

Visit Harford Trail Map

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Introduction and Project Background

This project focused on creating an interactive and searchable map of the most popular trails in Harford County for the use on the Visit Harford website. This report provides background on previously available searchable and interactive trail mapping, describes in detail what the project's goals, discusses the data collection process, including where the data was collected from and qualitative data sought out.

A significant amount of data about Harford County Trails is available online, but it is not consolidated in one place. If a visitor to Harford County wants to find a trail for hiking or biking, there are numerous incomplete data sources and maps provided by jurisdictions and independent organizations. The purpose of this project is to consolidate information on Harford County's most popular trails so that visitors and residents have easier access to the beauty of Harford County through its comprehensive network of state parks, county parks, and trails.

This report also describes how data was gathered and manipulated to suit this project. It also discusses the methodology, analysis, and visualization of the data. The primary purpose of this report is to explain how the team used the data collected for mapping purposes, as well as the project's results. It includes a tutorial of how to use the final product with an analysis of how it might be used on the Visit Harford site. This new interactive tool can benefit Harford County residents and tourists alike. Ultimately, the interactive map will be incorporated into an app that visitors to Harford County will be able to use to find not just trails, but other attractions, such as dining, lodging, and entertainment.

Introduction and Project Background

Visit Harford is the destination marketing organization of Harford County, Maryland with the goal of driving more tourism activity in Harford County. Their website includes many attractions for both residents and tourists. Through the PALS program, our class was tasked with providing the County with improved spatial data for tourist attractions in Harford County, making the County more navigable for those seeking to get the most out of their visits in and around Harford County.

Our group was assigned to Harford County's trails. At the project's outset, Harford County did not have any kind of trail map that visitors could use. Additionally, the Visit Harford County website only had a list of trails in the county, without any meaningful qualitative data about the trails. In fact, the list of trails was included in the list of parks as a combined list of parks and trails.¹ Our group was tasked with creating an up-to-date trails inventory with qualitative data about each trail, and then represent that data in an interactive map.

There is currently no interactive format nor a single place for visitors to research trails. The only option is the Parks & Trails website where trails are consolidated with the parks. But not all trails are included, and the site doesn't include a map.

¹ "Parks and Trails." Visit Harford. <https://visitharford.com/harford-county-maryland-parks-trails>

Parks & Trails

Showing results of 1 to 25 out of 35 total listings. [1] [2]

Show more results? 25 ▾

Aberdeen Festival Park

📍 34 North Philadelphia Boulevard
Aberdeen, MD 21001

Park within the City of Aberdeen with a pavilion used as an outdoor bandstand, playground area and b...



Anita C. Leight Estuary Center

📍 700 Otter Point Road
Abingdon, MD 21009
📞 Phone: 410-612-1688

Located on Otter Point Creek, this 600+ acre portion of the Chesapeake Bay National Estuarine Resear...



Figure 1: Harford County parks and trails listing <https://visitharford.com/harford-county-maryland-parks-trails>

Harford County is located in northeastern Maryland, borders Pennsylvania to the north, and is nearby Delaware and Baltimore, which is located south of Harford County. This location helps spur the number of visitors to the county, making it a logical place for people to spend time in and visit. Also, Interstate 95, one of the busiest interstates along the east coast, linking Washington, D.C. to Baltimore, Philadelphia, and New York City runs directly through Harford

County. Furthermore, the county also has four state parks, all of which offer their own unique views and trails that visitors and the county's 252,000 residents can enjoy.²

