

# **Exploring Coastal Flood Risk through Geospatial Storytelling**

## **Exercise 2 - ArcGIS Dashboards BRIGHT Workshop 2021**

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# Exercise 2

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## **Learning ArcGIS Dashboards**

### **Sub-Sections in Exercise 2:**

1. *Create a new web map*
2. *Create a dashboard*
3. *Configure map element*
4. *Add a list element*
5. *Add a pie chart element*
6. *Add a serial chart element*
7. *Add a map legend element*
8. *Add an indicator element*
9. *Add map actions*
10. *Share the dashboard*

# *Creating your ArcGIS Dashboard*

ArcGIS dashboards is a way to present information through location-based analytics using interactive data visualizations in one web-based interface. Dashboards show geographic information and data to help stakeholders make informed decisions.

In this exercise you will create a dashboard to communicate the risk of a Category 3 hurricane storm surge flooding in Chatham, GA. Your dashboard will include six elements; a map, a pie chart, a list, a serial chart, a map legend, and an indicator. All elements can be configured and interactive.

## *Create a new web map*

### **Step 1    Getting started with ArcGIS Dashboards**

Usually the map is the starting basis for ArcGIS Dashboards. You will start this exercise by creating a new map to use in your dashboard.

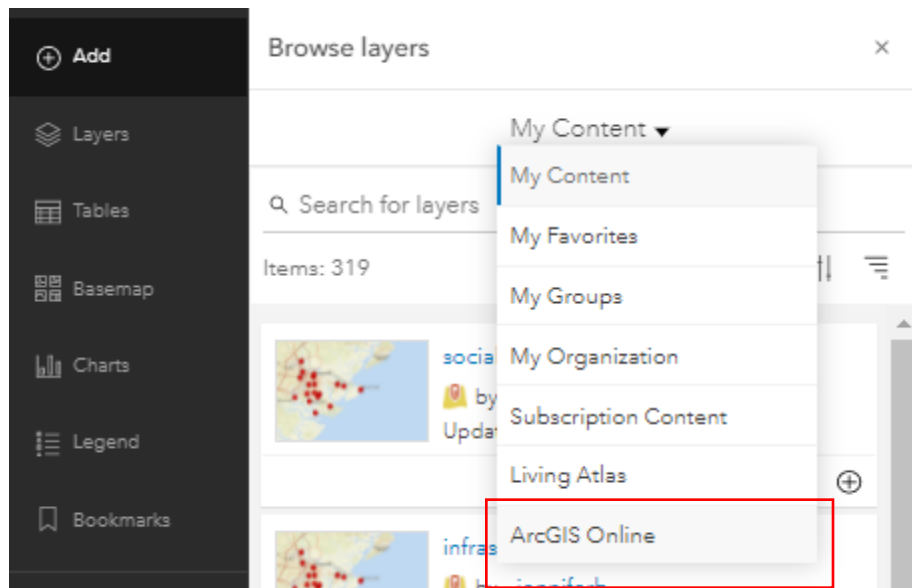
- In a web browser go to <https://www.arcgis.com/index.html>
- Log in using your BRIGHTE workshop username and password.
- Click on Map to open a new map.
- Make sure you **Open a new Map Viewer**.

You will add the storm surge layer you worked with in exercise 1 as well as a layer that contains census block group information for Chatham County, Georgia.

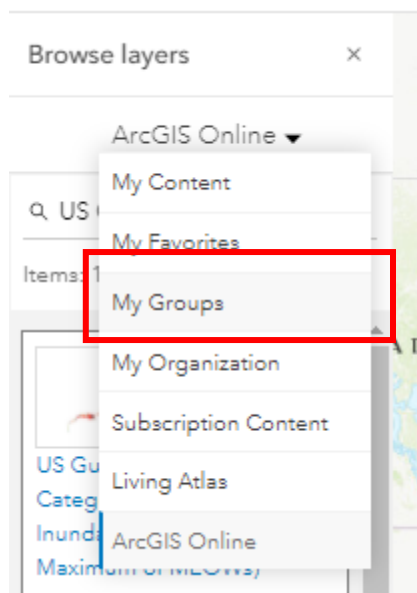
**TIP:** The Content Toolbar contains the functions and tools to create your map. Here you will find tools to add data, change symbology, and save your map.



- Click the **Add button** on the Content toolbar.
- Then click **Browse layers**.
- In the Browse layers pane, and change the search from **My Content** to **ArcGIS Online**.



- Type in '**US Gulf and East Coast Category 3 Storm Surge Inundation**' and click Enter.
- Click the **plus sign** button to add the layer **US Gulf and East Coast Category 3 Storm Surge Inundation** by Hazards\_noaa.
- Still in the Browse layer pane, change the search location from **ArcGIS Online** to **My Groups**.



- Search for the layer **BG\_chatham\_inundation** and click **Enter**.
- Add the layer to the map.
- Click the **Save and Open** button the Content toolbar.
- Save your map as '**<your login> Chatham County Storm Surge**'.
- Add the Tags 'Chatham County' and 'Storm Surge'.



- Add the following Summary '*This map show potential storm surge in Chatham County from a Category 3 hurricane. This map is created during the BRIGHT 2021 Workshop and is for training purposes only.*'
- Save it in the default folder.
- Click Save Map.

The layer that is added is currently symbolized to show population density. The areas in darker orange have higher population density than those in light orange. Notice that the Savannah area and Tybee Island have high population density while much of the rest of the county has lower population density.

- Click on one of the block groups to bring up the pop-up box.

Take a look at the attributes for this layer. Below is a table with the attributes and their definitions.

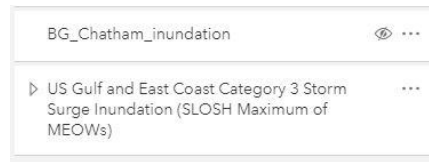
Inundation	Flooding based on climatology for a category 3 hurricane storm surge. Flooding is in feet and is the spatial average of flooding for the block group.
label	3 = less than 3 feet 6 = greater than 3 feet 9 = greater than 6 feet 15 = greater than 9 feet
Area_mile	Area in square miles in each flooding class
PercentLand	Percent of area in Chatham county
TotalPop	Total population from 2019 ACS
PercentPop	Percent of total population for Chatham county
Over65	Total population over 65 from 2019 ACS
Percent65	Percent of people living in this block group who are over 65
popDensity	Population density for the block group

These attributes will be used when we create our dashboard but they are not necessary for the visual map display.



- Make sure the **Layer** pane is open. ( click the second from the top button on the Content Toolbar)

- Turn off the 'BG\_Chatham\_inundation' layer by holding your mouse over the layer name in the Layer pane until you see the eye icon.
- Click the eye icon to turn off the layer.



