QGIS:
A user's perspective

Phil Pierdomenico
@PhilPierdo

Information Resource Exchange Group
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Who am I?

GIS Analyst

-Currently working as an Americorps VISTA

B.A. in Geography,
Rowan University 2008

M.S. in Geography,
Central Connecticut State University 2011

What do I do?

- Create data (e.g. geocoding)

- Analyze data
  - Retrieve data (e.g. American Community Survey)
  - Process data (calculations)
  - Visualize data (make really cool maps)

What is QGIS?

- Free and open source GIS desktop program
  - Licensed under GNU General Public License
- Geoprocessing and cartographic abilities
  - Vector creation and editing; Raster calculator; Python programming
  - Print composer; Web mapping
- Cross-platform
  - Windows, Mac, Linux, BSD and Android (in beta)

Why do I like QGIS?

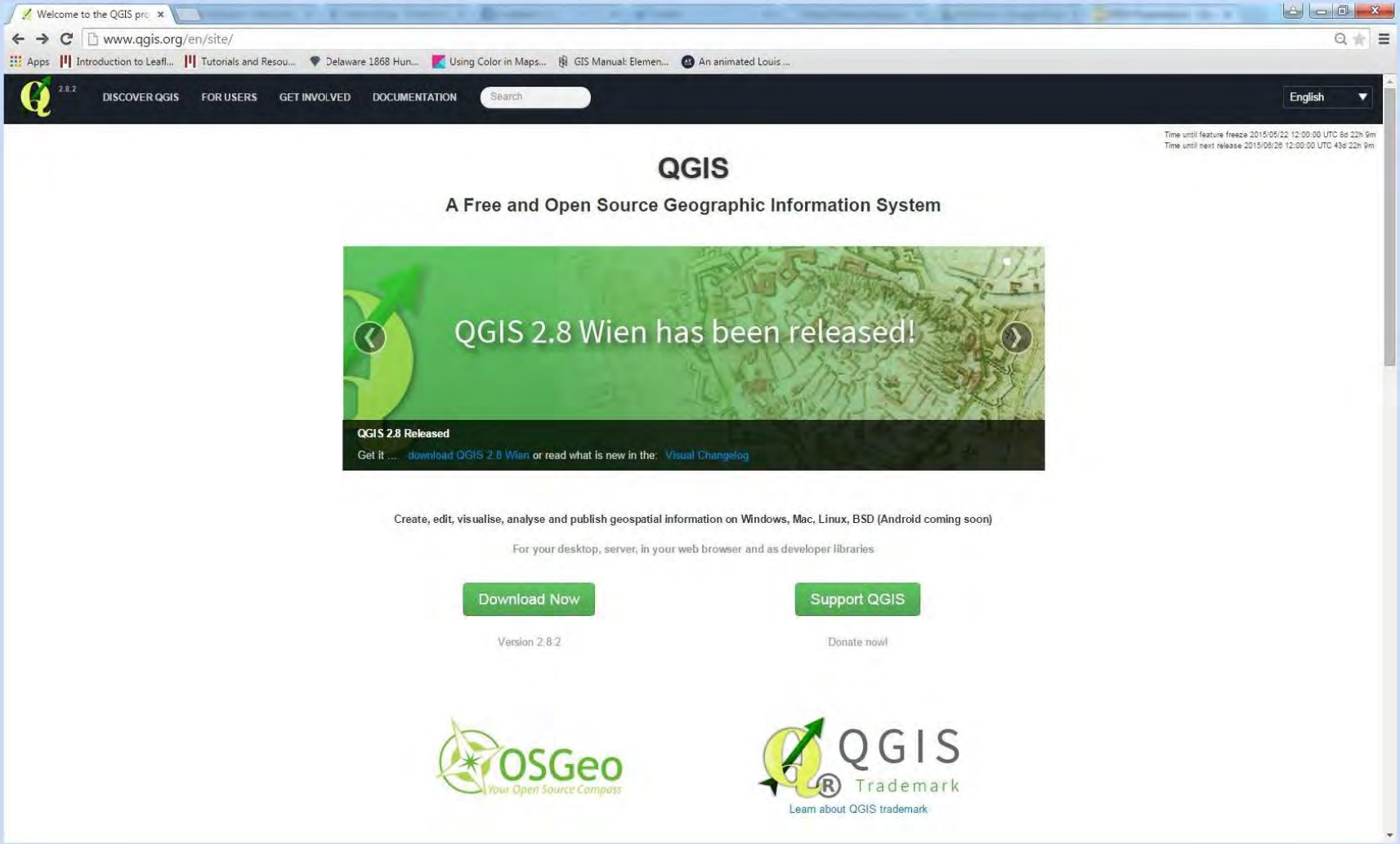
- No other GIS software available
  - I just wanted to make a few simple maps
  - I found that QGIS had what I was looking for

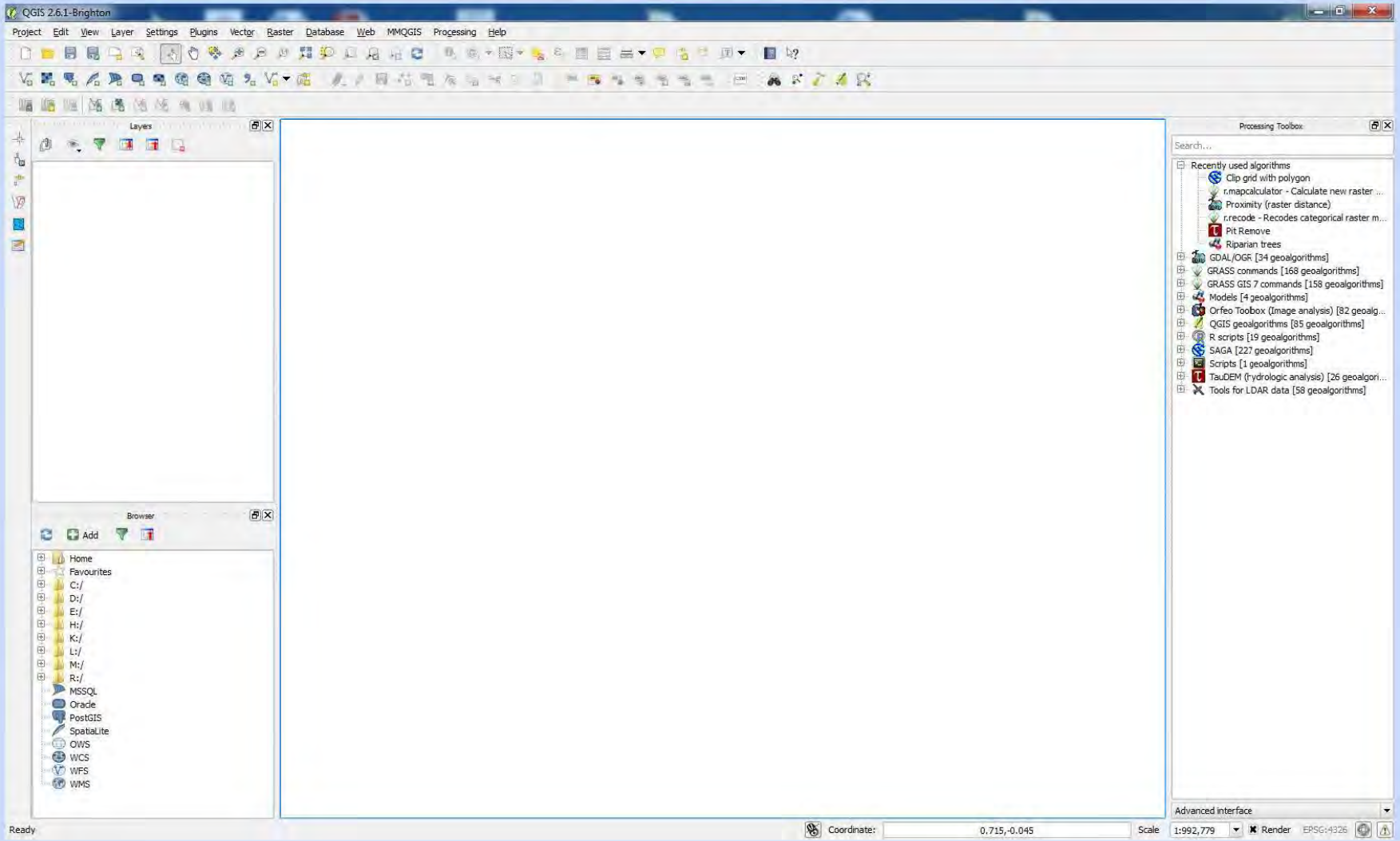
- Small operation
  - I’m a one-man GIS department

