picks up litter such as car oil, trash, water bottles, and paper. All that litter gets into our storm drains. In Video #2, GIS software and computers also help very much to test water. Turbidity meters that use light check the clarity of the water. All these tools help to monitor the water, so we can drink it.

Example #3: Stormwater management is important for many reasons. In video #1, it says you can get sick from stormwater runoff. In video #2, it says everyone needs water to live. So, I personally think we need stormwater management to stay healthy and be able to drink the water.

Sample 1 Point Responses:

Example #1: If we did not do stormwater management the runoff would pick up pollutants such as trash and car oil. That would then flow into oceans and if we swim, we can get sick. (Provides only one detail. Does not name the sources.)

Example #2: Stormwater management is important because stormwater polluted water that affects water bodies. And if we don't stop stormwater, we won't have any clean water. And if we don't have clean water or any water we won't live right. Permeable pavement and rain barrels will help with stormwater management. In Water Resources Engineering video, they use a turbidimeter and transparency tube to measure water clarity. (Only one source is referenced.)

Sample 0 Point Responses:

Example #1: There are many problems we face with stormwater runoff. Car oil gets picked up by runoff and is carried to streams where it in turn kills millions of fish. People can get sick swimming in polluted beach. (No connection is made to stormwater management.)

Example #2: Pollution and stormwater because pollution kills, and stormwater takes pollution with it. Then the pollution kills fish. Also, then you can't swim at beaches. (No connection is made to stormwater management.)



Scoring Notes: Stormwater Engineers



2. Evaluate which source, the job description or the water resource engineer video, best explains what a stormwater engineer does. Use details from the sources to support your answer. Cite your sources. (Claim 4, Target 3)

Use Evidence Rubric (Claim 4, Target 3)	
2	The response gives sufficient evidence of the ability to distinguish relevant from irrelevant information such as fact from opinion.
1	The response gives limited evidence of the ability to distinguish relevant from irrelevant information such as fact from opinion.
0	A response gets no credit if it provides no evidence of the ability to distinguish relevant from irrelevant information such as fact from opinion.

Scoring Notes:

- Students must select either the job description or the Water Resource Engineer video and not both.
- Arguments for the video may include the following:
 - The video shows us what a stormwater engineer does rather than just telling us as in the job description. We see things like water testing and using technology on the job.
- Arguments for the job description may include the following:
 - The job description provides lots of details regarding what a stormwater engineer does. For example, we learn that a stormwater engineer must solve complex problems, work with city government, manage stormwater runoff, design gray and green infrastructures, do watershed planning, and stream restoration maintenance.

2 Points:

- Selects either the job description or the video.
- Provides a general statement arguing for the resource selected.
- Includes at least one specific example from that source.
- References the other source in comparison.
- References the sources.

1 Point:

- Selects one of the sources.
- Does not compare the source selected to the other source.
- Provides a general statement with no specific example from the source selected.
- May or may not reference the sources.

0 Point:

- Unclear which source is selected or a source is selected with no rationale.
- Off topic response



Scoring Notes: Stormwater Engineers



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Sample 2-point responses:

Example #1: I think video 2 for water resource engineer video explains best because it shows you what you need to do or must be able to do to be a stormwater engineer. The job description lists qualifications but doesn't show what it looks like to do the job. In the video, the engineer uses GIS (Geographic Information software). She also uses a transparency tube which allows you to see how clear the water is and a turbidimeter which is a small machine that uses light to also measure water clarity.

Example #2: I think video 2 is the best source. I think video 2 is best because it's coming from an actual stormwater engineer and we see what she does. The job description says stormwater engineers design solutions to complex stormwater management problems. But video 2 says two things about what a stormwater engineer does. #1: They locate bad or polluted waters. #2: They fix the stormwater problems. I hope you understand that video the best resource to understand what stormwater engineer does.

Example #3: I think the job description best explains what a stormwater engineer does because it just explains exactly what the job responsibilities are. In the video 2 it says a lot of what most stormwater engineers do but it also says a lot of what she does like she said, "I use a computer every day." And maybe not all stormwater engineers use a computer every day. The job description, on the other hand, is very detailed and specific.

Sample 1-point responses:

Example #1: I think it was video 2 because she was an engineer herself. And what I learned from it was that she used a thing to see how clear the water was, and she used another thing where you put water in it and it uses light to check the water. (Provides a reasonable rationale for selecting video 2 (she was an engineer herself) but does not reference the job description.)

Example #2: The article best explains what a stormwater engineer does. It says a stormwater engineer designs solution to stormwater management problems and will review and assure the quality of the problems. (Does not reference the other source in comparison.)

