

## Frequently Asked Questions

**Q 1:** Questions have come up to do with the Tidewatch Time-Aware raster layers and why the rasters don't have depths, just blue color indicating that the area is flooded. A functional flood model visualization needs to geospatially depict the inundation depths with a color bar, which the current version of the Tidewatch map still doesn't. Groups are trying to estimate roadway flooding using our flood model outputs, but they can't determine depth of flooding without downloading their own DEM (which often differs in depths from ours in significant ways ~0.5-1 ft.) and then differencing the intersecting areas to estimate flood depths. Can you create a service that interpolates spatially varying depths and preserves this in the raster output in a meaningful way for communities and emergency managers to use?

**A 1:** VIMS is working on creating Tidewatch Map site with the depth classes and associated legend and there were a couple of unexpected technical snags. They hope to have it up by April 15th. Note that this map will be available for all forecasts from April 15<sup>th</sup> forward. This depth map data is not available for the historic events provided for generating teams' Stage 1 submissions (due June 1, 2020). These depth maps will be available at no cost for those finalists selected in Stage 2 to use in their real-time system if they choose to use it (there is no obligation to use it in Stage 2). It should also be noted that these depth maps have been developed specifically for the Hampton Roads region. Other cities or regions may or may not have equivalent data sources, and finalists should keep this in mind when considering applying their approaches to other cities (e.g., Miami or Houston).

**Q 2:** What do we do if the depth map file size is too large to use?

**A 2:** VIMS does anticipate the size being an issue depending upon your computer's processing power. The site where you download the DEM will allow you to choose the area of interest, so you can choose a smaller area that should process faster than the entire Chesapeake Bay Watershed or all of Tidewater Virginia (e.g. just Norfolk). If you've downloaded the entire DEM already, it can be cropped using the extract by mask function using a polygon mask extent of your choosing depending upon your group's solution's scale.

**Q 3:** Are there any data we are required to use in building the software and algorithms? Can we use different data sets?

**A 3:** Please refer to the Applicant Guidelines at:

[https://riseresilience.org/wp-content/uploads/2020/01/Applicant-Guidelines\\_Urban-Mobility-Resilience-Challenge.pdf](https://riseresilience.org/wp-content/uploads/2020/01/Applicant-Guidelines_Urban-Mobility-Resilience-Challenge.pdf)

Note the description of data to be used starting on page 5, in particular the paragraph at the end of page 6: *“After Finalist selection, in Stage 2 and thereafter, entrants may choose any data sources which give them the best solution (in their opinion and based on our judging criteria). RISE will not prescribe or direct entrants as to which flooding, weather, sensor, or other data sets to use or how to use them. Entrants may use proprietary and/or non-proprietary data they wish, however, if there is a cost to the data it must be reflected in the business plan. Several tidal and rain data sources will be provided on the Challenge website under Datasets.”*

Therefore after Stage 1, if you are selected as a finalist, you may use any data you want, but for Stage 1 submissions you need to use the provided (StormSense) flooding data as a basis for the reports. This is to allow our judges a way to compare the submissions. During Stage 1, at your own discretion, you may augment these provided Storm Sense data with other contemporaneous data if you feel it improves your solution.

**Q 4: Are there any GIS (and other) computer resources available for teams to use in developing their algorithms for submission and thereafter if they are selected as a finalist?**

**A 4:** Yes. ESRI, one of the Challenge partners, is helping us set up an ArcGIS hub, and get access to ESRI tools. We plan to release the hub in February and will cover it during the webinar on February 5, 2020.

**Q 5: What are the terms of the funding provided in the Urban Mobility Challenge? Does RISE take an equity position in the company? Do the funds have to be repaid?**

**A 5:** The funds are provided as grants. RISE takes no equity in any company. The funds do not have to be repaid as long as all deliverables and tasks in the contract are completed.

**Q 6: Am I able to apply if I have a strategic partner that doesn't meet a small business definition?**

**A 6:** Yes, but the small business must be leading the application and implementation.

**Q 7: The Waze app allows individuals ("Wazers") to report flooding obstructing roadways. What is RISE seeking in a solution that isn't provided by Wazers driving around at scale and reporting flooding across the area in real time?**

**A 7:** We want to tap into the Waze routing logic so that the app will route vehicles around the flooding areas. Reports from individuals do not go into the routing logic, only road closure/incident notices which are generated and subsequently approved by the City (Connected Community) and provided to Waze to be included in the logic. This will allow the routing logic to route your vehicle around dangerous flooding.

We are looking for an automated data driven process to accurately determine affected roadway segments. You are, of course, allowed to use Wazer reports if you want and can get them – that’s up to you.