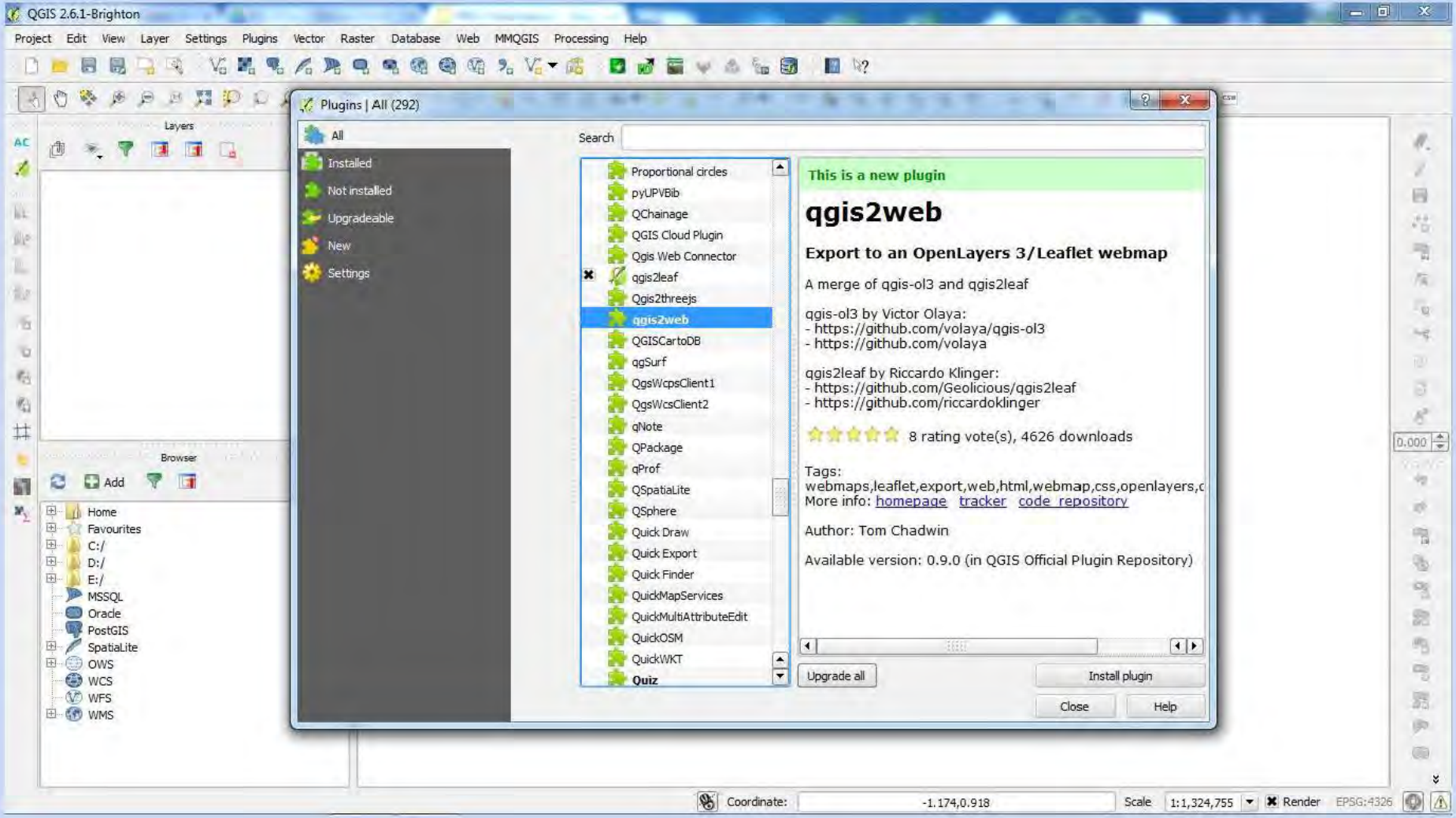
What does it do?

- Pretty much anything a GIS program should be able to do
- Rasters/vectors; databases; editing; spatial analysis; modeling; Python programming…
- Static print and interactive web mapping
- Hundreds of geoprocessing tools, both built-in and available through plugins

Let’s take a look!

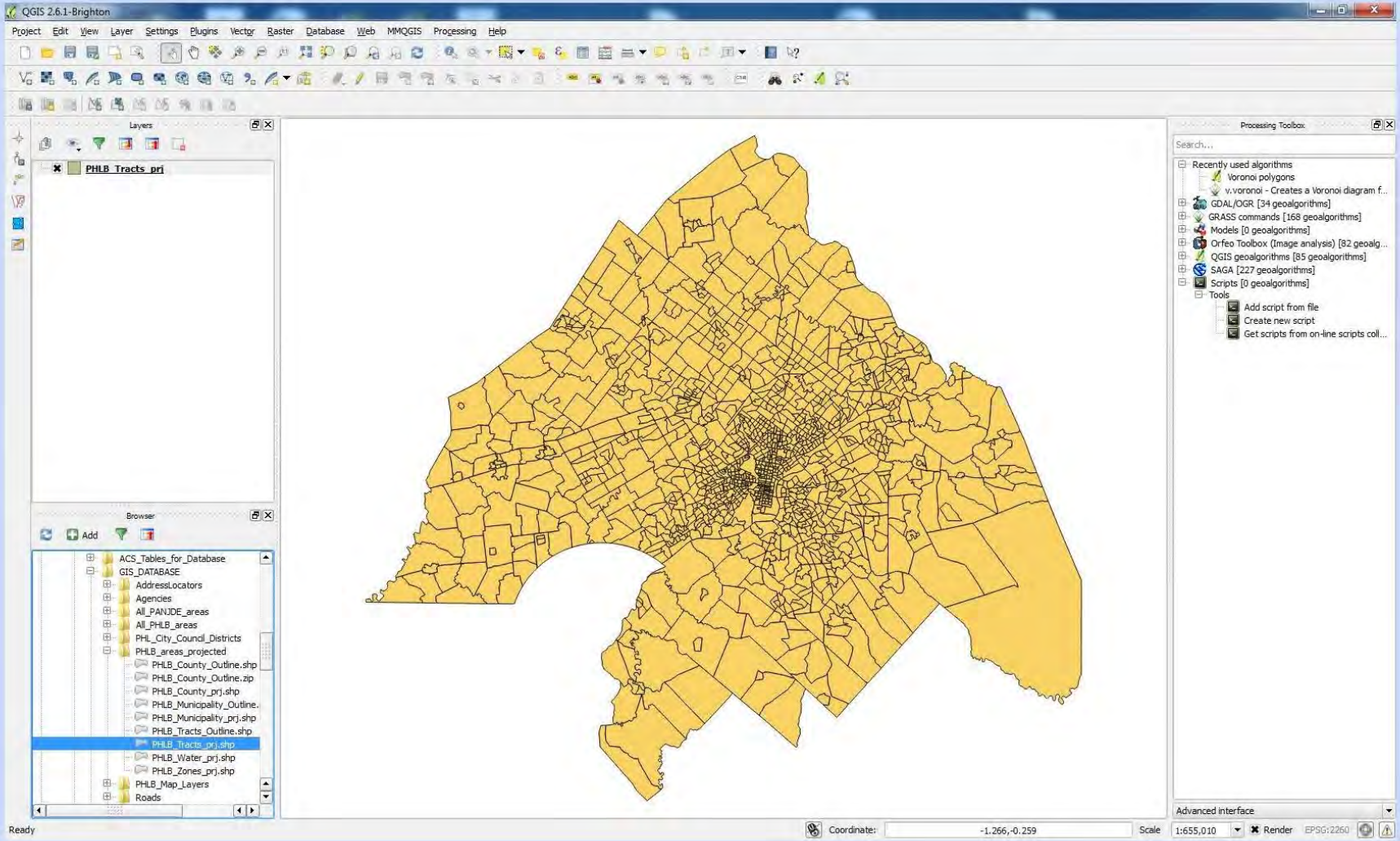

Welcome to the QGIS pro
www.qgis.org/en/site/
Apps
Introduction to Leafl...
Tutorials and Resou...
Delaware 1868 Hun...
Using Color in Maps...
GIS Manual: Elemen...
An animated Louis ...
2.8.2
DISCOVER QGIS
FOR USERS
GET INVOLVED
DOCUMENTATION
Search
English
Time until feature freeze 2015/05/22 12:00:00 UTC 8d 22h 9m
Time until next release 2015/06/26 12:00:00 UTC 43d 22h 9m
QGIS
A Free and Open Source Geographic Information System
QGIS 2.8 Wien has been released!
QGIS 2.8 Released
Get it ... download QGIS 2.8 Wien or read what is new in the: Visual Changelog
Create, edit, visualise, analyse and publish geospatial information on Windows, Mac, Linux, BSD (Android coming soon)
For your desktop, server, in your web browser and as developer libraries
Download Now
Version 2.8.2
Support QGIS
Donate now!
OSGeo
Your Open Source Compass
QGIS
Trademark
Learn about QGIS trademark