- Click the **Add layer** button.
- Change the search from **My Content** to **My Groups**.
- Type in 'schools'.
- Add the layer **Schools\_inundation** to the map.
- **Save** your map.

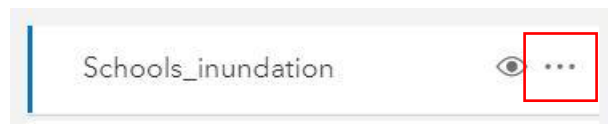
## **Step 2** Symbolize schools layers

Next you will symbolize the school layer and configure the pop-up.

- In the **Layers** pane click the arrow facing left that says Add layer to close the Add Layer pane.



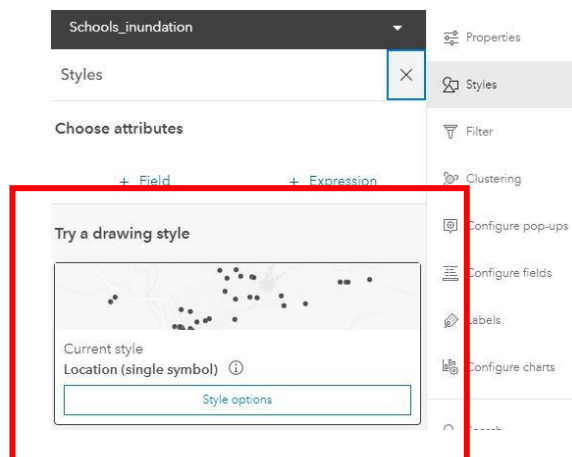
- Click the **Options** button for Schools\_inundation and select **Show Properties**.



On the right side of the map the Properties pane for the schools\_inundation layer will appear. A new list of tools will appear to the right in the Settings toolbar.



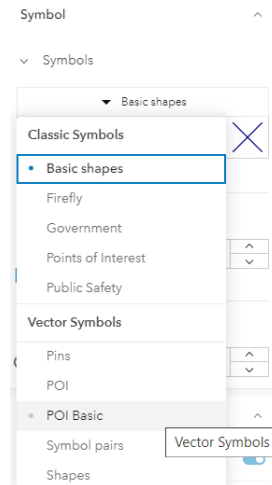
- Click **Styles** button in the Settings toolbar.
- In the **Try a drawing style** section, click the **Style options** button for Location (single symbol).



- Click the symbol in the **Symbol style** box.



- Change the symbol shape from **Basic Shape** to **POI Basic**



- Select any symbol that you think is a good representation for a school.
- Change the size to **25**.
- Click **Done** in the Style options pane twice to close the Style pane.
- Save your map.

Next you will configure the pop-up for schools.



- Click **Configure pop-ups** on the Settings toolbar.
- Make sure pop-ups are **Enabled**.
- Click Fields List and then **Select Fields** to select which field will be displayed in the popup.
- Unselect all fields except **TYPE, GRADES, and label**.

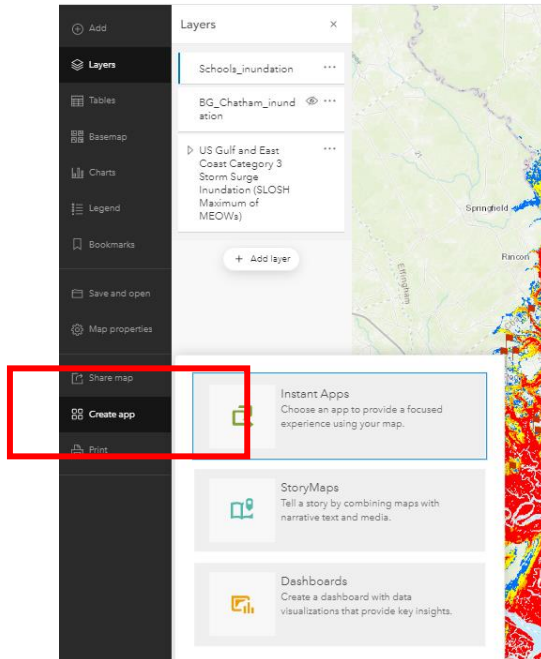
Notice that a pop-up window appears to show you what the pop-up will look like.

- Back on the Content toolbar, in the **Layer** pane, click the **Options** button for **Schools\_inundation** and select **Zoom to**.
- Click **Save**.

### Step 3 Create a dashboard

ESRI dashboards are configurable web applications that allow you to use maps and graphs to visualize information. Your dashboard will use the web map you just created as the center piece. Dashboards are intuitive applications that make information easy to understand.

- Click the **Create App** button at the bottom of the Content toolbar and then select **Dashboards**. If you do not see Create App you may need to click the three horizontal dots to see more tools.



- Leave the title as is.
- Add the **Tag** 'risk'.
- Add the following text for the **Summary** 'This dashboard will present people and places at risk from a category 3 storm to storm surge.'
- Click **Create dashboard**.

A dashboard is now created and will open. This is the starting point for your dashboard.

The main toolbar contains key features you will need to use to create your dashboard. This toolbar contains buttons to add new elements to your dashboard, save your dashboard, and configure your dashboard.





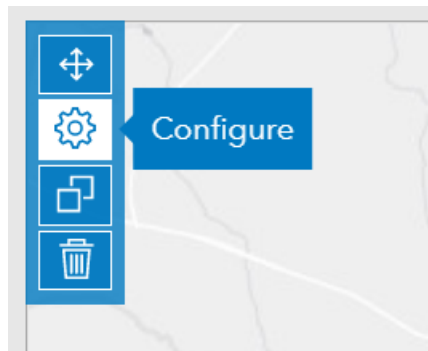
## **Step 4**    **Configure the map element**

Now that you have your first element, also called 'Card' in the dashboard (your map) you can configure the properties. A map is often the central piece of any dashboard. There are a number of different elements you will add to your dashboard such as lists, serial charts, and pie charts. Each element will have slightly different properties.

- Move your cursor to the upper left corner of the map to display the menu.

You can access all the settings for an element from the menu.

- Click the **Configure** button.



- In the **Settings** tab, make sure **Pop-ups** are enabled.
- Enable the following elements on the Settings tab: **Default extent and bookmarks**, **Legend**, and **Zoom in/out**.

## Chatham County JB

Settings General Map actions Layer actions

Pop-ups



Scalebar



Default extent and bookmarks



Legend



Layer visibility



Basemap switcher



Search



Zoom in/out



Point zoom scale

10000



- Click the **General** tab.