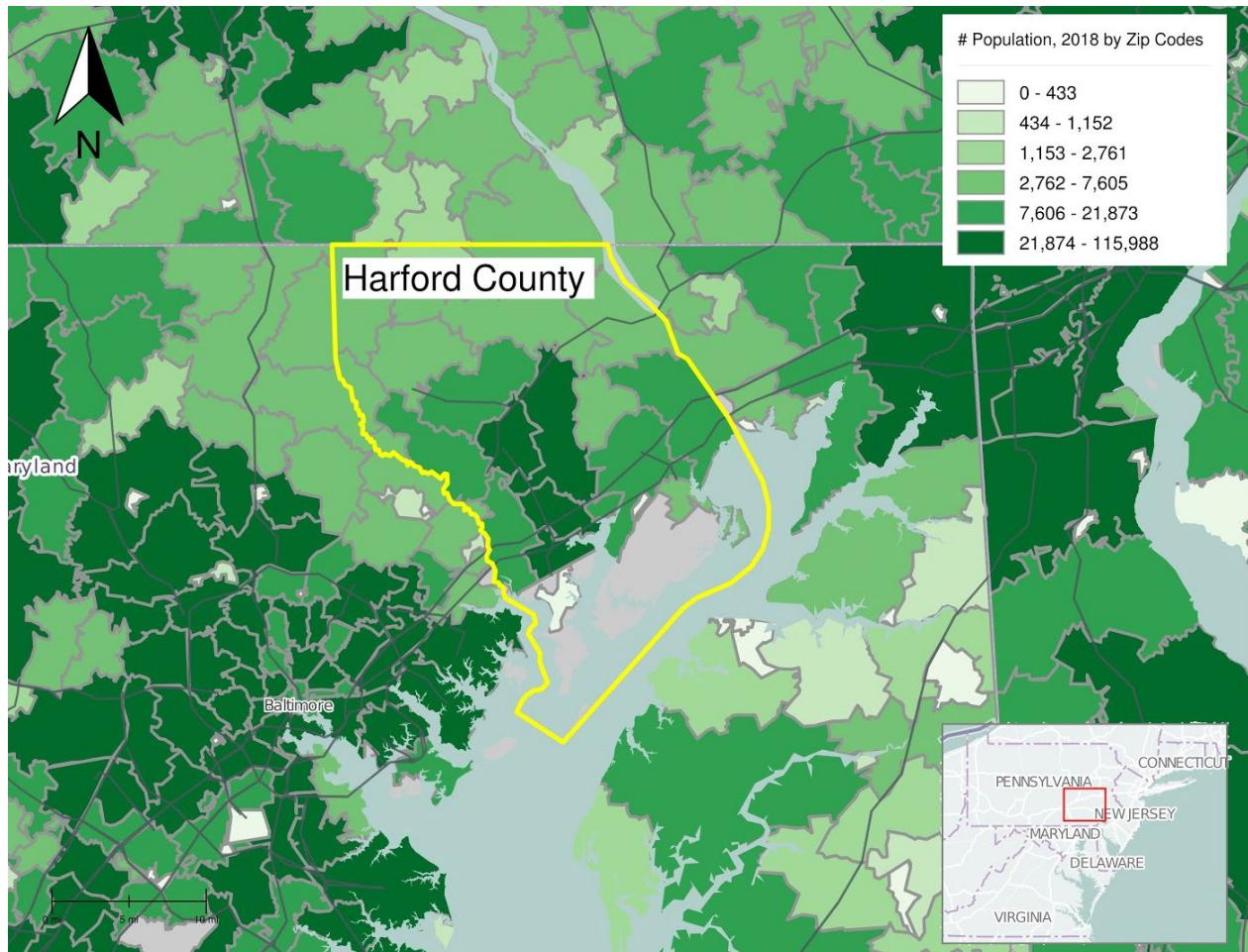


Figure 2: Harford County geography and population

Goals and Objectives

The project's final product is an interactive map of all the trails in Harford County. The map will be incorporated into the Visit Harford website. Along with mapping the trails, each trail is presented with qualitative data including its length, surface type, difficulty, and nearby

² "Quickfacts - Harford County." U.S Census Bureau. 1 July 2017.
<https://www.census.gov/quickfacts/harfordcountymaryland>

amenities accessible to users. By clicking on a trail within the interactive map, users can find all relevant data about that trail, enabling users to plan a hiking or biking trip on the trail systems throughout the county. This interactive map improves the usability of data on the Visit Harford website and eliminates the need for visitors to Harford County to search every trail individually. Lastly, the final product, which will be available for online users, includes a query tool available through ArcGIS Online. With this tool, users can search for specific trails based on individual wants and needs as hikers, runners, bikers, or walkers.

Data Collection and Preparation

Initially, our group hypothesized that data would likely be collected from various trails agencies, the Maryland Outdoor Club, state and county parks, and the existing Harford County app. At the outset we assumed these data resources would supply the location of all relevant trails within the county, as well as information about their length, surface, and difficulty, as well as loop vs. point-to-point trails.

The group initially compiled a list of all trails in Harford County from a list of state parks, county parks, and trail websites such as All Trails. In addition, further research using Google Maps pinpointed other parks with trails that should be included in the final product. This research led to additional locational information about a number of other trails, which helped ensure that the data included the entire county and its parks and trail systems. Analysis of the state parks website for additional trail information provided specific trail maps showing their location and proximity to certain amenities.

Lastly, the group collected data about the difficulty and surface type (terrain) through websites designed for hikers, specifically AllTrails.com and Traillink.com, both of which include information about many of the county's well-traveled trails.

The collected data was entered into a spreadsheet used to populate the attribute table of the final Harford County trails layer. The resulting data set is a cleaned and organized spreadsheet that contains the following information.

- Trail name
- Park where the trail is located
- Trail length
- Trail difficulty
- Trail surface (dirt, gravel, paved)
- Whether the trail is straight or a loop
- Whether the trail is good for hiking
- Whether the trail is good for biking
- Whether the trail is pet-friendly (specifically dogs)
- Whether there are historic features or sites near or along the trail
- Trail scenic features (such as forests, streams, waterfalls, fields, mountains, views)
- Whether the trail is accessible
- Trail amenities including restrooms, playgrounds, and parking
- Trail address, phone number, and website

This data was entered into the attribute table of the new consolidated Harford County Trails layer, which was created by searching existing GIS layers of Harford County online. First, the Maryland Department of Natural Resources keeps a GIS map of many of the trails in the state, many located in Harford County.³ Also, ESRI's state government team compiles trails from counties all over the country, including several trails from Harford County.⁴ This information was included in the layer.

Methodology, Analysis, and Visualization

This spatial and qualitative data for each trail was consolidated into one layer. Most of the spatial data was received from the Maryland Department of Natural Resources, however that file didn't include all of the trails in our product. We found other trails throughout the county that were worth including for the Visit Harford website. Their line features were added manually to match the trails' contours based on their sources (listed in the Reference List). In accordance with this spatial data, the qualitative data (trail length, difficulty, and type of surface) was entered into the attribute table associated with the trails layer, more specifically within the row of each specified trail. This qualitative data complements the line-features and finalizes the project's GIS portion, providing an informative, map-based database enabling Visit Harford website visitors to plan their hikes. Figure 3 depicts both spatial and qualitative data in the new consolidated Harford County trail layer.

³ "MERLIN Online." Maryland Department of Natural Resources GIS. <http://dnrweb.dnr.state.md.us/MERLIN/>

⁴ "State of Maryland Trails." ArcGIS Team State Gov. 7 Nov 2013.