**Q 8: Stormsense data provided on the website does not fully cover the spatial extent of the Hampton roads region and does not cover the spatial extent of the roadways map. How should entrants respond?**

**A 8:** All datasets provided for Stage 1 are from StormSense, a program developed by the Virginia Institute of Marine Science. This program was started in 2016 and has since expanded (spatially) in its coverage. This means that the flood maps for each event have different spatial coverage and may not cover the entire region of the roadway maps. Clearly applicants will be expected to produce roadway reports only in the region covered by the flooding data. Also, datasets provided at this stage of the development are intended to provided entrants data to start and test their software development, and full geographic extent at this stage is not necessary.

**Q 9: Is there numerical depth information in the StormSense data? If not, how do entrants calculate and assess water depth on roadways?**

**A 9:** The flood map datasets from StormSense do not contain the numerical water depth values explicitly. They only indicate the presence of flooding. The computed depths in the datasets were not stored on computation due to the large amount of storage that would have been required. To calculate the flooding depth at a particular point, entrants need the topological elevation at that point. For Stage 1, entrants must use this elevation map: [2016 USGS CoNED Topobathymetric Model \(1859 - 2015\) Chesapeake Bay](#).

**Q 10:** My team is struggling with how to incorporate the USDS CoNED Topobathymetric Model data. I've tried the bulk download and adding the GDB as a layer using a free developer ArcGIS instance, but it threw errors upon import. Is this data available in CSV or other format or are there APIs we could hit to return data based on LAT and LONG?

**A 10: Answer: (from Dr. Derek Loftis, VIMS)**

A digital elevation model (DEM) is a continuous interpolated raster surface scaled to 1 meter spatial resolution. The USGS' CoNED Topobathymetric DEM (<https://doi.org/10.2112/SI76-008>) which covers the entire tidal Chesapeake Bay watershed, generally can't be represented as comma separated values, because the 135 GB file size (for the entire DEM) would actually increase in size. There are two ways to difference these components to get what you want, and it's really all about what order and format (which will also dictate output file size):



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1) You probably only want to know the elevations of certain places in a .csv format... So, you can import the raster DEM into a GIS program like the one you have, and select relevant areas you wish to extract elevations for ([points](#) for sensors, or [sub-divided line segments](#) [or their vertices] for roadways). You can add a field in their attribute tables to store your computed flood depth elevation values, and then just store elevations above a vertical reference datum (typically NAVD88) within those shape files (whose attribute tables can easily be stored as .csv's). Then, depending upon your GIS program (some can directly use rasters as the clip/mask), you can extract the inundated coverage for the VIMS flooded extent raster to clip the areas you have represented to show inundation in those areas estimated to be flooded by the model.

Alternatively, you can do this last part in few additional steps using ArcGIS: A) [convert the model's flooded areas to an integer raster](#), and then B) [convert the raster to a vector](#) polygon (choose non-simplified to preserve precision; only works on INT rasters, thus Step A), finally C) clip the other layers to the same area to show depths in the flooded area relative to VIMS' model-predicted extents.

2) If you care more about the geospatial pattern of flooding, first extract the VIMS model raster and use it as a mask to extract the elevations from the USGS CoNED DEM (via [extract by mask](#)). This now provides a raster surface of varying elevation values. These elevation values may then be translated to depths above a vertical reference datum (typically NAVD88), when interpreting average elevations at the contoured edges to be zero. Then from there, you can use this geospatial layer as the target for your points for sensors or lines for roadways to satisfy the challenge requirements. It involves storing the raster DEM (typically as a GeoTIFF) on your end, and involves more data processing, but you get a more complete picture of the flood conditions this way by having the raster flood extents and the vector impacted roadways/point areas highlighted by depths (whose attributes can be converted and updated as .csv's).

We used to do it at VIMS the 2nd way to provide flood depth rasters before processing got too computationally expensive and people complained that representing multiple flood depths on an hourly basis via color ramps was confusing to comprehend (and render). We are looking to update this again this summer to include depths to be prescribed to our flood rasters (I will let you know when/if that happens), but no data values and 1's for flooded areas were easier to compress and process (for each of the 36 hourly outputs) every 12 hours that we update our model predictions.

**Q 11:** Regarding each of the full field names on the Excel sheet in the Roadways directory of the Dropbox data. Are brief descriptions of their purpose and when to use them? For instance, when do the following attributes are applicable? - Transport Edge and Transport Junction, RTE\_JURIS, RTE TYPE MODIFIER, RTE NM / RTE COMMON NMs, and MASTER RTE / MASTER COMMON NMs.

**A 11:** See the VDOT PDF file in the Roadways directory:  
Transport Edge: Segment  
Transport Junction: roadway intersection

RTE\_JURIS: Route Jurisdiction

RTE TYPE MODIFIER: Route Type Modifier Name is used to differentiate version of a given route type, such as 'Alternate', 'Business/Commercial', 'Bypass', etc. Corresponds to Route Type Modifier Code.