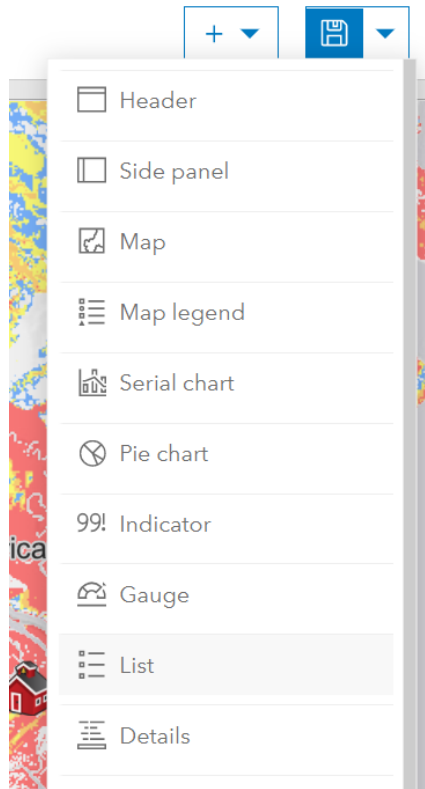
In this tab there are a few more properties to set. The Name will be used to uniquely identify the element. You can leave the name as the default or give it your own unique name. The Title is the title of the element that will be displayed on your dashboard.

- For **Name** enter '**Map of Chatham County**'.
- For **Title**, click the Edit button and enter '**Chatham County Category 3 Storm Surge**'.
- Change the size from **Normal** to **Heading 3**.
- Click **Done** at the bottom to apply your changes.
- Click **Save** on the main toolbar.

## **Step 5**    Add a list element

You will now add a List element to your dashboard. A list is used to show attributes from features in a layer. You will create a list for the schools layer in your map.

- Open the element dropdown list on the main toolbar and select **List**.



- Choose the layer **Schools\_inundation** to be used.

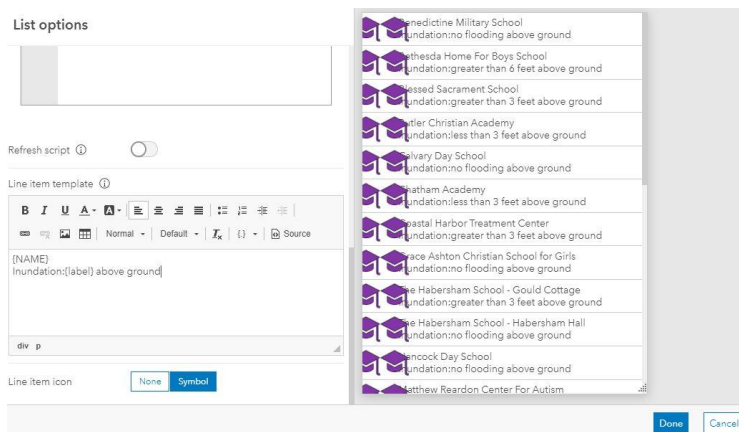
Now the list will be sorted in alphabetical order by the field name.

- Click the **List** tab on the left to configure the **Line item template**.
- In the text box on the second line under {name} add the word **Inundation:**
- Click the **{ }** button and select **{label}**.

- Add the words **above ground**.
- Make sure your textbox looks like the one below.

**TIP:** As you are creating the text to be displayed in the list you can see how it is displayed to the right of your screen.

- Click **Done** in the lower right corner of the screen.



You now have 2 elements in your dashboard. Since the map is the central element in this dashboard you will rearrange the elements to make the list narrower.

- Hold your mouse on the bar in between the list and the map.
- Notice that the pointer symbol changes.
- Drag the map edge towards the left to make the list narrower (make the list around 25%).
- **Save** your dashboard

## **Step 6** Add a pie chart element

A pie chart visualizes data in a circular chart divided into sections. Each section represents a proportion of the whole. Pie charts are used when trying to visualize parts of the whole. You will add a pie chart to represent the percent of people who may be impacted by storm surge based on the different flooding level categories.

- Open the element dropdown list and select **Pie chart**.

This will open the Pie chart properties.

- Select the layer **BG\_Chatham\_inundation**.
- Click the **Show data table** and take a look at the fields and data in this layer.

Now you will continue to configure the pie chart to display the percentage of people who can be at risk of being flooded by storm surge.

- Click **Show Preview**.

- Select the field **label** for the **Category** field.

Data options

Show data table

Layer: BG\_Chatham\_inundation

Change

Filter

+ Filter

Categories from

Grouped values

Features

Fields

Category field

Statistic

Field

Sort by

Filter options

OBJECTID

unique

NAME

string

inundation

number

label

string

Area\_mile

decimal

PercentLand

decimal

TotalPop

number

PercentPop

decimal

Over65

number

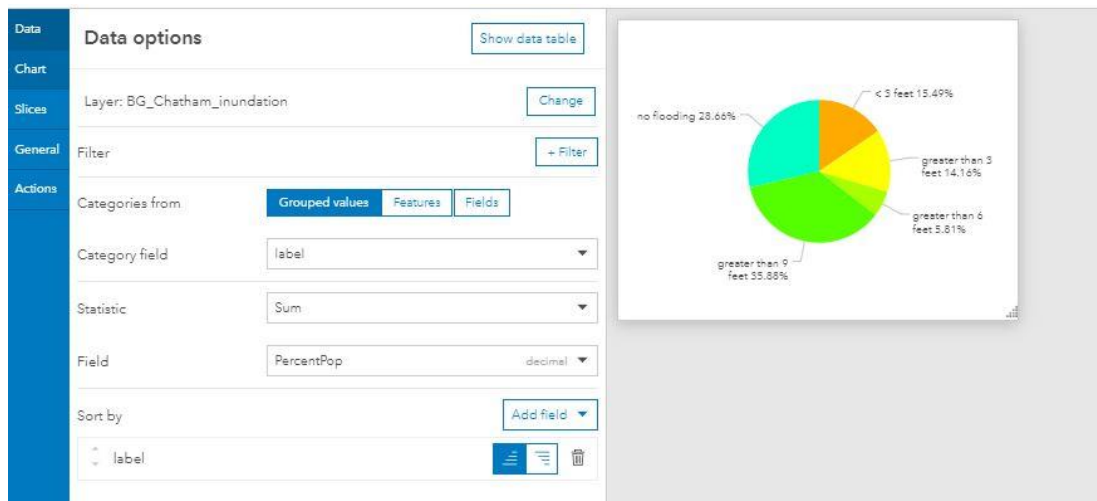
Percent65

decimal

popDensity

decimal

- Select **Sum** for the **Statistic**.
- Select **PercentPop** for the **Field**
- In the **Sort by** section click **Add field** and select **label**.