<https://www.arcgis.com/home/item.html?id=ee1b4298916c49e6b5eaad2cd1b7a821>

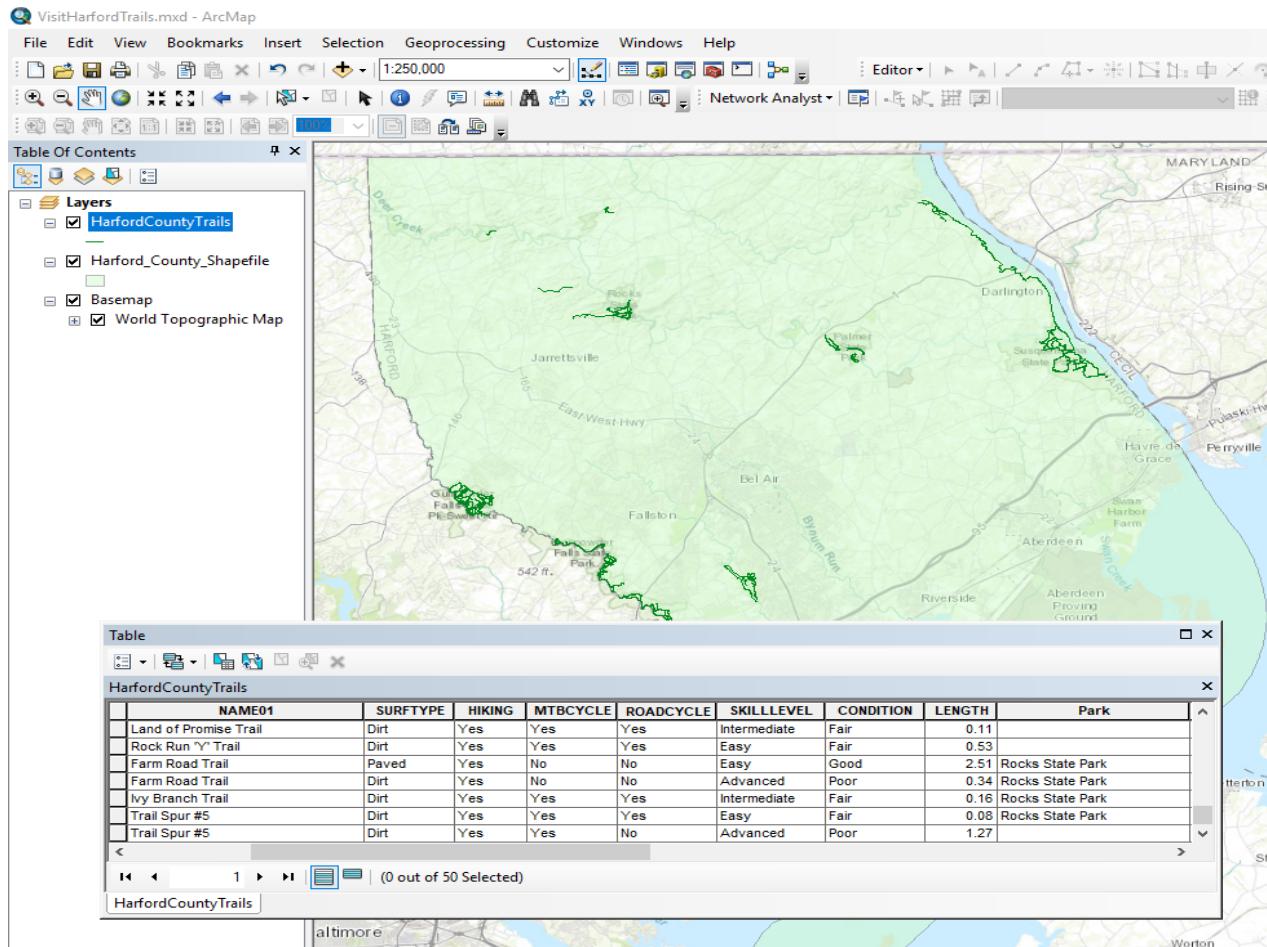


Figure 3: Spatial and qualitative trails data

The final product is one layer placed on top of geographic raster data. Each feature within the attribute table is a trail with its appropriate qualitative data attached to it. Next, this ArcMap product was uploaded into an interactive ArcGIS Online map, so it could be embedded into the Visit Harford website, where visitors will be able to use it. An added feature within the interactive online platform will be a query function, which will allow users to search for trails based on the characteristics of their interest. The full product allows users to visualize the trails geographically and reach the important information related to each. It will also allow them to search for trails based on a variety of characteristics, ultimately streamlining their search process

and helping them seamlessly plan their recreational experiences in Harford County. Figure 4 depict the interactive GIS Online product and some of the query options that can be used by visitors to Harford County.

