



# **ESRI Watershed StoryMap Analysis of Potential Solutions**

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*We have neither given nor received unauthorized assistance on this assignment.  
Our advisors have had an opportunity to review this document.*

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## **Introduction**

New River Valley MS4 permittees and Montgomery County Public Schools seek to develop interactive online content to meet permit obligations for MS4 public participation and provide content relevant to the Virginia Department of Education Standards of Learning (SOLs). The opportunities for close contact public participation events required under the General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4) are periodically limited by weather conditions or other unforeseen conditions, including current social distancing guidelines due to the outbreak of COVID-19. Development of an interactive virtual StoryMap is needed that can meet both MS4 permit requirements and provide curriculum content for use by Montgomery County Public Schools (MCPS) teaching staff. The primary goal is to create an interactive online learning tool to educate and assess middle school students in MCPS on watershed education. This must also satisfy the permit obligations for MS4 public participation and provide content relevant to the school system's educational goals. Assessment will be necessary for the students in MCPS to complete in order to evaluate the effectiveness of the StoryMap. This report analyzes and evaluates different assessment techniques and comparing platforms for the StoryMap.

## **Potential Solutions**

When evaluating the potential solutions to create the best possible story map for watershed education, a variety of factors needed to be considered. The program needs to be user friendly and interactive while also allowing for creative control and ensuring that all the curriculum content is covered. The two best possibilities for generating a user friendly, interactive mapping experience are ESRI's StoryMap platform and Google Earth Voyager. ESRI's StoryMaps allow users to follow a very straightforward exploration of the world around them. On this linear journey, creators can embed different media such as pictures, videos and PowerPoint slides to present information in a variety of forms. Google Earth Voyager allows for less a structured expedition. Students get a 'worksheet' which just outlines the stops they need to take on their journey. They would do this by typing a term or coordinates into Google Earth's search bar, such as "New River, Blacksburg, VA." From these sites users can make observations and draw comparisons, and students can answer the guiding questions on their 'worksheets'.

Although each platform has its strengths and weaknesses, they both have the potential to support this project.

Another key aspect of this project is the assessment tool that will be used to map student learning and engagement with the map. To create the assessment a variety of platforms are being considered. Survey123 is a survey platform that is partnered with ESRI and allows their surveys to be directly embedded into ESRI's StoryMaps. This allows for not only students, but all members of the community, to engage with the assessment tool. This advantage would not be present if the group chooses to pursue a Google Earth based project as links cannot be embedded. Qualtrics is a survey platform that Virginia Tech subscribes to, it allows for excellent data visualization from graphics generated by the program. This would either have to be embedded into the map as a link or sent to the teachers separately. Google forms is the survey platform currently used by many educators in the Montgomery County School system. Google forms have the same drawback of Qualtrics where it cannot be directly embedded in the map, however students and staff are already familiar with this platform.

## **Results of Analysis and Ranking**

### **StoryMap Platform**

For the StoryMap platform there are four aspects that are necessary to effectively complete the goal of the project: user friendliness, user interaction, creative control, and curriculum content. The platform must be easy for both the teacher and student to use. It would be ideal if the platform did not require the user to download any extra software or use a third party application. ESRI StoryMaps does not require any additional software or application and is compatible for a multitude of devices such as tablets, mobile devices, and PC/Desktops. On the other hand, Google Earth Voyager is best displayed on a PC/Desktop, if a user wanted to use this platform on a tablet or mobile device it would require the installation of an additional application. With the extra step of having to download additional applications may reduce user engagement.

The next piece of criteria is user interaction, this is also a crucial step since this application will be used by both students in the classroom and adults in the community. The chosen platform must have features in order to allow the students to interact with the system to retain engagement. A downside to both softwares are due to the immense amount of data and

memory used to generate the maps, the software may operate at a slower capacity. This may be an issue with users with slower wireless connection capabilities. The solution to this issue has not yet been resolved. The third category is creative controls. While ESRI StoryMap allows the content creator to create a story from scratch, Google Earth Voyager does not yet have the ability to allow users to create their own story. Lastly, the relevancy to the curriculum is the most important one of criteria. As was stated before, Google Earth Voyager has plenty of pre-made content but is not relevant to the MCPS Curriculum. Using ESRI StoryMap would allow for the content creators to implement the key learning objectives for the students and community members. Overall, ESRI StoryMap has more appealing features which makes this the most desirable platform to use.