- Click the **Chart** tab.
- Change the Font size to **15**.
- Change the Inner radius to **35**.
- Click the **Slices** tab.

You are going to change the color in the pie slices to match the flooding inundation colors on the map.

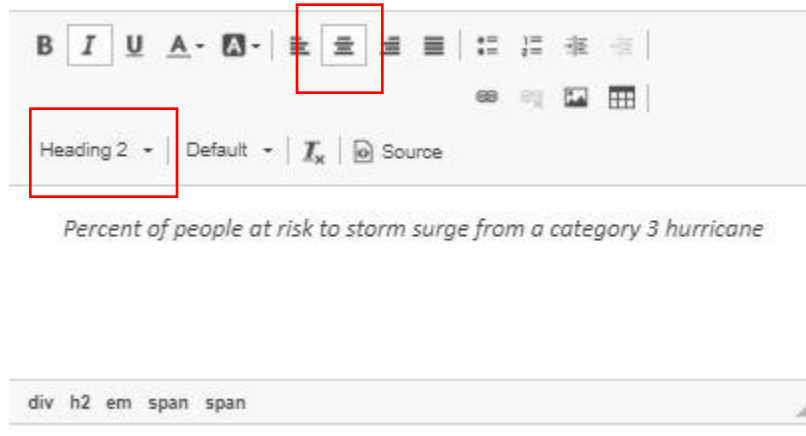
- Change the color for < 3 feet to #0f73ff
- Change the Label to 'less than 3 feet'.
- Change the color for greater than 3 feet to #ffff01
- Change the color for greater than 6 feet to #ffa705
- Change the color for greater than 9 feet to #f70408
- Change the color for no flooding to #ebebeb.

### Slices

Opacity: 0  1

Category	Color	Label
< 3 feet	<span style="color: blue;">■</span>	less than 3 feet
greater than 3 feet	<span style="color: yellow;">■</span>	greater than 3 feet
greater than 6 feet	<span style="color: orange;">■</span>	greater than 6 feet
greater than 9 feet	<span style="color: red;">■</span>	greater than 9 feet
no flooding	<span style="color: lightgray;">■</span>	no flooding
Null	<span style="color: gray;">■</span>	null
Blank	<span style="color: gray;">■</span>	blank
Undefined categories	<span style="color: gray;">■</span>	

- Click the **General** tab.
- Change the **Name** to 'Pie chart of population'.
- Click the **Edit** button for the Title type the following 'Percent of people at risk to storm surge from a category 3 hurricane'.
- Center justify the title and change the font from Normal to **Heading 2**.



- Click **Done**.

## **Step 7** Rearrange elements

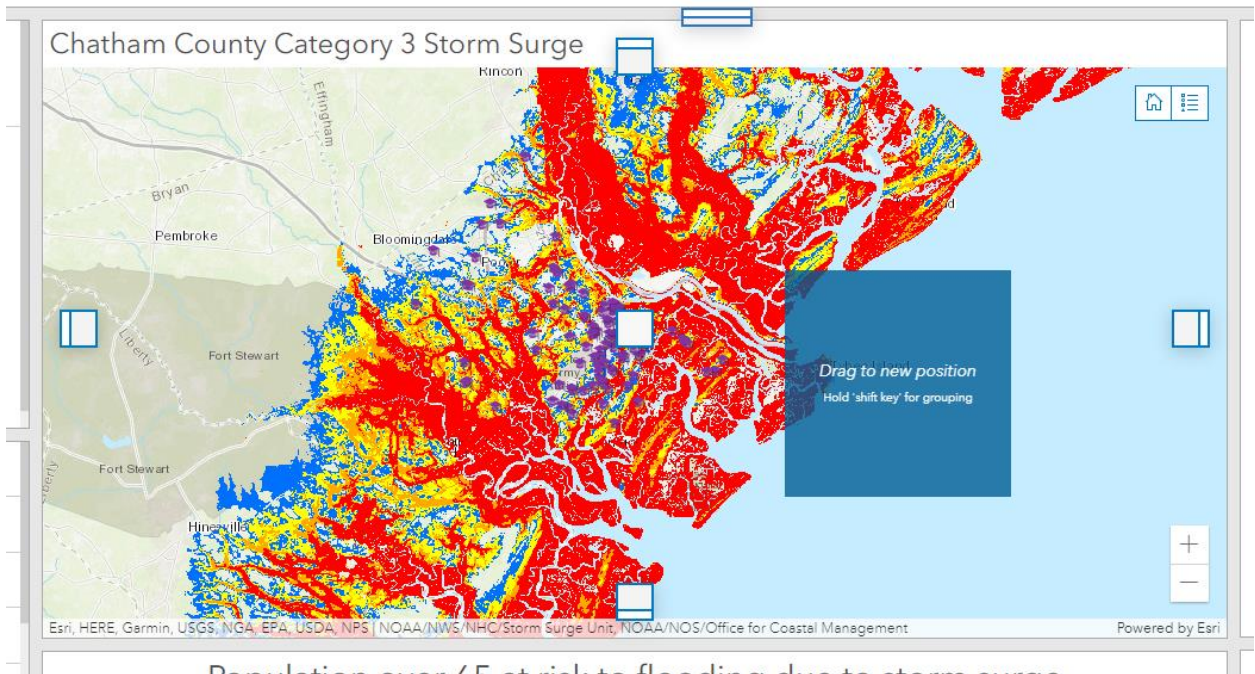
Back in the dashboard you will rearrange the elements.

To rearrange elements on a dashboard you must first click the Drag item tool located on the top corner of the element.