RTE NM: The RNS-defined unique name for the route. This name is a unique key used to identify a single route. It is ...

RTE COMMON NM: Route Common Name is an abbreviated form of the route name. It includes either name or number of route and directionality of route, as well as jurisdiction if applicable.

MASTER RTE NM: The master route is the definitive route on any edge upon which all event data is recorded. There can only be one master route for each edge, and this field yields the name of the master route for the given edge.

MASTER COMMON NMs: Master Route Common Name is an abbreviated form of the master route name. It includes either name or number of route and directionality of route, as well as jurisdiction if applicable.

**Q 12: What is the difference between FROM/TO JURISDICTION NM and JURIS FROM/TO MSR?**

**A 12:** See the VDOT PDF file in the Roadways directory:

FROM/TO JURISDICTION NM: Maintenance Jurisdiction name at the From Junction ID JURIS

FROM/TO MSR: Jurisdiction From Measure is the cumulative LRS measure for the route at the start of the edge within the given jurisdiction. Will differentiate itself from Transport\_Edge\_From\_Msr for routes that span multiple jurisdictions.

**Q 13: What are the full description of MSR and DSC?**

**A 13:** MSR: Measure, DSC: Description

**Q 14: For Stage 1, only the road closure and hazard reports and business plan will be submitted?**

**A 14:** Yes. If the applicant feels that their solution has particular performance that you wish to emphasize to the judges (e.g., enhanced road closure capability, enhanced spatial resolution of hazards, predictive capabilities, etc.), please provide a write-up (5 pages maximum) describing the performance expected and if this performance can be seen in the data from the provided final flood dataset and the time of occurrence(s). The report can be uploaded in Question 9 of the application form. Please do not provide proprietary information.

**Q 15: In slide 4 from last week, what does the comment "consider the roadways in the circles" intended for. Am I submitting the reports based on these areas only?**

**A 15:** No. Submit for the entire Hampton Roads region covered by the flood map data. The roadways in circles were only for illustrative purposes in the presentation.

**Q 16: I am working alone without a team for stage 1. Am I still qualified to enter the challenge?**



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**A 16:** Yes, you can enter. If chosen as a finalist, you will need to form a company before you receive any funds. See attached list of companies for possible partners.

**Q 17: Are you expecting some large and established companies to enter the challenge?**

**A 17:** We can only fund small businesses. Large companies can enter if the team they are on is led by a small business.

**Q 18: When will the final data be available on the RISE website before the deadline of June 1, 2020?**

**A 18:** One week before the submission deadline of June 1. We are reviewing that date and might make it earlier.

**Q 19: Can a team's draft answers be edited online before June 1 after being entered?**

**A 19:** No. Best to develop answers in a separate doc and cut and paste them.

**Q 20: Will it be acceptable to refer to the business plan for additional details for some of the answers? for example "List all the members of your team, their relevant experience, and their role in the company. Please indicate whether any members have prior entrepreneurial experience."**

**A 20:** Yes. As long as the information is in the Business Plan.

**Q 21: I am thinking of including a table of contents and a title page for the Business Plan. Will that count toward the 15 pages maximum.**

**A 21:** Yes, they will count in the 15-page max. It is your call whether you include them in the document.

**Q 22: Can I include an appendix for things like our individual resumes? And in addition to that, do you need the resumes of all team members?**

**A 22:** Question 4 states we are interested in the members' entrepreneurial expertise to be provided in the submission. Enter relevant experience and expertise there. Links to profiles/resumes may be included but are not sufficient on their own.

**Q 23: Who is on the judging committee?**

**A 23: Technical judges:**

Kyle Spencer Deputy Resilience Officer, City of Norfolk

Mark Cave Spatial Systems Analyst, City of Virginia Beach

Mecit Cetin Professor, Old Dominion University

**Business plan judges:**

Jeff Cummings Investor

Bob Smith Director, I-Corps at George Washington University

Paul Robinson Executive Director, RISE

**Q 24: Can anyone apply if they are out of state?**

**A 24:** Yes, but the systems will have to be demonstrated in Hampton Roads.

**Q 25: Who can apply to these challenges?**

**A 25:** Anyone can apply, but only small businesses can receive RISE funds.

**Q 26: If you have a two-way road, and flooding effects both sides of the road. Do you want the same report twice? n the Waze guidance here: <https://developers.google.com/waze/data-feed/incident-information#json-feed-file>, it is stated that for a hazard affecting traffic in both directions on a two-way street we should represent the affected road segment with a polyline and “provide the exact same coordinates twice” to indicate a hazard in both directions. Could you clarify this guidance?**

**A 26:** Please provide the same report twice.