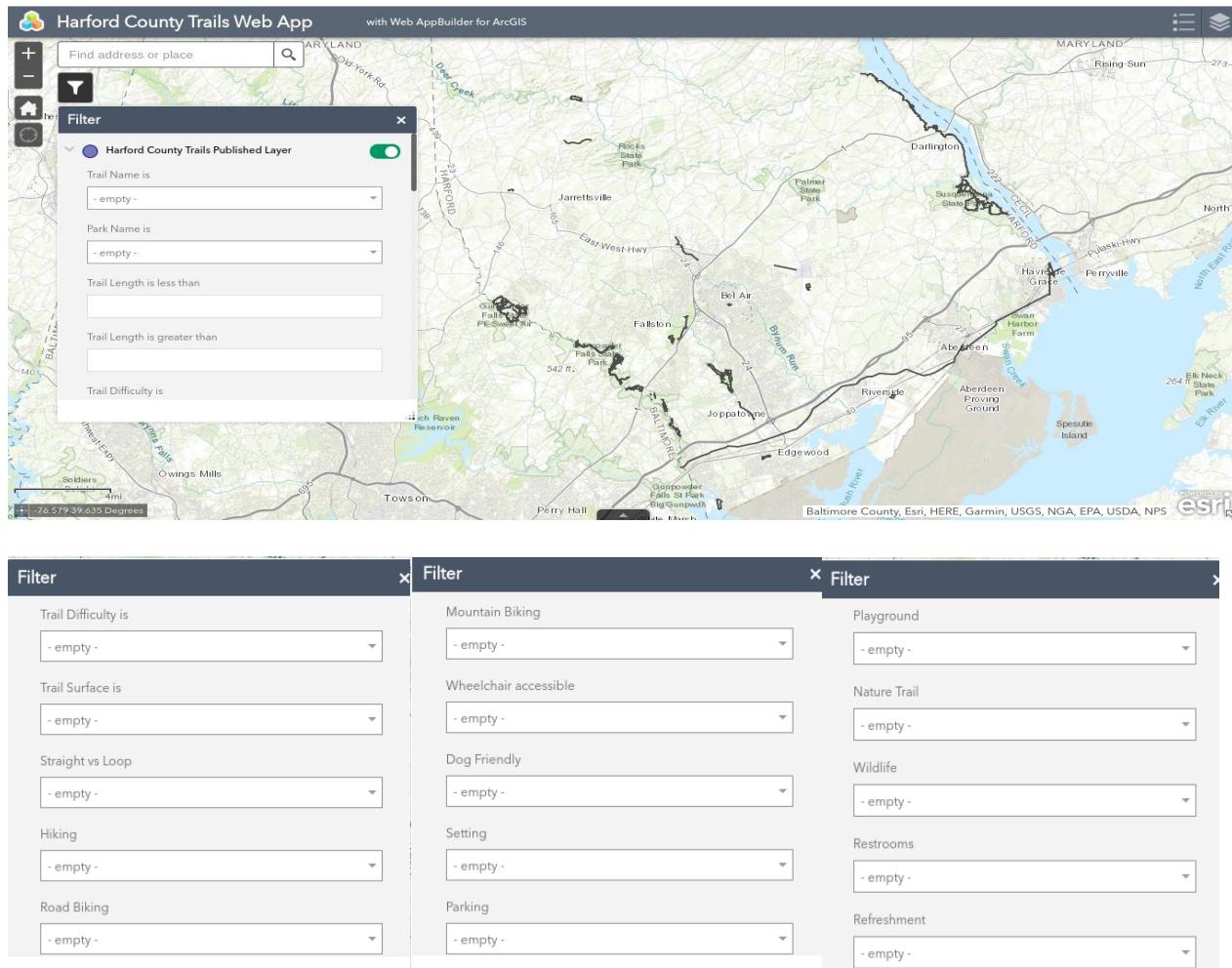


Figure 4: Interactive map and query options

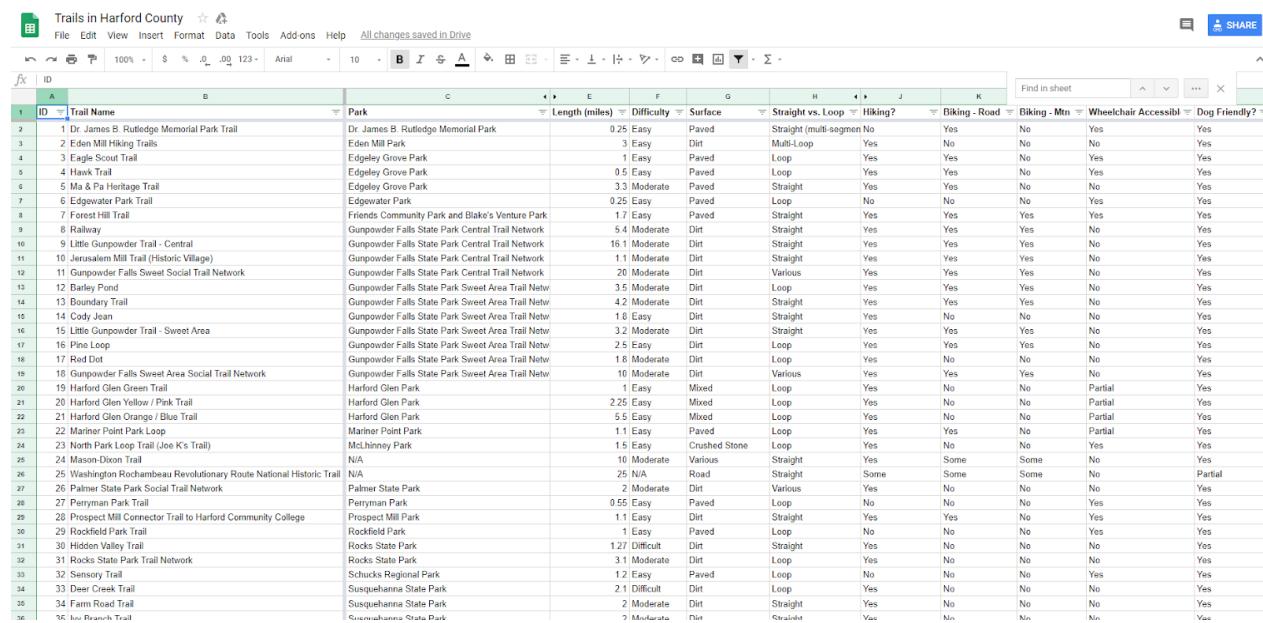
Team Responsibilities

Throughout the project, the group worked collectively. At each step, the team decided the best way to split the duties and complete each task. To begin, the group decided on the final product's structure, brainstorming options, and concluded that the best way to portray the data was in a simple and easy-to-navigate end-user experience. We decided to attach attribute data

with the vector data of each trail. This configuration would allow the intended audience to easily navigate the desired information.