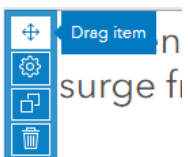
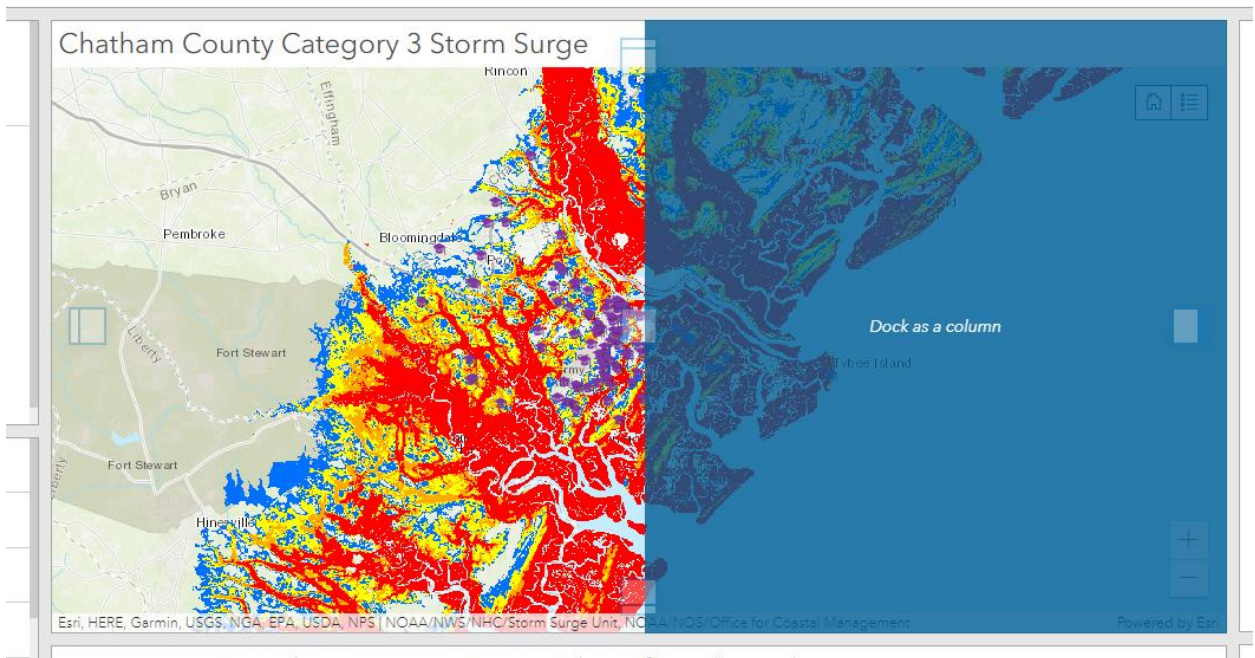
Drag item 

While moving the element you will see indicator for positions appear on the dashboard that say "Drag to new position".

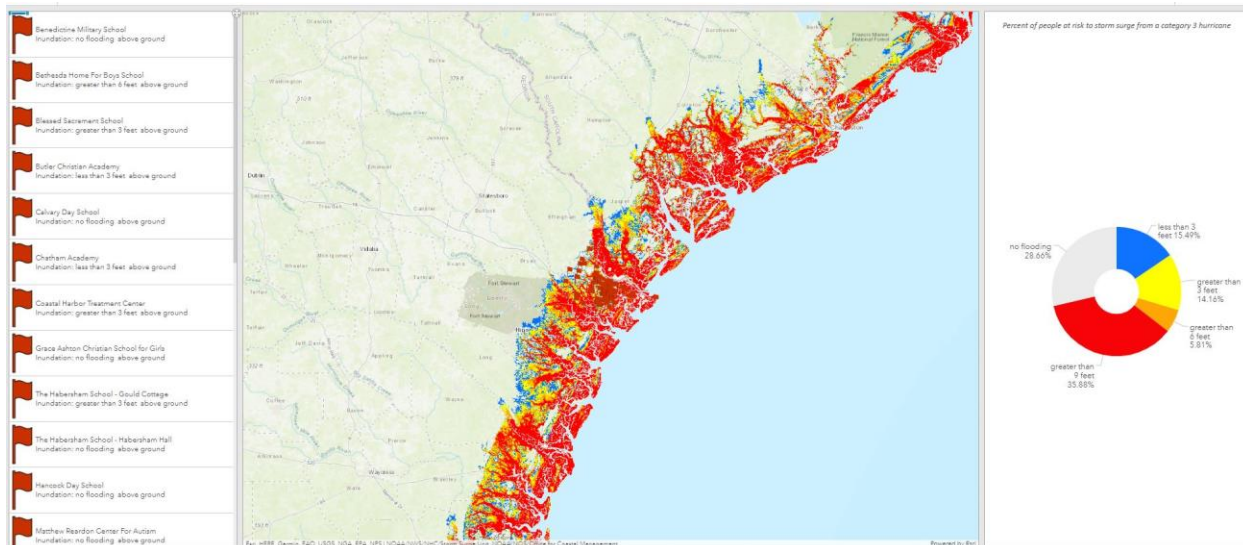




When you place your cursor over one of those positions you will see text such as Dock as a column, or Dock as a row. Drop your item over that position to place the element.



- Click the top-left corner of the pie chart and drag the element to the right of the map in order to dock it as a column.
- Your dashboard should look similar to the image below. Note that your map symbols may be different.



- **Save your dashboard.**

## Step 8 Add a serial chart

A serial chart visualizes data along an X and Y axis. Serial charts can show more than one series of data. The chart you will add to the dashboard will also use the census block group layer to display how many people over the age of 65 live in the different flooding level classes.

- Open the element dropdown list and select **Serial chart**.
- Select the layer **BG\_Chatham\_inundation**.

**Category field** select **label**.

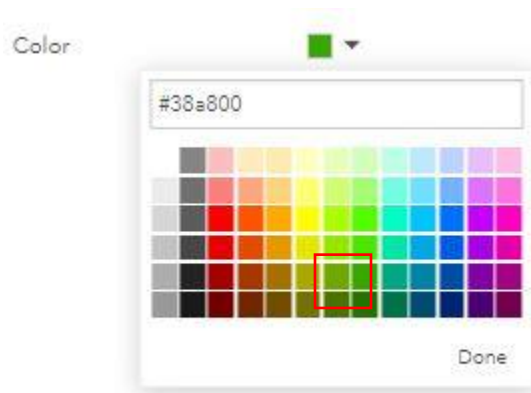
**Statistics** select **Sum**.

For the **Field** select **Over65**.