<b>Criteria</b>	<b>Weight</b>	<b>ESRI StoryMap</b>	<b>Google Earth Voyager</b>
User Friendly	15	13	12
User Interaction	10	8	10
Creative Control	25	20	10
Curriculum Content	30	30	15
<b>Total</b>	<b>80</b>	<b>71</b>	<b>47</b>

*Table 1 - Decision Matrix for StoryMap Platform*

### **Assessment**

When considering the assessment tools, one of the most critical features is the accessibility of the data and scores to both teacher and county officials. 123Survey will send the survey scores directly to the creators of the StoryMap, where they will then have to be sent out to the teachers to ensure that their students are participating. Qualtrics has a similar issue where it would send the data to those who created the survey. This would mean that the data would go to the one of the team member's Virginia Tech Qualtrics accounts. This would mean that the team would have to go in and periodically send out results to teachers and county officials, even after they graduate. This would not be ideal for the longevity of this project and may cause future complications in retrieving data. Google Forms on the other hand, is a platform that is currently being used by MCPS teachers. Google Forms can be shared with many people, and allow them all to see the results. This makes the data most accessible to all of those who would need the

data. As far as creative controls, all three of these programs are very similar. They all allow a user to create a variety of styles of questions. The last consideration is the user-friendliness aspect of the tool. 123Survey scores highly in this category because it can directly be embedded into an ESRI StoryMap. This allows for a very aesthetic presentation of the survey data. It also prevents teachers from having to send out a survey link or having to embed a link someone and hoping that it is seen. Qualtrics can not be directly embedded into the map, so a link would need to be attached. It does however, allow for very organized data presentation in automatically generated graphics. This data visualization could be very useful when attempting to analyze the data to find gaps in learning and engagement with the map. Google Forms scores the highest in this category because it is the primary platform being used by the Montgomery County Schools. This means both teachers and students know how to interact with the tool so that it can be used appropriately. Additionally, as stated before, this platform is collaborative, allowing all the teachers to view the results. Overall, Google Forms will be the most effective tool to use for the assessment portion of our StoryMap.

<b>Criteria</b>	<b>Weight</b>	<b>123Survey</b>	<b>Qualtrics</b>	<b>Google Forms</b>
Data Accessibility	20	10	10	20
Creative Control	10	10	10	10
User Friendly	15	15	10	15
<b>Total</b>	<b>45</b>	<b>35</b>	<b>30</b>	<b>45</b>

*Table 2 - Decision Matrix for Assessment Platform*

## **Conclusion**

Using 123Survey and Qualtrics will either prevent or delay the teachers in MCPS from receiving the assessment scores for their students. By using either of these platforms, the teachers would have to go through a third party to receive the student data, which will further extend the time allotted for the activity.

Furthermore, using Google Earth as a StoryMap platform has many advantages in terms of student interactive features although it lacks the maps needed to explain the learning objectives for the students. Google Earth also lacks creative control, so the team would not be able to edit or change the layers of the maps to relate to the project goals and objectives.

In conclusion, the best possible solution is using the ESRI StoryMap platform in combination with Google Forms for the assessment tool. This solution was chosen due to the familiarity with Google Forms for the teachers in MCPS and quickly being able to access student information and evaluation data. The ESRI StoryMap was the most efficient solution to use for the StoryMap platform because of the data prestored by Montgomery County Stormwater Department. Using ESRI will provide the team with premarked and edited maps that can be used in the platform, this will prevent the team from having to curate maps from scratch.

### **Team Update**

Currently our team has completed an assessment using Google Forms that has been reviewed and approved by Dr. Patricia Gaudreau, Administrator of Science Curriculum for Montgomery County Public Schools (MCPS). We have a skeleton for the StoryMap using the ESRI StoryMap platform. In the Spring the team will have to create media content to integrate into the StoryMap. When that step is complete, the team must send out this BETA version to be tested by students and teachers to receive feedback. After receiving the feedback from MCPS, the team will create a final version of the StoryMap by April 2020.