Sample 0-point responses:

Example #1: A stormwater engineer is responsible for designing solutions to complex stormwater management problems. A stormwater engineer will engineer, review, and assure the quality of project designs for county stormwater management. (Off topic response. Does not select one of the sources as best explaining what a stormwater engineer does. Lists information in a source but does not answer the question.)

Example #2: In video 2, it says stormwater engineers work on water quality in their states. Readings. Also, it says that stormwater engineers design solutions to complex stormwater management problems. And quality control on all storm water management. (Does not select one source as better than the other with reasons.)



Scoring Notes: Stormwater Engineers



3. **Would you consider a career as a stormwater engineer? Use information from the videos and the job posting in your response. Include three reasons to support your choice. Cite your sources. (Claim 4, Target 4)**

Use Evidence Rubric (Claim 4, Target 4)	
2	<ul style="list-style-type: none">The response gives sufficient evidence of the ability to cite evidence to support arguments and/or ideas.
1	<ul style="list-style-type: none">The response gives limited evidence of the ability to cite evidence to support arguments and/or ideas.
0	<ul style="list-style-type: none">A response gets no credit if it provides no evidence of the ability to cite evidence to support arguments and/or ideas.

Scoring Notes:

- States a position: “Yes, I would consider a career as a stormwater engineer” or “No, I would not consider a career as a stormwater engineer.” Or “I don’t know because....”
- Provides at least three specific reasons for the position stated.
- Uses information from at least one of the videos and the job posting in the response.
- References the sources

2 Points:

- Includes all of the above

1 Point:

- States a position
- Provides one or two specific reasons for the position stated.
- Uses information from only one source.
- May or may not reference the sources.

0 Points:

- No clear position is stated, or a position is stated with no specific evidence to support it.
- Sources are not referenced.
- Off topic.

Sample 2-point responses:

Example #1: Yes! Yes! Yes! I would love to be a stormwater engineer. I love to do STEM science, technology, engineering and math and all of these are included in being a stormwater engineer. I would get to use technology on the job. Also, the posting states you need skills and have the responsibility for the design and testing of projects. I like design work. When video 2 told me that the engineers have to work hard, I still wanted the job!



Scoring Notes: Stormwater Engineers



○ **Example #2:** I would consider this a career because I like to solve problems. In the article, they said that stormwater engineers are always responsible for stormwater problems. They also manage surface water runoff designing green and gray infrastructures. In video #1, they said that this awesome pavement can really soak in water, so this polluted water will soak in the water and if they plant more grass they can improve the environment. I like improving the environment. In video 2, they explained that they try to monitor water even close to a $\frac{1}{4}$ of an inch. Also, a lot of people get their master's degree and I would like to get a master's degree too. Another example from video #2 is that they use a lot of technology to test the water quality and I like using technology.

Example #3: I would not consider a career as a stormwater engineer. The article says that you need to know the stormwater engineering principles and it's kind of hard for me to remember things. I understand that this job is very important, as both the article and video 2 states. But both the article and video 2 also states that you need experience or training and I don't know where I would get it. This job just does not interest me.

Sample 1-point responses:

Example #1: No because it involves getting dirty and because you have to be good at math which I am not. You also need to be able to communicate with people you work with and the people you work for. I can't communicate well with others. (Three reasons but does not reference the sources.)

Example #2: I don't really know. I kind of would but I kind of don't because you have to know a whole lot of things like surface water design, computer application for stormwater and much more. But why I think it would be a good job because you get paid a lot of money. (States a position ("I really don't know.") with two reasons, not three. Fails to reference the sources.)

Example #3: I don't think I would want to be a stormwater engineer. I don't want to be a stormwater engineer because it's dirty. I am not the kind of person who likes to get mud all over them. I'm not saying I'm girly girl but I just don't. I'll also have to deal with pollution. I'm just going to say this. I'm paranoid to those kinds of things. It also says I have to have the ability to creatively problem solve. I can't do that. So if you're someone like me, I don't recommend it. (Has three reasons but fails to reference sources.)

Sample 0-point responses:

Example #1: No, because If you really like math and science, I think stormwater engineering would be really good to work at. I think some stormwater engineers use a GIS (Geographic Information Software) and think I really would be good at using that because I have a stream next to my house and I test it with my dad often. (Positions unclear. Sources are not referenced.)

Example #2: No. No is my answer because the job seems a little too hard, but if someone else wants the job, then fine by me! I just want to be something else and that something else is a Pop Star! But if someone else wants to be an engineer that's OK. (Position is stated with no specific evidence from the sources to support it.)