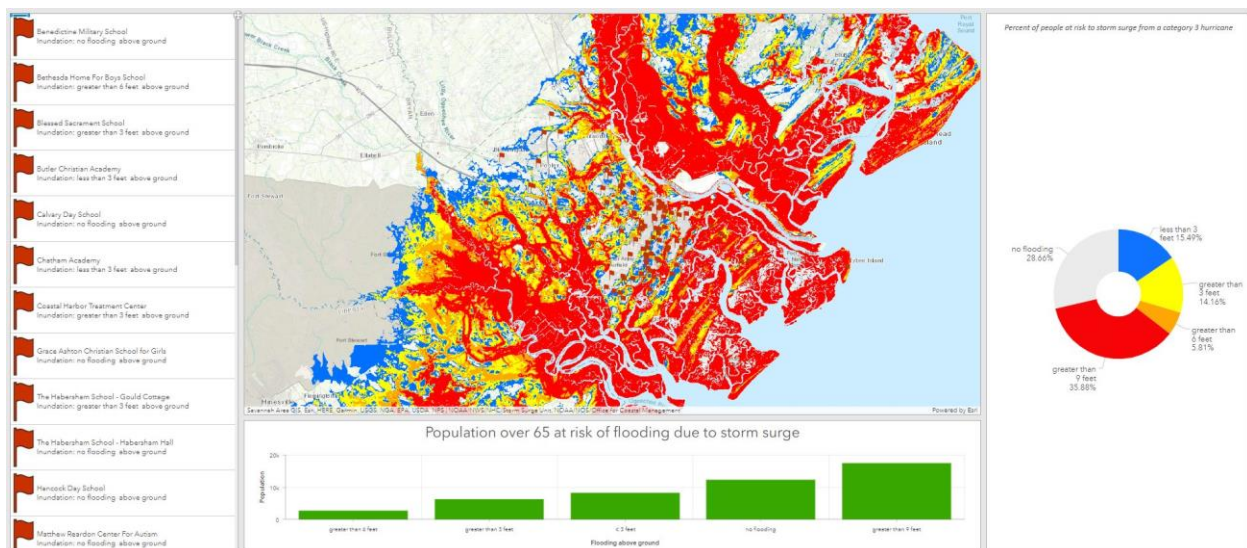
In the **Sort by** section click **Add field** and select **Statistic**.

Data	Data options	Show data table
Chart		
Category axis	Layer: BG_Chatham_inundation	Change
Value axis	Filter	+ Filter
Guides	Categories from: <b>Grouped values</b>   Features   Fields	
Series	Category field: label	
General	Parse dates: <input type="checkbox"/>	
Actions	Split by field:	
	Statistic: Sum	
	Field: Over65 (number)	
	Sort by: Add field	
	Statistic	
	Maximum categories: No limit	

- Select the tab **Category axis** and change the Title to '*Flooding above ground*'.
- Select the tab **Value axis** and change the Title to '*Population*'.
- Select the tab **General** and change the Name to '*Serial chart population over 65*'.
- Click the edit button (pencil) and change the Title to '*Population over 65 at risk of flooding due to storm surge*'.
- Center justify the title and make the font from Normal to Heading 2.
- Select the **Series** tab and change the color at the bottom to a **green**.



- Click **Done**.
- Back in the dashboard you will rearrange the elements.
- Click the top left corner of the serial chart and drag the element to the bottom of the map in order to Dock it as a row.
- Your dashboard should look similar to the image below.
- **Save** your dashboard.





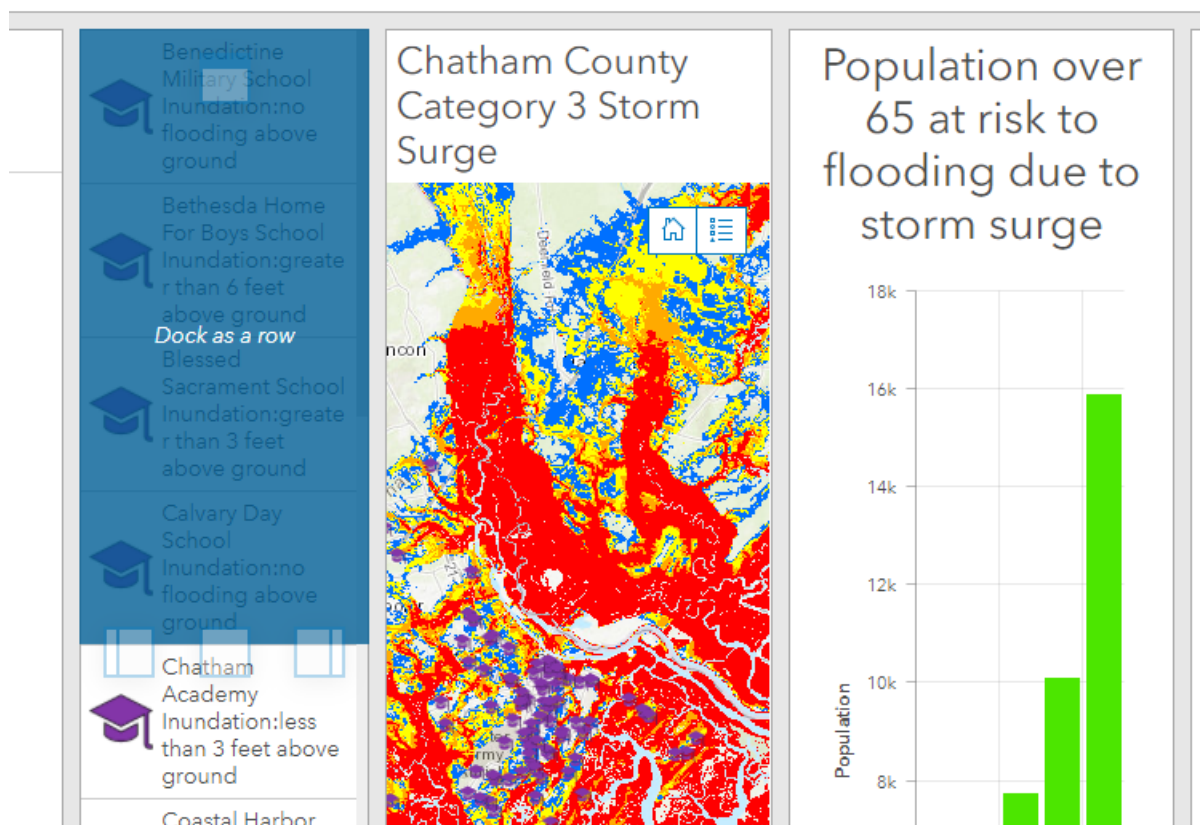
## Step 9 Add a map legend

A map legend shows the symbols for data in the map element.