Based on this decision, the next decision was to identify what qualitative data should be captured for each trail. Most importantly, the data should include information that the end-user would find most helpful. Research led to good data sources and focused the team's concept of useful characteristics. Each team member proposed attributes and the group ultimately decided on which ones to include.

For data collection, the county was split into three sections with group members assigned to one of them, to make the large data-mining process more manageable. Philip Clitis worked on the northern part of the county, Meagan Staton on the southeast section. The group collecting the agreed-upon trail attributes and then filled out an excel spreadsheet that would be entered into the attribute table associated with the ArcMap trails layer (see Figure 5).



The screenshot shows an Excel spreadsheet with the title "Trails in Harford County". The spreadsheet contains a table with 36 rows of data, each representing a trail. The columns are labeled A through K. Column A is "ID", column B is "Trail Name", column C is "Park", column D is "Length (miles)", column E is "Difficulty", column F is "Surface", column G is "Straight vs. Loop", column H is "Hiking?", column I is "Biking - Road", column J is "Biking - Mtn", column K is "Wheelchair Accessibl", and column L is "Dog Friendly?". The data includes various trail names like Dr. James B. Rutledge Memorial Park Trail, Eden Mill Park, Edgely Grove Park, Hawk Trail, Ma & Pa Heritage Trail, Edgewater Park Trail, Forest Hill Trail, Railway, Little Gunpowder Trail - Central, Jerusalem Mill Trail (Historic Village), Gunpowder Falls Social Trail Network, Barley Pond, Boundary Trail, Cody Jean, Little Gunpowder Trail - Sweet Area, Pine Loop, Red Dot, Gunpowder Falls Sweet Area Social Trail Network, Harford Glen Trail, Harford Glen Yellow / Pink Trail, Harford Glen Orange / Blue Trail, Mainer Point Park Loop, North Park Loop (Joe K's Trail), Mason-Dixon Trail, Washington Rochambeau Revolutionary Route National Historic Trail, Palmer State Park Social Trail Network, Perryman Park, Prospect Mill Connector Trail to Harford Community College, Rockfield Park, Hidden Valley Trail, Rocks State Park, Sensory Trail, Deer Creek Trail, Farm Road Trail, and Bear Branch Trail. The "Length (miles)" column ranges from 0.25 to 2.27, and the "Difficulty" column includes Easy, Moderate, and Difficult levels. The "Surface" column includes Paved, Multi-Loop, Loop, and Various types. The "Straight vs. Loop" column includes Straight and Loop. The "Hiking?" column includes Yes and No. The "Biking" columns include Road, Mtn, and Partial values. The "Wheelchair Accessibl" and "Dog Friendly?" columns include Yes, No, and Some values.

ID	Trail Name	Park	Length (miles)	Difficulty	Surface	Straight vs. Loop	Hiking?	Biking - Road	Biking - Mtn	Wheelchair Accessibl	Dog Friendly?
1	Dr. James B. Rutledge Memorial Park Trail	Dr. James B. Rutledge Memorial Park	0.25	Easy	Paved	Straight (multi-segments)	No	Yes	No	Yes	Yes
2	Eden Mill Hiking Trails	Eden Mill Park	3	Easy	Dirt	Multi-Loop	Yes	No	No	No	Yes
3	Eagle Scout Trail	Edgely Grove Park	1	Easy	Paved	Loop	Yes	Yes	No	Yes	Yes
4	Hawk Trail	Edgely Grove Park	0.5	Easy	Paved	Loop	Yes	Yes	No	Yes	Yes
5	Ma & Pa Heritage Trail	Edgely Grove Park	3.3	Moderate	Paved	Straight	Yes	Yes	No	No	Yes
6	Edgewater Park Trail	Edgewater Park	0.25	Easy	Paved	Loop	No	No	No	Yes	Yes
7	Forest Hill Trail	Friends Community Park and Blake's Venture Park	1.7	Easy	Paved	Straight	Yes	Yes	Yes	Yes	Yes
8	Railway	Gunpowder Falls State Park Central Trail Network	5.4	Moderate	Dirt	Straight	Yes	Yes	Yes	No	Yes
9	Little Gunpowder Trail - Central	Gunpowder Falls State Park Central Trail Network	16.1	Moderate	Dirt	Straight	Yes	Yes	Yes	No	Yes
10	Jerusalem Mill Trail (Historic Village)	Gunpowder Falls State Park Central Trail Network	1.1	Moderate	Dirt	Straight	Yes	Yes	Yes	No	Yes
11	Gunpowder Falls Sweet Social Trail Network	Gunpowder Falls State Park Central Trail Network	20	Moderate	Dirt	Various	Yes	Yes	Yes	No	Yes
12	Barley Pond	Gunpowder Falls State Park Sweet Area Trail Netw	3.5	Moderate	Dirt	Loop	Yes	Yes	Yes	No	Yes
13	Boundary Trail	Gunpowder Falls State Park Sweet Area Trail Netw	4.2	Moderate	Dirt	Straight	Yes	Yes	Yes	No	Yes
14	Cody Jean	Gunpowder Falls State Park Sweet Area Trail Netw	1.6	Easy	Dirt	Straight	Yes	No	No	No	Yes
15	Little Gunpowder Trail - Sweet Area	Gunpowder Falls State Park Sweet Area Trail Netw	3.2	Moderate	Dirt	Straight	Yes	Yes	Yes	No	Yes
16	Pine Loop	Gunpowder Falls State Park Sweet Area Trail Netw	2.5	Easy	Dirt	Loop	Yes	Yes	Yes	No	Yes
17	Red Dot	Gunpowder Falls State Park Sweet Area Trail Netw	1.8	Moderate	Dirt	Loop	Yes	No	No	No	Yes
18	Gunpowder Falls Sweet Area Social Trail Network	Gunpowder Falls State Park Sweet Area Trail Netw	10	Moderate	Dirt	Various	Yes	Yes	Yes	No	Yes
19	Harford Glen Trail	Harford Glen Park	1	Easy	Mixed	Loop	Yes	No	No	Partial	Yes
20	Harford Glen Yellow / Pink Trail	Harford Glen Park	2.25	Easy	Mixed	Loop	Yes	No	No	Partial	Yes
21	Harford Glen Orange / Blue Trail	Harford Glen Park	5.5	Easy	Mixed	Loop	Yes	No	No	Partial	Yes
22	Mainer Point Park Loop	Mariner Point Park	1.1	Easy	Paved	Loop	Yes	Yes	No	Partial	Yes
23	North Park Loop (Joe K's Trail)	McKinney Park	1.5	Easy	Crushed Stone	Loop	Yes	No	No	Yes	Yes
24	Mason-Dixon Trail	N/A	10	Moderate	Various	Straight	Yes	Some	Some	No	Yes
25	Washington Rochambeau Revolutionary Route National Historic Trail	N/A	25	N/A	Road	Straight	Some	Some	Some	No	Partial
26	Palmer State Park Social Trail Network	Palmer State Park	2	Moderate	Dirt	Various	Yes	No	No	No	Yes
27	Perryman Park Trail	Perryman Park	0.65	Easy	Paved	Loop	No	No	No	Yes	Yes
28	Prospect Mill Connector Trail to Harford Community College	Prospect Mill Park	1.1	Easy	Dirt	Straight	Yes	Yes	No	Yes	Yes
29	Rockfield Park Trail	Rockfield Park	1	Easy	Paved	Loop	No	No	No	Yes	Yes
30	Hidden Valley Trail	Rocks State Park	1.27	Difficult	Dirt	Straight	Yes	No	No	No	Yes
31	Rocks State Park Trail Network	Rocks State Park	3.1	Moderate	Dirt	Loop	Yes	No	No	No	Yes
32	Sensory Trail	Schucks Regional Park	1.2	Easy	Paved	Loop	No	No	No	Yes	Yes
33	Deer Creek Trail	Susquehanna State Park	2.1	Difficult	Dirt	Loop	Yes	No	No	No	Yes
34	Farm Road Trail	Susquehanna State Park	2	Moderate	Dirt	Straight	Yes	No	No	No	Yes
35	Ice Branch Trail	Susquehanna State Park	2	Moderate	Dirt	Straight	Yes	No	No	No	Yes