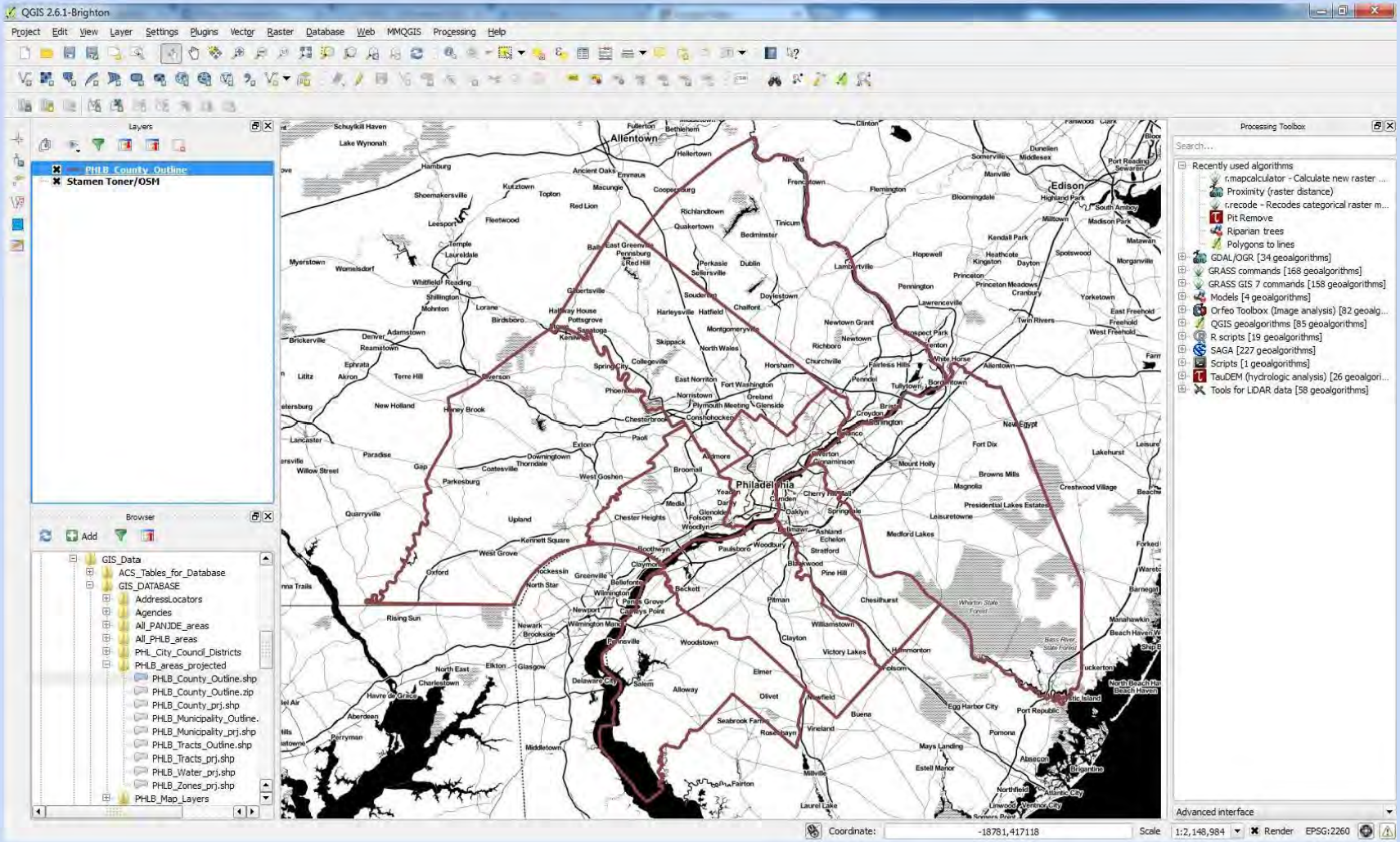

QGIS 2.6.1-Brighton
Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help
Layers
Browser
Add
Home
Favourites
C:/
D:/
E:/
H:/
K:/
L:/
M:/
R:/
MSSQL
Oracle
PostGIS
SpatiaLite
OWS
WCS
WFS
WMS
Processing Toolbox
Search...
Recently used algorithms
Clip grid with polygon
r.mapcalculator - Calculate new raster ...
Proximity (raster distance)
r.recode - Recodes categorical raster m...
Pit Remove
Riparian trees
GDAL/OGR [34 geoalgorithms]
GRASS commands [168 geoalgorithms]
GRASS GIS 7 commands [158 geoalgorithms]
Models [4 geoalgorithms]
Orfeo Toobox (Image analysis) [82 geoalg...
QGIS geoalgorithms [85 geoalgorithms]
R scripts [19 geoalgorithms]
SAGA [227 geoalgorithms]
Scripts [1 geoalgorithms]
TauDEM (hydrologic analysis) [26 geoalgori...
Tools for LDAR data [58 geoalgorithms]
Advanced interface
Ready
Coordinate:
0.715,-0.045
Scale
1:992,779
Render
EPSG:4326


QGIS 2.6.1-Brighton
Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help
Plugins | All (292)
All
Installed
Not installed
Upgradeable
New
Settings
Search
Proportional circles
pyUPVBib
QChainage
QGIS Cloud Plugin
Qgis Web Connector
qgis2leaf
Qgis2threejs
qgis2web
QGISCartoDB
qgSurf
QgsWcpsClient1
QgsWcsClient2
qNote
QPackage
qProf
QSpatiaLite
QSphere
Quick Draw
Quick Export
Quick Finder
QuickMapServices
QuickMultiAttributeEdit
QuickOSM
QuickWKT
Quiz
This is a new plugin
qgis2web
Export to an OpenLayers 3/Leaflet webmap
A merge of qgis-ol3 and qgis2leaf
qgis-ol3 by Victor Olaya:
- https://github.com/volaya/qgis-ol3
- https://github.com/volaya
qgis2leaf by Riccardo Klinger:
- https://github.com/Geolicious/qgis2leaf
- https://github.com/riccardoklinger
8 rating vote(s), 4626 downloads
Tags:
webmaps,leaflet,export,web,html,webmap,css,openlayers,c
More info: homepage tracker code repository
Author: Tom Chadwin
Available version: 0.9.0 (in QGIS Official Plugin Repository)
Upgrade all
Install plugin
Close
Help
Layers
Browser
Add
Home
Favourites
C:/
D:/
E:/
MSSQL
Oracle
PostGIS
SpatiaLite
OWS
WCS
WFS
WMS
Coordinate:
-1.174,0.918
Scale
1:1,324,755
Render
EPSG:4326

Vector Data

- ESRI shapefile (point, line, polygon)
  - Create from scratch and edit existing ones
    - Geometries -- add, remove, reshape
    - Attributes -- field calculator
  - Define projection or display on-the-fly
  - Style in properties window
  - Join tabular data
  - Join data spatially


QGIS 2.6.1-Brighton
Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help
Layers
PHLB_Tracts_prj
Browser
Add
ACS_Tables_for_Database
GIS_DATABASE
AddressLocators
Agencies
All_PANJDE_areas
All_PHLB_areas
PHL_City_Council_Districts
PHLB_areas_projected
PHLB_County_Outline.shp
PHLB_County_Outline.zip
PHLB_County_prj.shp
PHLB_Municipality_Outline.
PHLB_Municipality_prj.shp
PHLB_Tracts_Outline.shp
PHLB_Tracts_prj.shp
PHLB_Water_prj.shp
PHLB_Zones_prj.shp
PHLB_Map_Layers
Roads
Processing Toolbox
Search...
Recently used algorithms
Voronoi polygons
v.voronoi - Creates a Voronoi diagram f...
GDAL/OGR [34 geoalgorithms]
GRASS commands [168 geoalgorithms]
Models [0 geoalgorithms]
Orfeo Toolbox (Image analysis) [82 geoalg...
QGIS geoalgorithms [85 geoalgorithms]
SAGA [227 geoalgorithms]
Scripts [0 geoalgorithms]
Tools
Add script from file
Create new script
Get scripts from on-line scripts coll...
Advanced interface
Ready
Coordinate:
-1.266,-0.259
Scale
1:655,010
Render
EPSG:2260