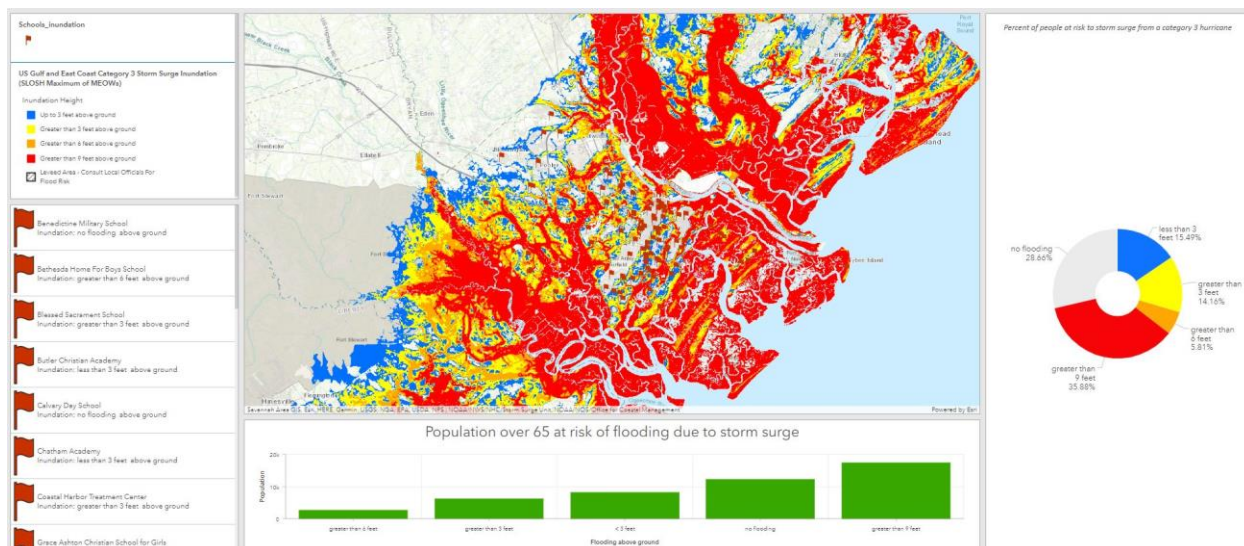
- Open the element dropdown list and select **Map legend**.

You will not need to do any configuration for the Map legend.

- Click **Done**.
- Back in the dashboard you will rearrange the elements.
- Click the top left corner of the map legend and drag the element to the top of the list element in order to Dock it as a row.



- Resize the elements.
- Your dashboard should look similar to the image below.



## Step 10 Add an Indicator Element

An indicator is a card used to display the numeric attribute of a feature. You will configure an indicator element to show how much land may be at risk to more than 9 feet of flooding due to storm surge with a category 3 hurricane.

- Open the element dropdown list and select **Indicator**.
- Select the layer **BG\_Chatham\_inundation** to use for your data values.

This layer contains a field percentLand. This field contains the percent of land in Chatham County that can experience flooding due to storm surge from a category 3 hurricane for each inundation class.

- Click the **Filter** button.
- For the **Field for the condition** select **inundation**.
- Change the condition to **'greater than or equal'**.
- Change the value to **12**.

**Data options**

Show data table

Value

Layer: BG\_Chatham\_inundation

Change

Filter

inundationnumber

greater than or equal

ValueField

12

AND

OR

This will filter out all areas that may not be at risk to over 9 feet of flooding due to storm surge.

- Make sure the **Value type** is set to **Statistic**
- Change the **Statistic** to **Sum**
- Change the **Field** to **PercentLand**
- Click the **Indicator** tab.
- For the Top text type in '{value}%'.  
• Change the font size to **XLarge**.

Top text Fields: {} ■ □ A

{value}%

Middle text Fields: {}

{value}

Bottom text Fields: {}

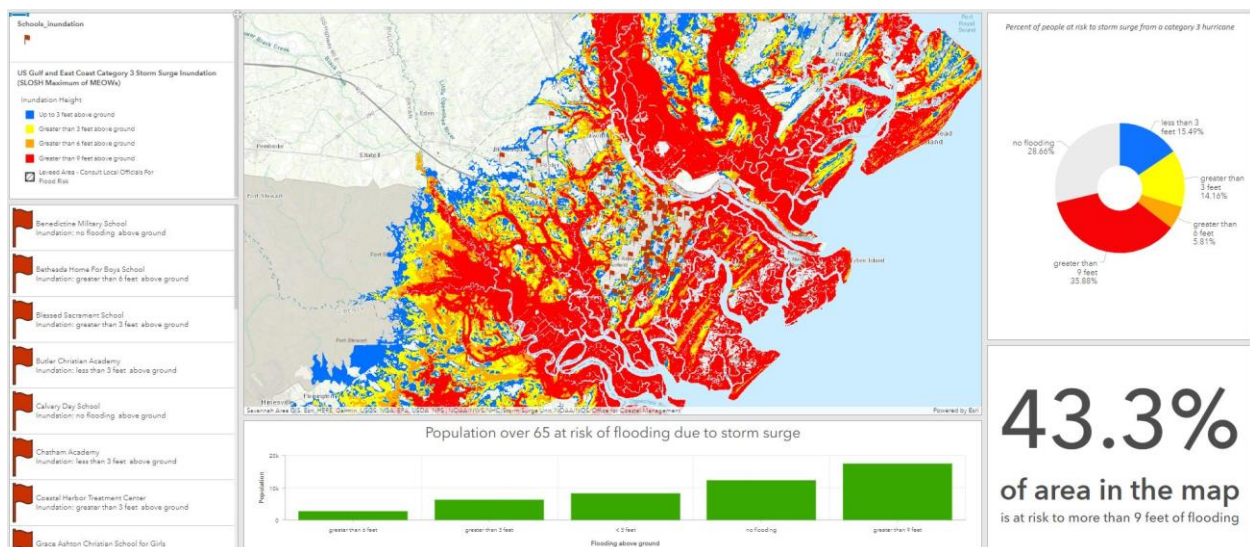
Icon

Value formatting Edit

Size dropdown menu:

- xx-small
- x-small
- small
- medium
- large
- x-large
- xx-large

- For the Middle text type in ***'of area in the map'***.
- Change the size to **Large**.
- For the Bottom text type in ***'is at risk to more than 9 feet of flooding'***.
- Change the size to **Medium**.
- Click **Done**.
- Back in the dashboard click the upper left corner of the Indicator and drag the item to dock as a row underneath the pie chart.



## **Step 11 Add Header**

- Open the element dropdown list and select **Header**.
- For Title type in '**Risk of flooding due to storm surge from a category 3 hurricane**'.
- Click **Done**.
- Click **Save**.

## **Step 12 Configuring Map Actions**

Actions are initiated by events and they allow your dashboard to be a more interactive experience. In this next section you will configure your elements to be linked to your map extent through a map action. In this situation when your map extent changes all your dashboard elements (cards) will reflect only the data display in the current map display. You will also configure a selection action, so that when a feature is selected on a card, the map will zoom to the feature.

**TIP:** The unique names you assigned each of your cards will be important in this step to identify cards.

First you will set a map action on the list.