Figure 5: Excel trails data file

Along with qualitative data, spatial data was also needed. The initial thought was to hand-draw the trails into ArcMap (some of which were) but instead, found a resource that had already collected this information—the Maryland Department of Natural Resources and file with a significant amount of spatial trail data. Phillip Clite took on this task, along with filling in the missing trails by hand-drawing them. The trails contours were found through the varying sources. Once the spatial data was entered, Philip also transferred the Excel spreadsheet's qualitative data into the attribute table within ArcMap, carefully aligning each trail dataset with its specific row, matching with the right line feature.

While Philip added the uncharted spatial data and the attributes of the completed qualitative dataset into the shapefile's attribute table in ArcMap, Meagan and Patrick Slawta worked on the second draft of the final proposal paper. The completed first draft was the work of all three group members. On the second draft Meagan and Patrick split the duties, adding in final methodology, final results, and examples of how the public could use the application. Philip then fit the paper into the PALS format.

The last step was uploading the final ArcMap product onto the Online Interactive Platform. We also completed it by adding the query function, making the database more navigable for the end-user.

Using the Final Product

To best show how this final product may be used, the following scenarios show why the tool is useful. These scenarios also show how Visit Harford might benefit from this tool. Each scenario is illustrated with an image of the map after filtering. Users will be able to click on each

trail for more information. In addition, users will be able to access a user-friendly version of the attribute table that will list the trails that meet their criteria.

Scenario #1:

Bill and Jane moved into Baltimore City last year for Bill's new job at Morgan Stanley. They have two elementary school-aged children and between duties at work and home, they have little time to get out and enjoy themselves. This year, Bill is planning to take a week vacation in early April, during spring break. But to make the most of it, he starts planning early. Plans for the children are already set, now it's time for the fun part. As outdoor enthusiasts, he's hoping to book a range of outdoor activities. Given its connection with the Susquehanna River, he thinks Harford County would be a good place to explore. At the Visit Harford website, he finds the trail database. He is looking for a moderately difficult trail, near the river, that has accessible parking and is dog-friendly. The database and map reveal six trails with those attributes—the Mason Dixon Trail, the Heritage Greenway, the Land of Promise Trail, Rock Run Trail, Ivy Branch Trail, and Farm Road.