QGIS 2.6.1-Brighton
Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help
Layers
PHLB_County_Outline
Stamen Toner/OSM
Browser
Add
GIS_Data
ACS_Tables_for_Database
GIS_DATABASE
AddressLocators
Agencies
All_PANJDE_areas
All_PHLB_areas
PHL_City_Council_Districts
PHLB_areas_projected
PHLB_County_Outline.shp
PHLB_County_Outline.zip
PHLB_County_prj.shp
PHLB_Municipality_Outline.
PHLB_Municipality_prj.shp
PHLB_Tracts_Outline.shp
PHLB_Tracts_prj.shp
PHLB_Water_prj.shp
PHLB_Zones_prj.shp
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Processing Toolbox
Search...
Recently used algorithms
r.mapcalculator - Calculate new raster ...
Proximity (raster distance)
r.recode - Recodes categorical raster m...
Pit Remove
Riparian trees
Polygons to lines
GDAL/OGR [34 geoalgorithms]
GRASS commands [168 geoalgorithms]
GRASS GIS 7 commands [158 geoalgorithms]
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Orfeo Toolbox (Image analysis) [82 geoalg...
QGIS geoalgorithms [85 geoalgorithms]
R scripts [19 geoalgorithms]
SAGA [227 geoalgorithms]
Scripts [1 geoalgorithms]
TauDEM (hydrologic analysis) [26 geoalgori...
Tools for LIDAR data [58 geoalgorithms]
Allentown
Philadelphia
Edison
Advanced interface
Coordinate:
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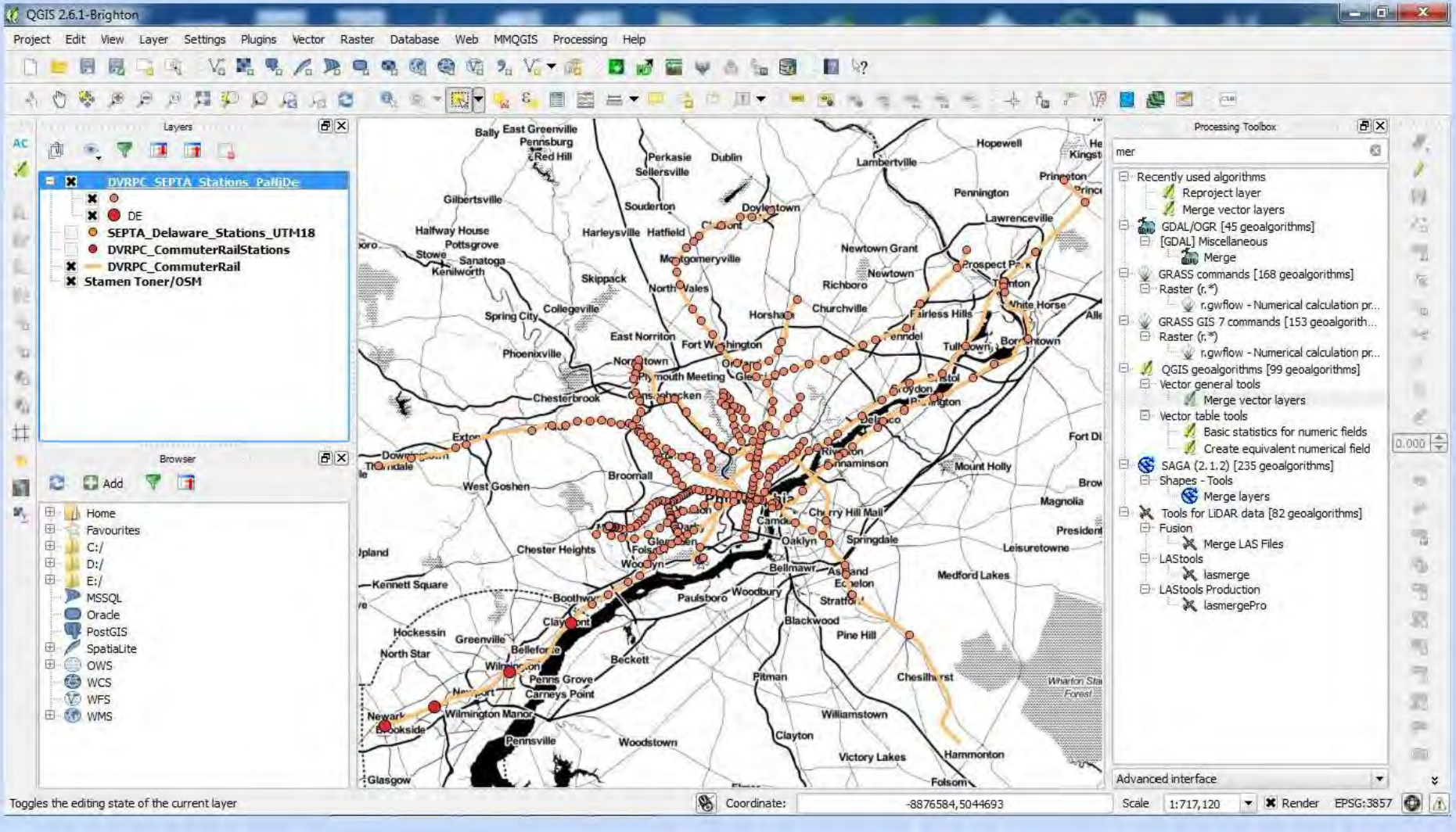
Scale
1:2,148,984
Render
EPSG:2260


QGIS 2.6.1-Brighton
Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help
Layers
DVRPC_SEPTA_Stations_PalliDe
DE
SEPTA_Delaware_Stations_UTM18
DVRPC_CommuterRailStations
DVRPC_CommuterRail
Stamen Toner/OSM
Browser
Add
Home
Favourites
C:/
D:/
E:/
MSSQL
Oracle
PostGIS
SpatiaLite
OWS
WCS
WFS
WMS
Processing Toolbox
mer
Recently used algorithms
Reproject layer
Merge vector layers
GDAL/OGR [45 geoalgorithms]
[GDAL] Miscellaneous
Merge
GRASS commands [168 geoalgorithms]
Raster (r.*)
r.gwflow - Numerical calculation pr...
GRASS GIS 7 commands [153 geoalgorith...
Raster (r.*)
r.gwflow - Numerical calculation pr...
QGIS geoalgorithms [99 geoalgorithms]
Vector general tools
Merge vector layers
Vector table tools
Basic statistics for numeric fields
Create equivalent numerical field
SAGA (2.1.2) [235 geoalgorithms]
Shapes - Tools
Merge layers
Tools for LiDAR data [82 geoalgorithms]
Fusion
Merge LAS Files
LAStools
lasmerge
LAStools Production
lasmergePro
Advanced interface
Toggles the editing state of the current layer
Coordinate:
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Scale
1:717,120
Render
EPSG:3857