- Click the top left corner of the **list** card and select **Configure**.
- Click the **Actions** tab on the left hand side.
- Click **Add action** and select **Zoom**.
- Click **Add target** and select **Map of Chatham County**.
- Click **Add action** and select **Flash**.
- Click **Add target** and select **Map of Chatham County**.
- Click **Done**.

Test your new action by selecting a feature in the list.

- Click on a feature in your list.

Your map should zoom to the feature you have just selected. When you zoom in your storm surge data will disappear. This is because there is a scale dependency on this layer and when you are zoomed in too close the data will automatically turn off.

Next, you will configure the serial chart to change based on the map extent. As the map extent changes, the population in the serial chart will only reflect the population displayed on the map.

- Click the top left corner of the **map** card and select **Configure**.



- Click the **Map Actions** tab.
- Click **Add target** and click **Filter**.
- Click **Add target** and select **Indicator**.
- Keep clicking Add target for the list, pie chart, and serial chart.
- Click **Done**.

Test your new action by selecting a feature in the list.

- Zoom around the map and take a look at how the elements changes to reflect only the population in the map view.
- **Save** your dashboard.

### **Step 13** Sharing your dashboard

- Click **Home** in the upper left corner, and from the menu click **Dashboard item details**.
- Click **Share** and select **Everyone (public)**.
- Click **Save**.

Your dashboard is now shared publically and anyone can view it.

- Click **View Dashboard** to see your dashboard again.

You have just created a dashboard that can be shared with others to communicate who is a risk to storm surge flooding in Chatham County, GA.

### **Step 14** EXTRA : If you have time and want to add some Arcade code please continue.

In this step you will add code written in a scripting language called Arcade. Arcade is used to perform mathematical calculations, and manipulate text. You will add some Arcade code to change the color of text being displayed in the list based on the level of inundation.

- Click the **Configure** tool on the **List** element.
- Click the **List** tab.
- Enable the **Advanced formatting**.

In the **Expression** tab you will see some Arcade code already written.

First you will create a new variable that will contain a color based on the inundation field value.

- On line 1 type in the following line `var floodColor`.

```

1 var floodColor
2 return {
3   textColor: '',
4   backgroundColor: '',
5   separatorColor: '',
6   selectionColor: '',
7   selectionTextColor: '',
8   // attributes: {
9     // attribute1: '',
10    // attribute2: ''
11  // }
12 }

```

Next, you will add code to create different colors depending on the inundation level using a `When()` statement. The color below sets the variable to a particular color based on the inundation value.

- Add the following code. Do not delete the `return{}` statement.

```

Var floodColor = When(
  $datapoint.inundation==3, '#0f73ff',
  $datapoint.inundation==6, '#ffff01',
  $datapoint.inundation==9, '#ffa705',
  $datapoint.inundation==15, '#f70408',
  '#d6d0d0')

```

Your code should look like this.

Expression	Globals	Functions	Constants
<pre> 1 Var floodColor = When( 2   \$datapoint.inundation==3, '#0f73ff', 3   \$datapoint.inundation==6, '#ffff01', 4   \$datapoint.inundation==9, '#ffa705', 5   \$datapoint.inundation==15, '#f70408', 6   '#d6d0d0') 7 8 </pre>			

If you copy and paste this code into your expression box you may get an red X (error) on line 6. Follow the sequence above and add the last color in your statement separately.

This code creates a variable called 'floodColor' :

when the inundation value is 3 the variable will hold the color blue  
 when the inundation value is 6 the variable will hold the color yellow,  
 when the inundation value is 9, the variable will hold the color orange,

when the inundation value is 15 the variable will hold the color red, otherwise, the variable will hold the color light gray.

Now we need to add this variable as an attribute that gets returned.

- In the **return { }** section uncomment all the attribute lines by remove the two forward slashes.

```
7 return {
8   textColor: '',
9   backgroundColor: '',
10  separatorColor: '',
11  selectionColor: '',
12  selectionTextColor: '',
13  attributes: {
14    attribute1: '',
15    attribute2: ''
16  }
17 }
```

- Add the following code as an attribute -

*floodColor: floodColor*

- Delete the lines

*attribute1: "*  
*attribute2: "*

```
return {
  textColor: '',
  backgroundColor: '',
  separatorColor: '',
  selectionColor: '',
  selectionTextColor: '',
  attributes: {
    floodColor: floodColor,
  }
}
```

Now that you have an attribute called floodColor that has a color for the different inundation levels you will add this attribute to the Line Item Template.

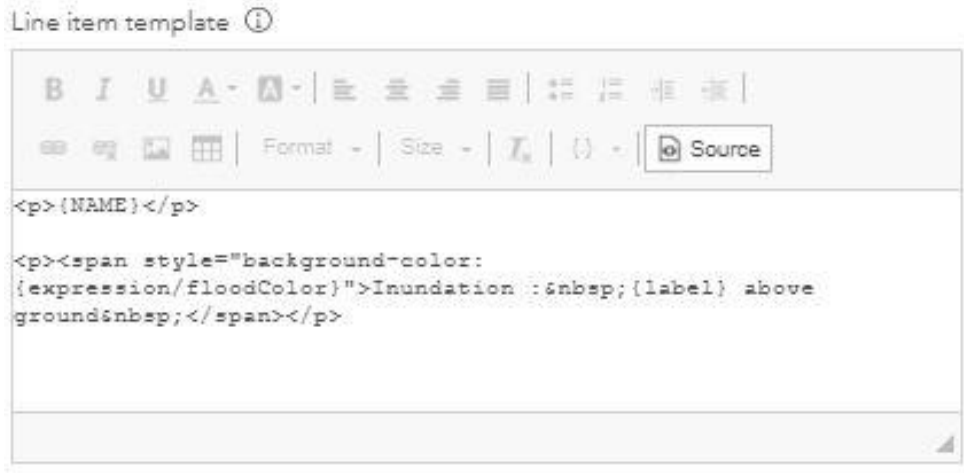
- Back in the **Line item template** click the **Source** button.

You are now look at the text for the list in HTML.

Add the following **<span>** tag in between **<p>** and the word **Inundation**.

*<span style="background-color:{expression/floodColor}">*

- Before the last **</p>** close your **<span>** tag with **</span>**.



- Click **Source** again to see what your list will look like now that you added a little bit of Arcade code.

Here is the HTML code if you want to copy and paste.

```
<p>{name}</p>
<p><span style="background-color:{expression/floodColor}">Inundation:{inundation} feet above
ground level</span></p>
```

Notice that now your list is highlighting the Inundation levels based on the flooding that can occur at that site.

- Click **Done**.

Take a look at the list and how schools are colored differently based on the amount of flooding inundation they may experience.

- Save the dashboard.