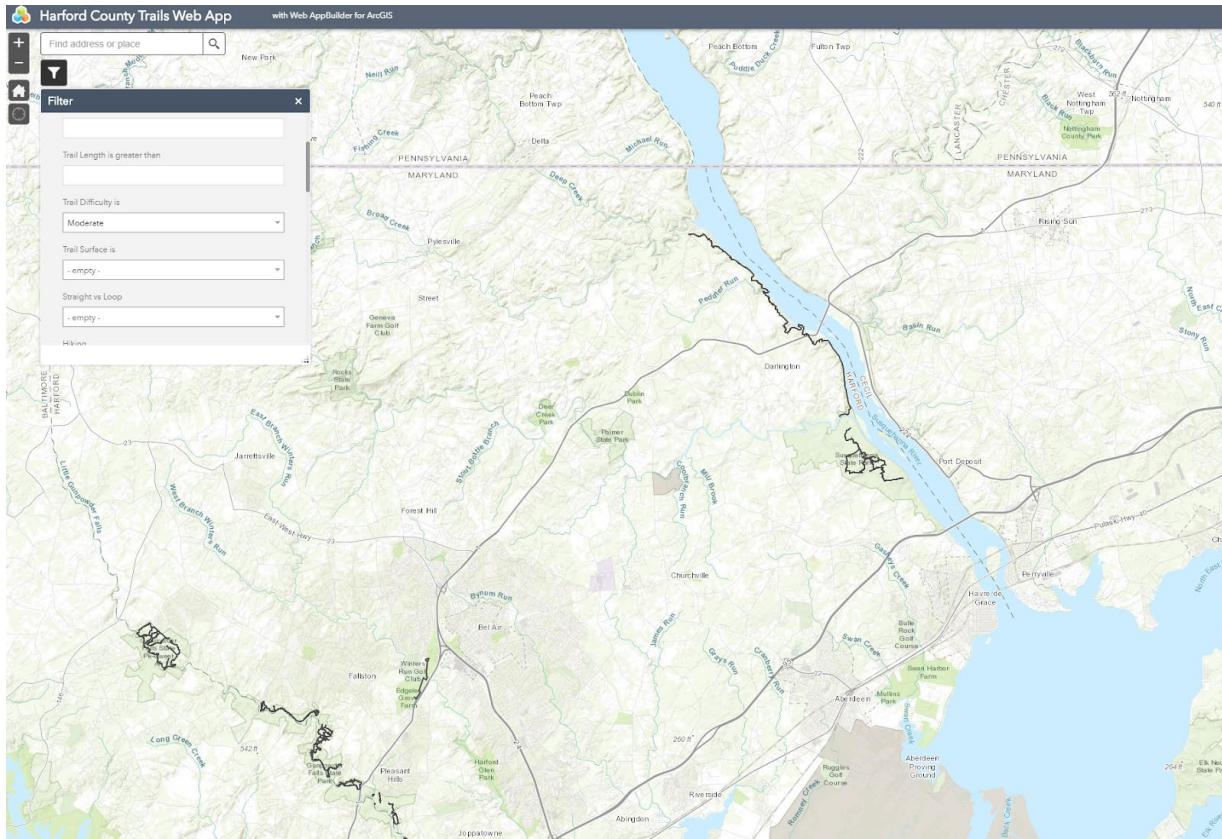


Figure 6: Scenario #1 search results

Scenario #2

Mountain Bike enthusiasts Bill, Bob, and Joe are looking for a place to ride this upcoming Memorial Day weekend. They plan this trip every year and in 2019 they'd like to explore Harford County. Bill typically comes up with the group's itinerary and starts his search with Google and finds his way to the Visit Harford website, where he finds the map database offering a geographic view of the many trails throughout the county. Using the query box, he scrolls to the mountain bike drop-down menu. He selects "yes" for a display of only trails for mountain bikes. From this refined selection he reports options back to Bob and Joe. They decide on the Sweet Air area of Gunpowder Falls State park where they can try a couple different trails throughout the weekend. They have a great weekend in Harford, spending the night in a hotel nearby. The chances of them coming back in a future year are high (see Figure 7).