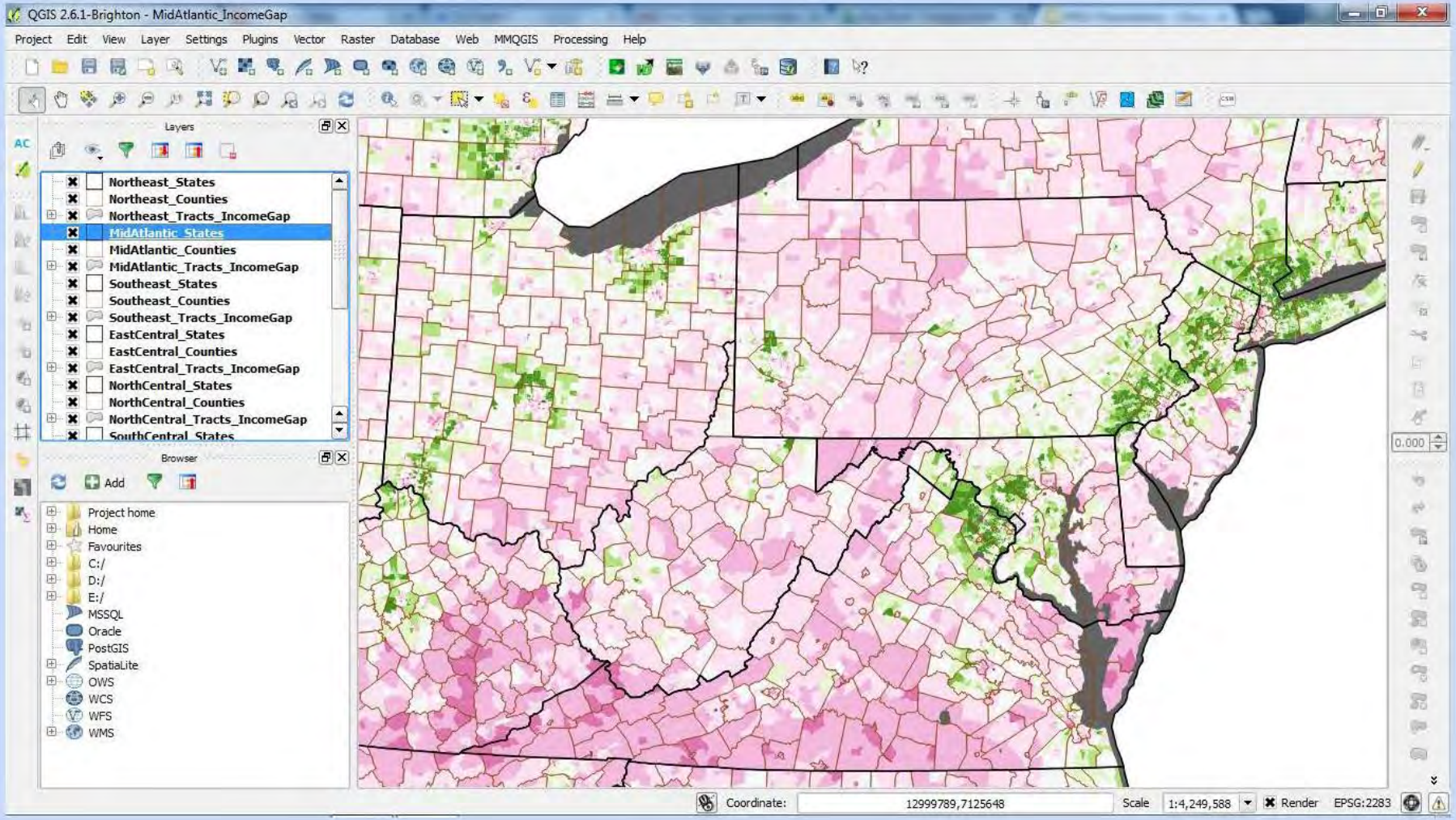
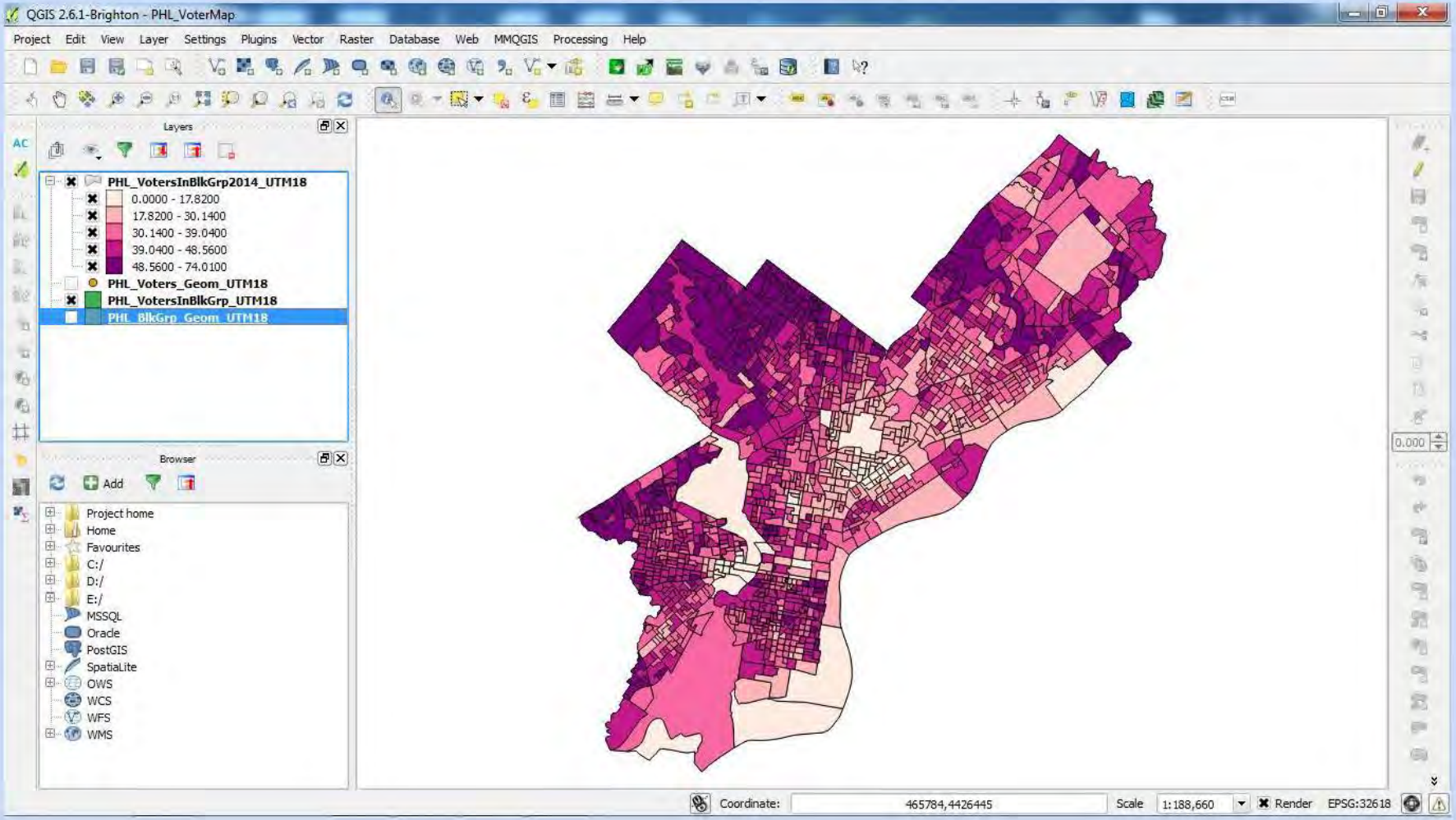
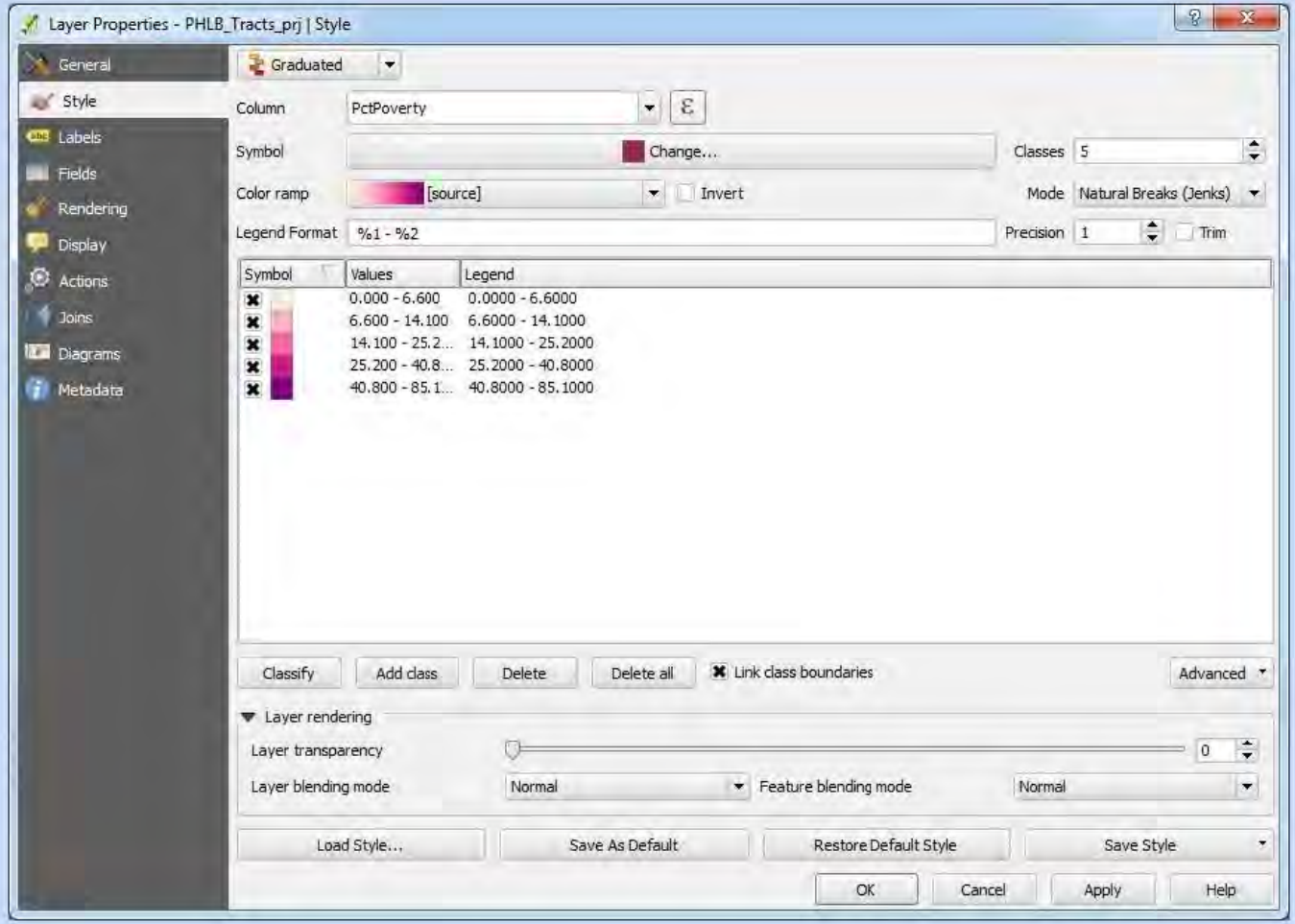
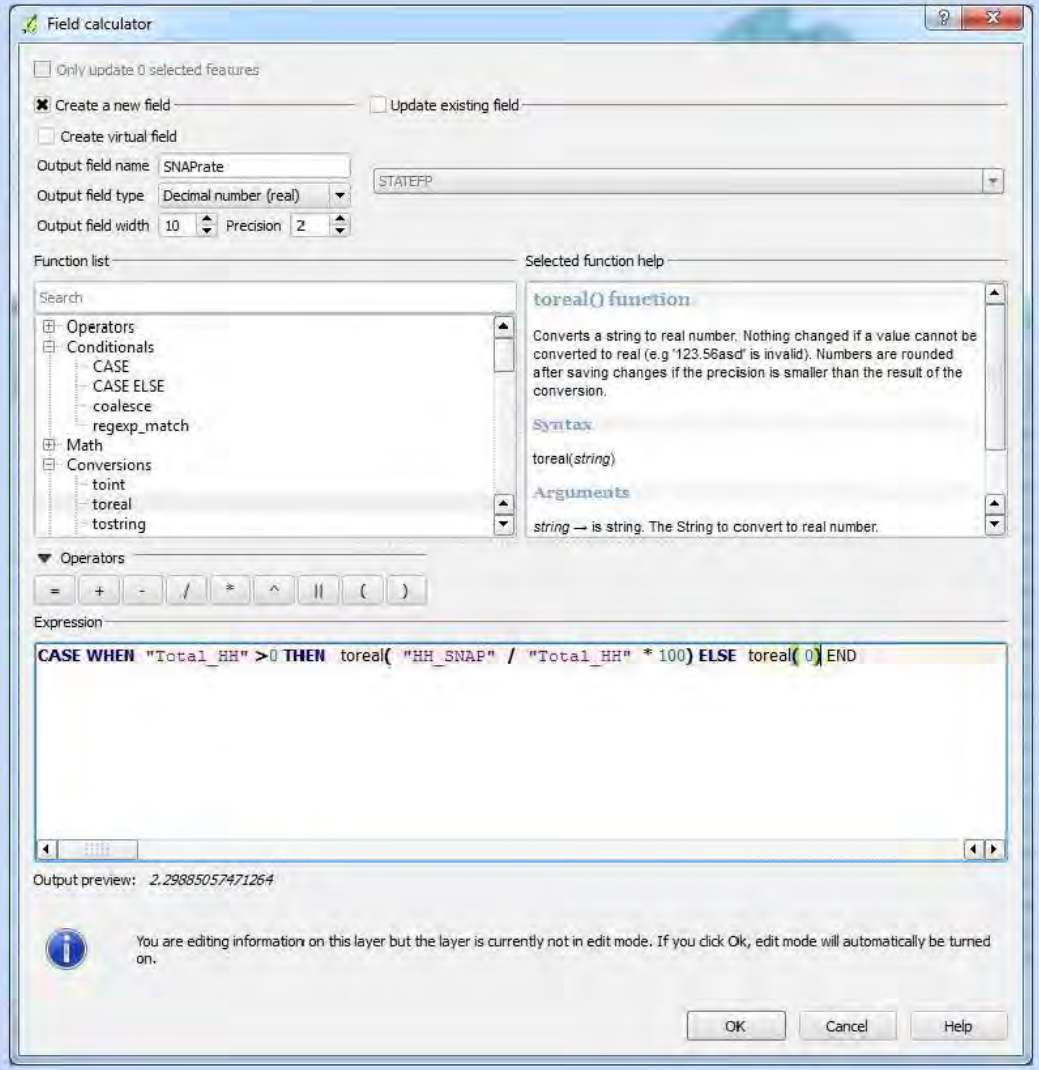