Informative / Explanatory Performance Task Writing Rubric (Grades 3-5)



Score	4	3	2	1
Statement of Purpose/Focus	<p>The response is fully sustained and consistently and purposefully focused:</p> <ul style="list-style-type: none"> controlling or main idea of a topic clearly communicated, and the focus is strongly maintained for the purpose, audience, and task 	<p>The response is adequately sustained and generally focused:</p> <ul style="list-style-type: none"> controlling or main idea of a topic is clear, and the focus is mostly maintained for the purpose, audience, and task 	<p>The response is somewhat sustained and have a minor drift in focus:</p> <ul style="list-style-type: none"> controlling or main idea may be somewhat unclear, or the focus may be insufficiently sustained for the purpose, audience, and task 	<p>The response has little or no discernable organizational structure:</p> <ul style="list-style-type: none"> controlling or main idea may be confusing or ambiguous; response may be too brief or the focus may drift from the purpose, audience, and task
Organization	<p>The response has a clear and effective organizational structure creating unity and completeness:</p> <ul style="list-style-type: none"> consistent use of a variety of transitional strategies to clarify the relationship between and among ideas effective introduction and conclusion logical progression of ideas from beginning to end; strong connections among ideas with some syntactic variety 	<p>The response has an evident organizational structure and a sense of completeness, though there may be minor flaws and some ideas may be loosely connected:</p> <ul style="list-style-type: none"> adequate use of transitional strategies with some variety to clarify the relationship between and among ideas adequate introduction and conclusion progression of ideas from beginning to end; strong connections among ideas 	<p>The response has an inconsistent organizational structure, and flaws are evident:</p> <ul style="list-style-type: none"> inconsistent use of transitional strategies and/or little variety introduction and conclusion, if present, may be weak uneven progression of ideas from beginning to end; and/or formulaic; inconsistent or unclear connections between and among ideas 	<p>The response may be related to the topic but may provide little or no focus:</p> <ul style="list-style-type: none"> few or no transitional strategies are evident introduction and/or conclusion may be missing frequent extraneous ideas may be evident; ideas may be randomly ordered or have an unclear progression
Elaboration of Evidence	<p>The response provides thorough and convincing support/evidence for the controlling idea and supporting idea(s) that includes the effective use of sources, facts, and details:</p> <ul style="list-style-type: none"> comprehensive evidence from sources is integrated; references are relevant and specific effective use of a variety of elaborative techniques* 	<p>The response provides adequate support/evidence for the controlling idea and supporting idea(s) that includes the use of sources, facts, and details:</p> <ul style="list-style-type: none"> adequate evidence from sources is integrated, some references may be general adequate use of some elaborative techniques* 	<p>The response provides uneven, cursory support/evidence for the controlling idea and supporting idea(s) that includes partial or uneven use of sources, facts, and details:</p> <ul style="list-style-type: none"> some evidence from sources may be weakly integrated, imprecise, or repetitive; references may be vague weak or uneven use of elaborative techniques*; development may consist primarily of source summary 	<p>The response provides minimal support/evidence for the controlling idea and supporting idea(s) that includes little or no use of sources, facts, and details:</p> <ul style="list-style-type: none"> evidence from the source material is minimal or irrelevant; references may be absent or incorrectly used minimal, if any, use of elaborative techniques*
Language	<p>The response clearly and effectively expresses ideas, using precise language:</p> <ul style="list-style-type: none"> vocabulary is clearly appropriate for the audience and purpose effective, appropriate style enhances content 	<p>The response adequately elaborates ideas, employing a mix of precise and more general language:</p> <ul style="list-style-type: none"> vocabulary is generally appropriate for the audience and purpose generally appropriate style is evident 	<p>The response expresses ideas unevenly, using simplistic language:</p> <ul style="list-style-type: none"> vocabulary use is uneven or somewhat ineffective for the audience and purpose inconsistent or weak attempt to create appropriate style 	<p>The response is vague, lacks clarity, or is confusing:</p> <ul style="list-style-type: none"> vocabulary is limited or ineffective for the audience and purpose little or no evidence of appropriate style

Score	2	1	0
Conventions	<p>The response demonstrates an adequate command of conventions:</p> <ul style="list-style-type: none"> adequate use of correct sentence formation, punctuation, capitalization, grammar usage, and spelling 	<p>The response demonstrates a partial command of conventions:</p> <ul style="list-style-type: none"> limited use of correct sentence formation, punctuation, capitalization, grammar usage, and spelling 	<p>The response demonstrates little or no command of conventions:</p> <ul style="list-style-type: none"> infrequent use of correct sentence formation, punctuation, capitalization, grammar usage, and spelling

NS Unintelligible, in a language other than English, off-topic, copied text. (Off-purpose writing will still receive a score in Conventions.)

*Elaborative techniques may include the use of personal experiences that support the controlling idea.