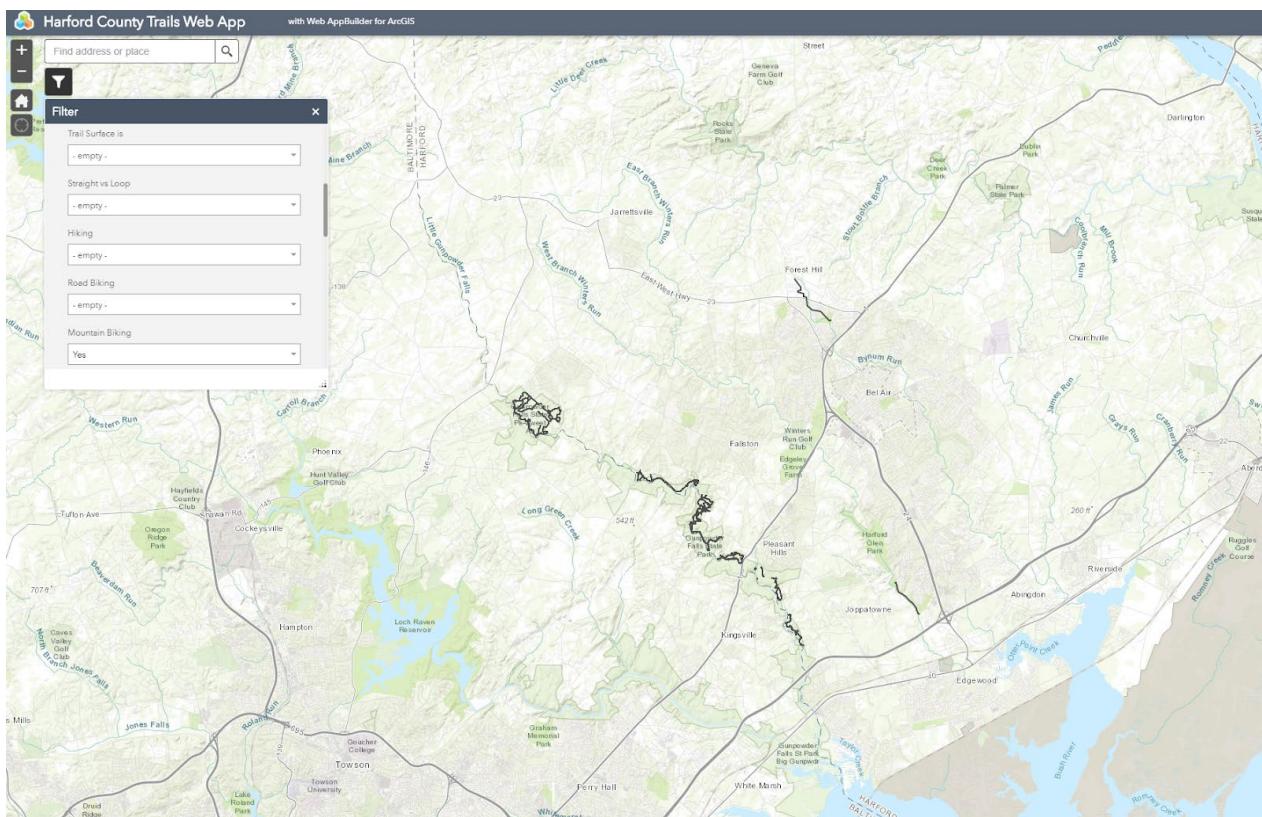


Figure 7: Scenario #2 search results

Scenario #3

Jared and Caitlin were avid hikers before moving to Harford County, and want to get back into hiking. But now they have three small children who they want to share the experience with. They're looking for fun and easy trails that can accommodate a wagon if the children get tired and that has a playground nearby. At work, Jared learned from a friend that the Visit Harford website had a query tool that would allow him to find trails with those exact features. At the website, he enters "easy" and "playground," and gets a map of trails that fit those criteria. He's didn't waste time driving the family to a park just to find the trails that are too strenuous and no playground. In the end, he finds that there are several trails options, including the Mariner Point Park Loop at Mariner Point Park, the Hawk Trail and the Eagle Scout Trail at Edgeley Grove Park, the Rockfield Park Trail at Rockfield Park, the Forest Hill Trail at Friends Community Park and Blake's Venture Park, the Prospect Mill Connector Trail to Harford

Community College at Prospect Mill Park, the Shucks Regional Park Sensory Trail at Shucks Regional Park, and the North Park Loop Trail at McLhinney Park (see Figure 8).

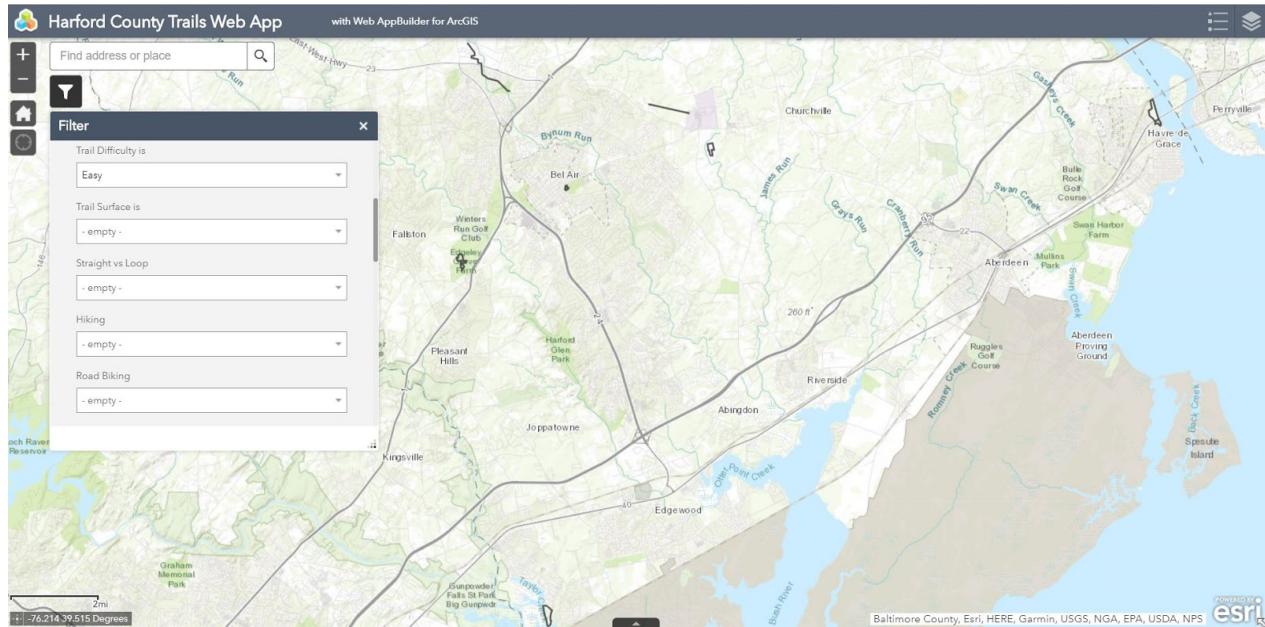


Figure 8: Scenario #3 search results

Conclusion

This interactive map compiled of Harford County trails can be a beneficial feature on the Visit Harford website. It allows Harford County trail locations to be consolidated into a single, map-based data-set where Harford County tourists can find complete trail information. It will be accessible to the public through the ARCGIS Online site, with the capability of being linked into the Visit Harford website.

The query feature allows users to easily search for trails based on varying interests—hiking, nature, dog-walking, road biking, mountain biking—as shown in the included tutorial. The user experience is thus greatly improved for visitors to Harford County seeking to explore the county's many trails.

With all the trail data in one location, the County will also have a complete and consolidated inventory. In addition, when incorporated into a new Harford County app, this trail layer can be shown along with other attractions, as well as dining, lodging, and entertainment options to provide a single comprehensive experience for those considering a visit to Harford County.

Harford County has many beautiful trails, and this interactive map will allow more people to experience them. It will allow web-browsers to research and plan their trips more efficiently. They will be able to get to the fun quicker, which in turn entices them to come back again and spend more time in Harford County. This supports and furthers Visit Harford's main goal of attracting visitors to the area and showing them what Harford County has to offer, especially in terms of recreation.

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