Table join, field calculator, diverging color ramp



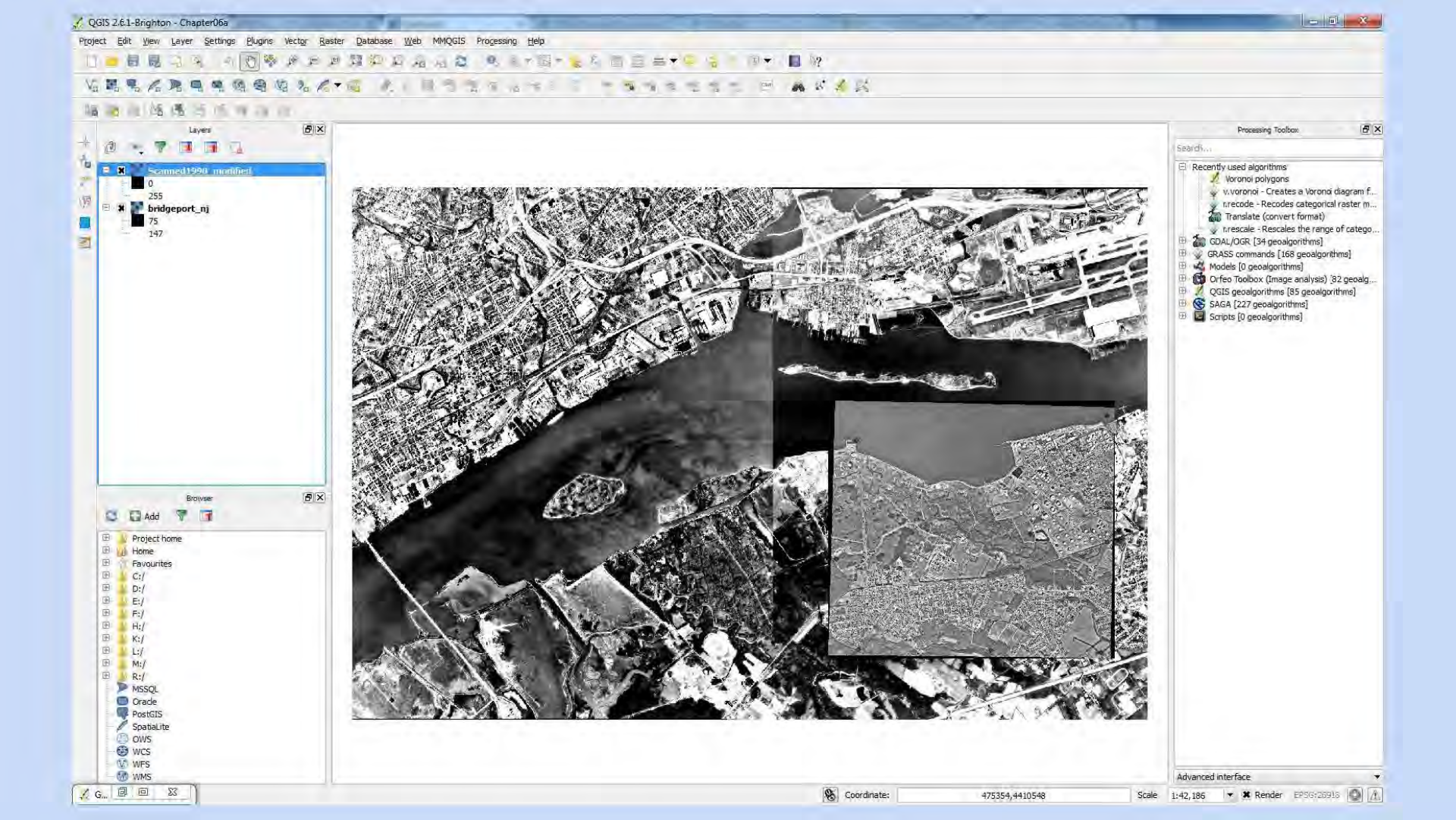
Location join (2x), field calculator, graduated color ramp

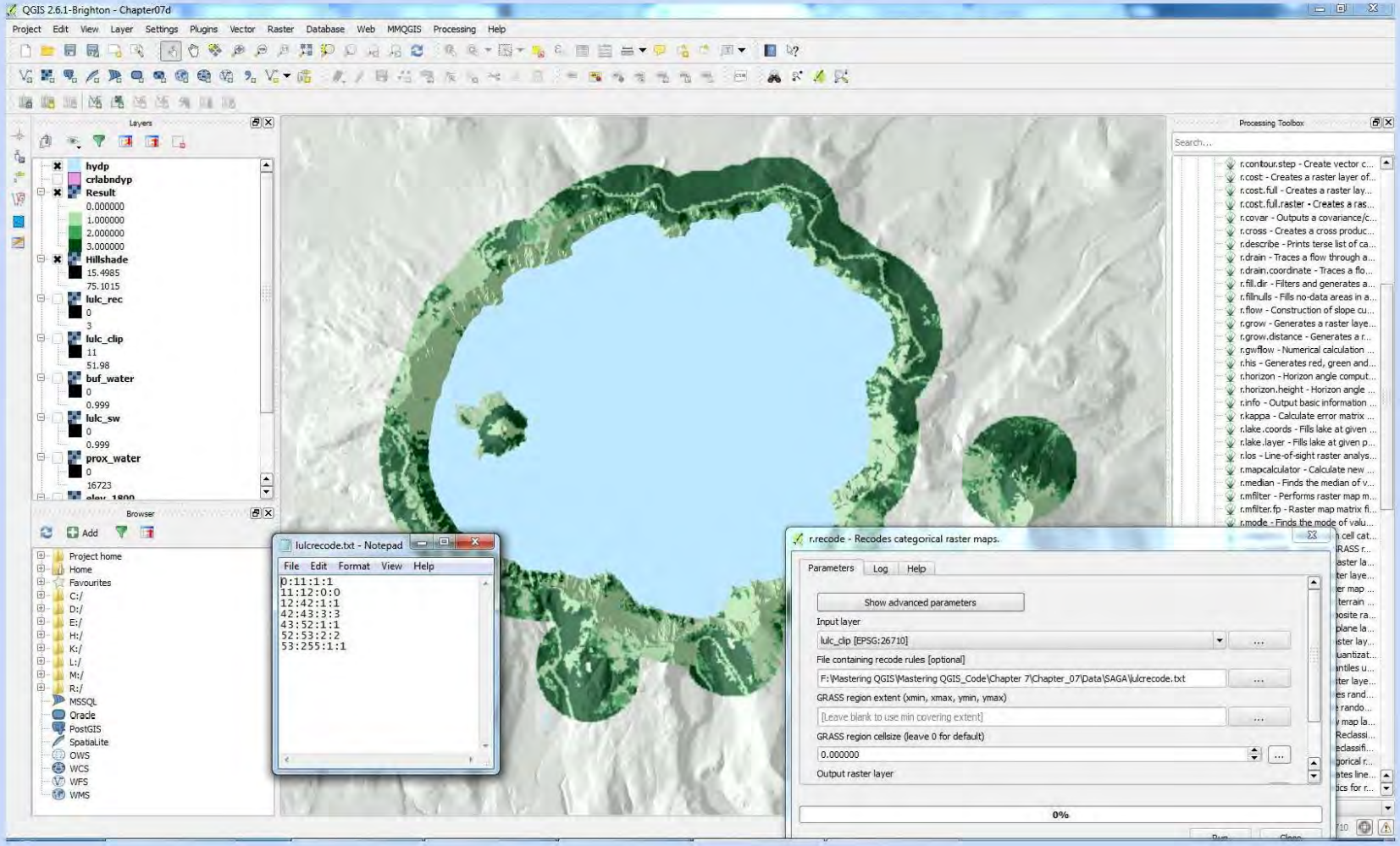

Layer Properties - PHLB_Tracts_prj | Style
General
Style
Labels
Fields
Rendering
Display
Actions
Joins
Diagrams
Metadata
Graduated
Column
PctPoverty
Symbol
Change...
Classes
5
Color ramp
[source]
Invert
Mode
Natural Breaks (Jenks)
Legend Format
%1 - %2
Precision
1
Trim
Symbol
Values
Legend
0.000 - 6.600
0.0000 - 6.6000
6.600 - 14.100
6.6000 - 14.1000
14.100 - 25.2...
14.1000 - 25.2000
25.200 - 40.8...
25.2000 - 40.8000
40.800 - 85.1...
40.8000 - 85.1000
Classify
Add class
Delete
Delete all
Link class boundaries
Advanced
Layer rendering
Layer transparency
0
Layer blending mode
Normal
Feature blending mode
Normal
Load Style...
Save As Default
Restore Default Style
Save Style
OK
Cancel
Apply
Help


Field calculator
Only update 0 selected features
Create a new field
Update existing field
Create virtual field
Output field name
SNAPrate
Output field type
Decimal number (real)
Output field width
10
Precision
2
STATEFP
Function list
Search
Operators
Conditionals
CASE
CASE ELSE
coalesce
regexp_match
Math
Conversions
toint
toreal
tostring
Selected function help
toreal() function
Converts a string to real number. Nothing changed if a value cannot be converted to real (e.g '123.56asd' is invalid). Numbers are rounded after saving changes if the precision is smaller than the result of the conversion.
Syntax
toreal(string)
Arguments
string → is string. The String to convert to real number.
Operators
= + - / * ^ || ( )
Expression
CASE WHEN "Total_HH" >0 THEN toreal("HH_SNAP" / "Total_HH" * 100) ELSE toreal(0) END
Output preview: 2.29885057471264
You are editing information on this layer but the layer is currently not in edit mode. If you click Ok, edit mode will automatically be turned on.
OK
Cancel
Help

Raster Data

- Various raster files supported
  - .img, .tif, .jpg, .png, etc
  - Single band and Multiband
- Processing capabilities
  - Georeferencing
  - Terrain/slope analysis
  - Raster calculator (reclassify or recode)

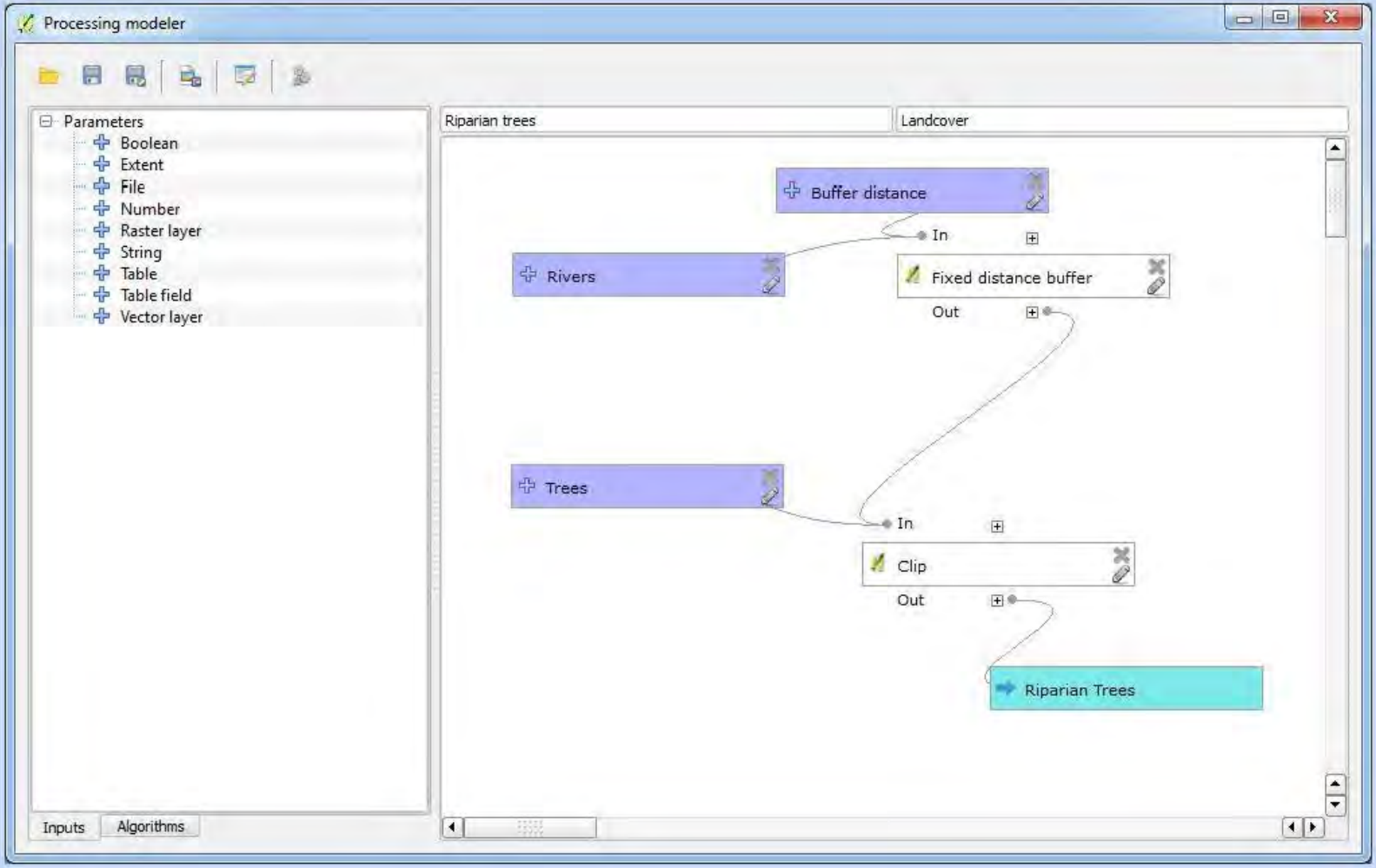

QGIS 2.6.1-Brighton - Chapter06a
Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help
Layers
Scanned1990_modified
0
255
bridgeport_nj
75
147
Browser
Add
Project home
Home
Favourites
C:/
D:/
E:/
F:/
H:/
K:/
L:/
M:/
R:/
MSSQL
Oracle
PostGIS
SpatiaLite
OWS
WCS
WFS
WMS
Processing Toolbox
Search...
Recently used algorithms
Voronoi polygons
v.voronoi - Creates a Voronoi diagram f...
r.recode - Recodes categorical raster m...
Translate (convert format)
r.rescale - Rescales the range of catego...
GDAL/OGR [34 geoalgorithms]
GRASS commands [168 geoalgorithms]
Models [0 geoalgorithms]
Orfeo Toolbox (Image analysis) [82 geoalg...
QGIS geoalgorithms [85 geoalgorithms]
SAGA [227 geoalgorithms]
Scripts [0 geoalgorithms]
Advanced interface
Coordinate:
475354,4410548
Scale
1:42,186
Render



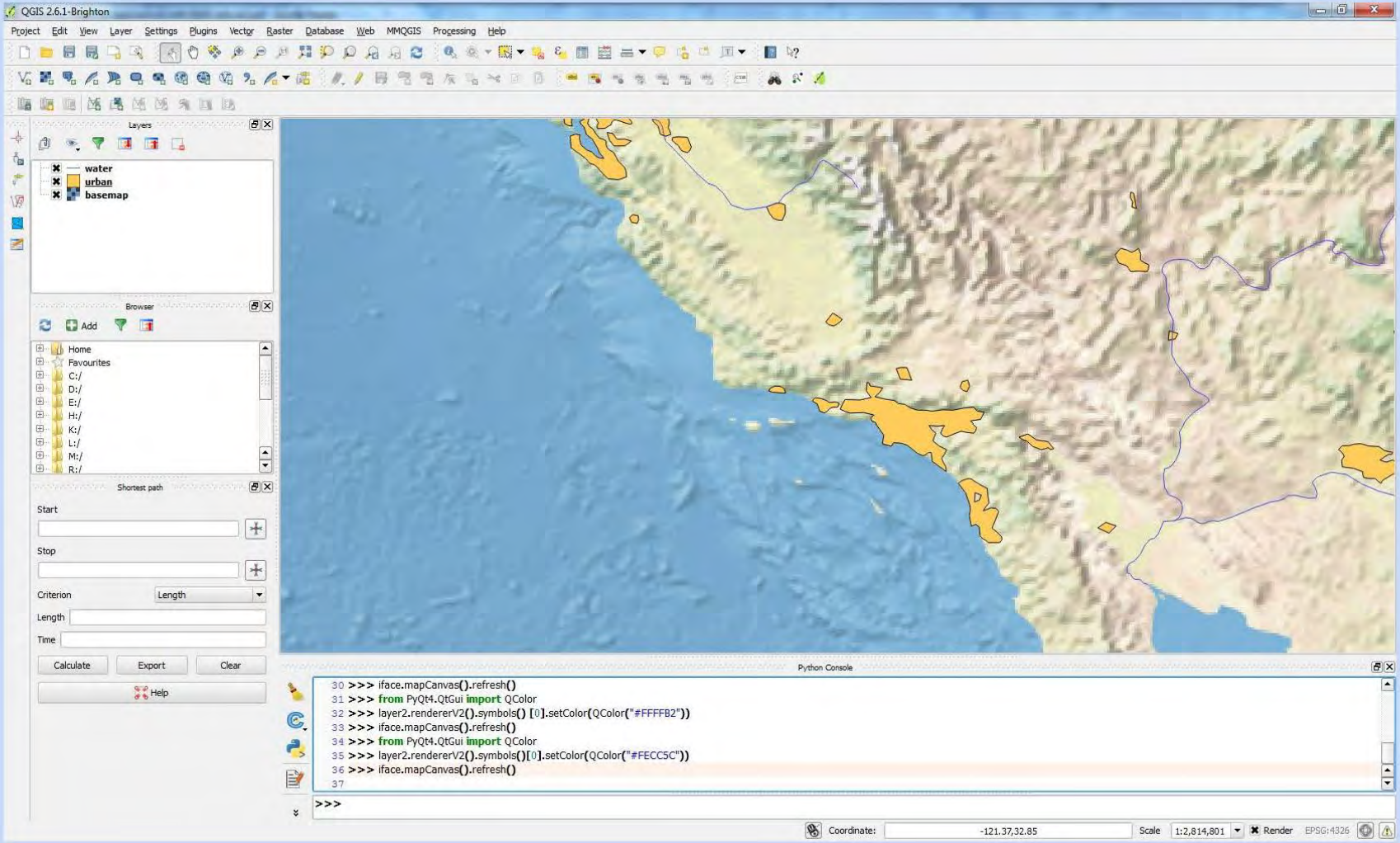
Raster reclassification

Processing Data

- Graphical modeler
  - Create algorithms to automate workflows
- Python console
  - Run scripts and build plugins

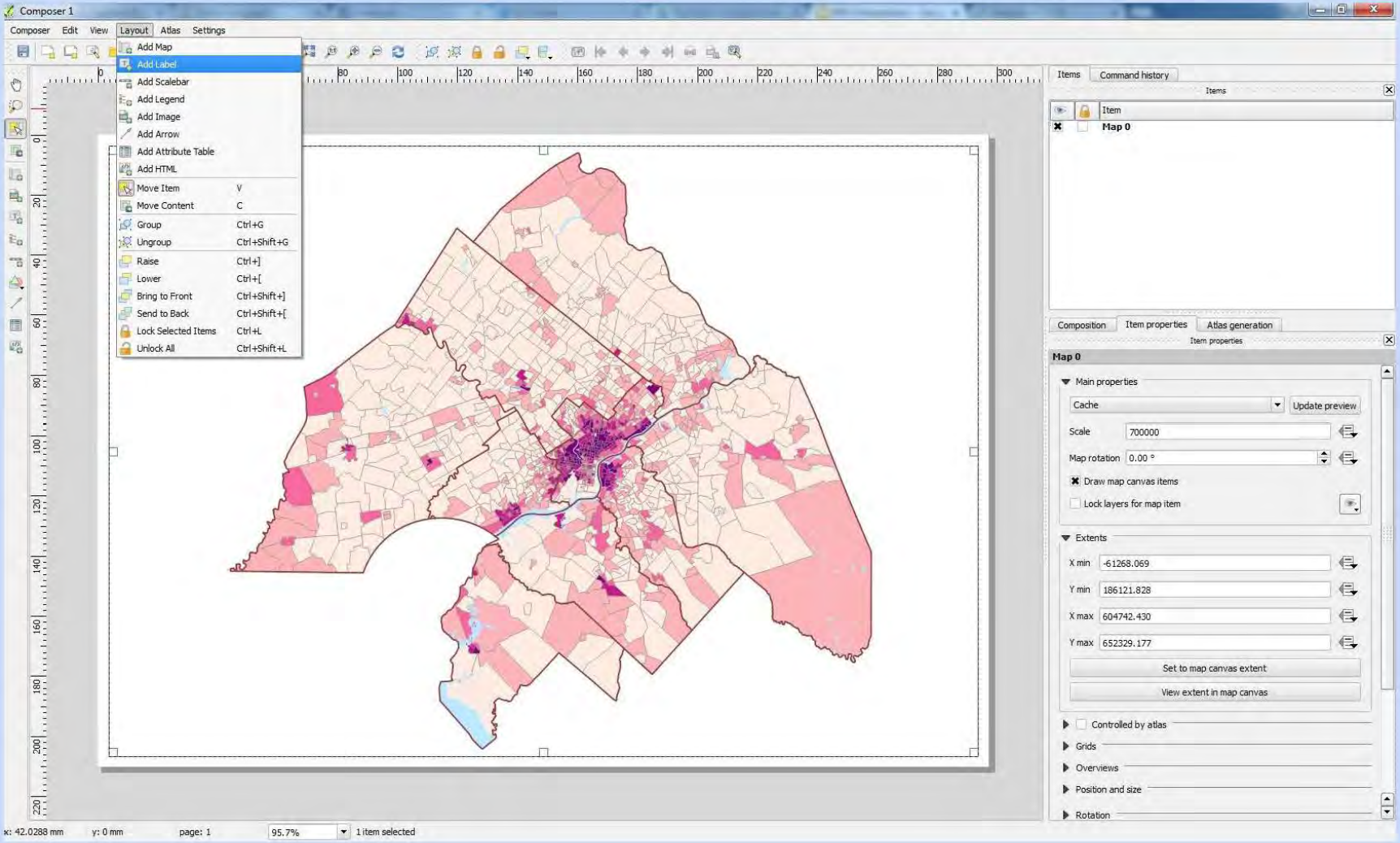


Create a buffer, clip another layer to that buffer

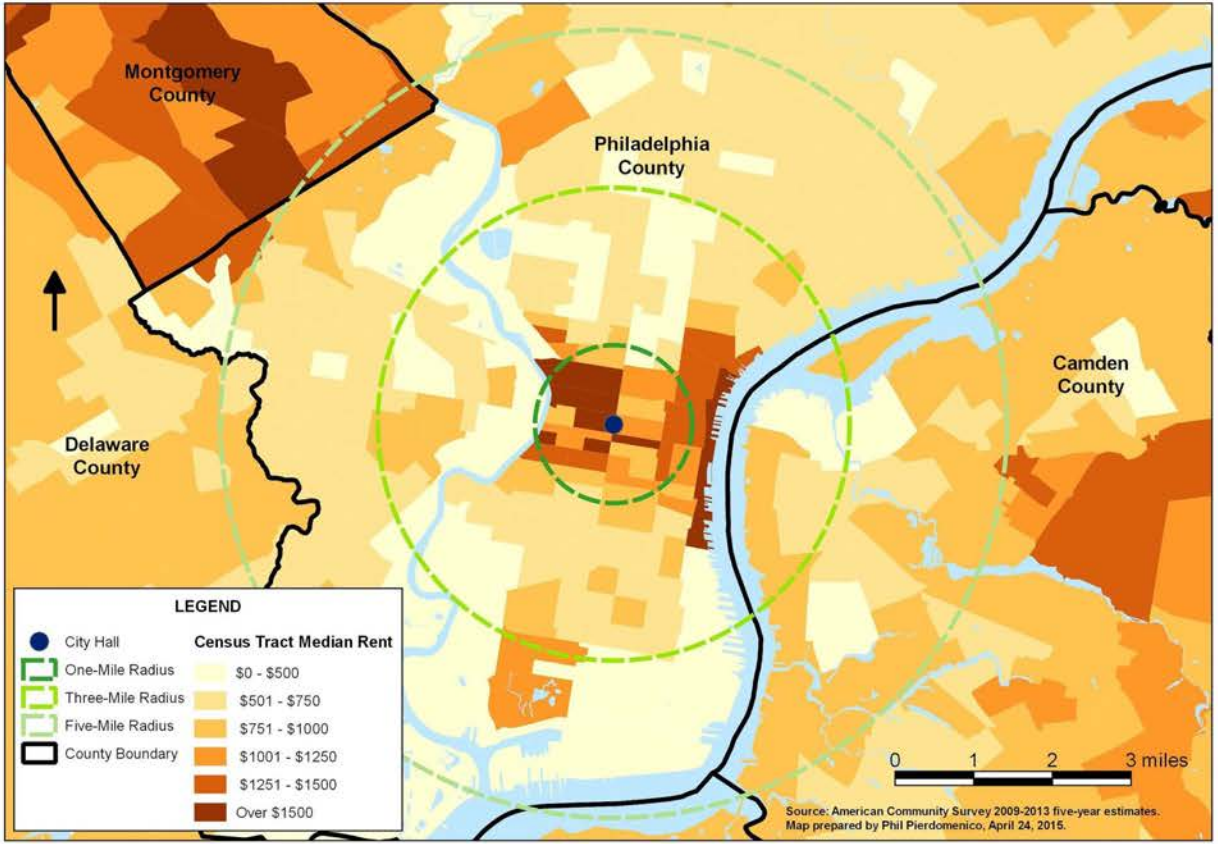

QGIS 2.6.1-Brighton
Project Edit View Layer Settings Plugins Vector Raster Database Web MMQGIS Processing Help
Layers
water
urban
basemap
Browser
Add
Home
Favourites
C:/
D:/
E:/
H:/
K:/
L:/
M:/
R:/
Shortest path
Start
Stop
Criterion
Length
Length
Time
Calculate
Export
Clear
Help
Python Console
30 >>> iface.mapCanvas().refresh()
31 >>> from PyQt4.QtGui import QColor
32 >>> layer2.rendererV2().symbols() [0].setColor(QColor("#FFFFB2"))
33 >>> iface.mapCanvas().refresh()
34 >>> from PyQt4.QtGui import QColor
35 >>> layer2.rendererV2().symbols()[0].setColor(QColor("#FECC5C"))
36 >>> iface.mapCanvas().refresh()
37
>>>
Coordinate:
-121.37,32.85
Scale
1:2,814,801
Render
EPSG:4326

Create Maps

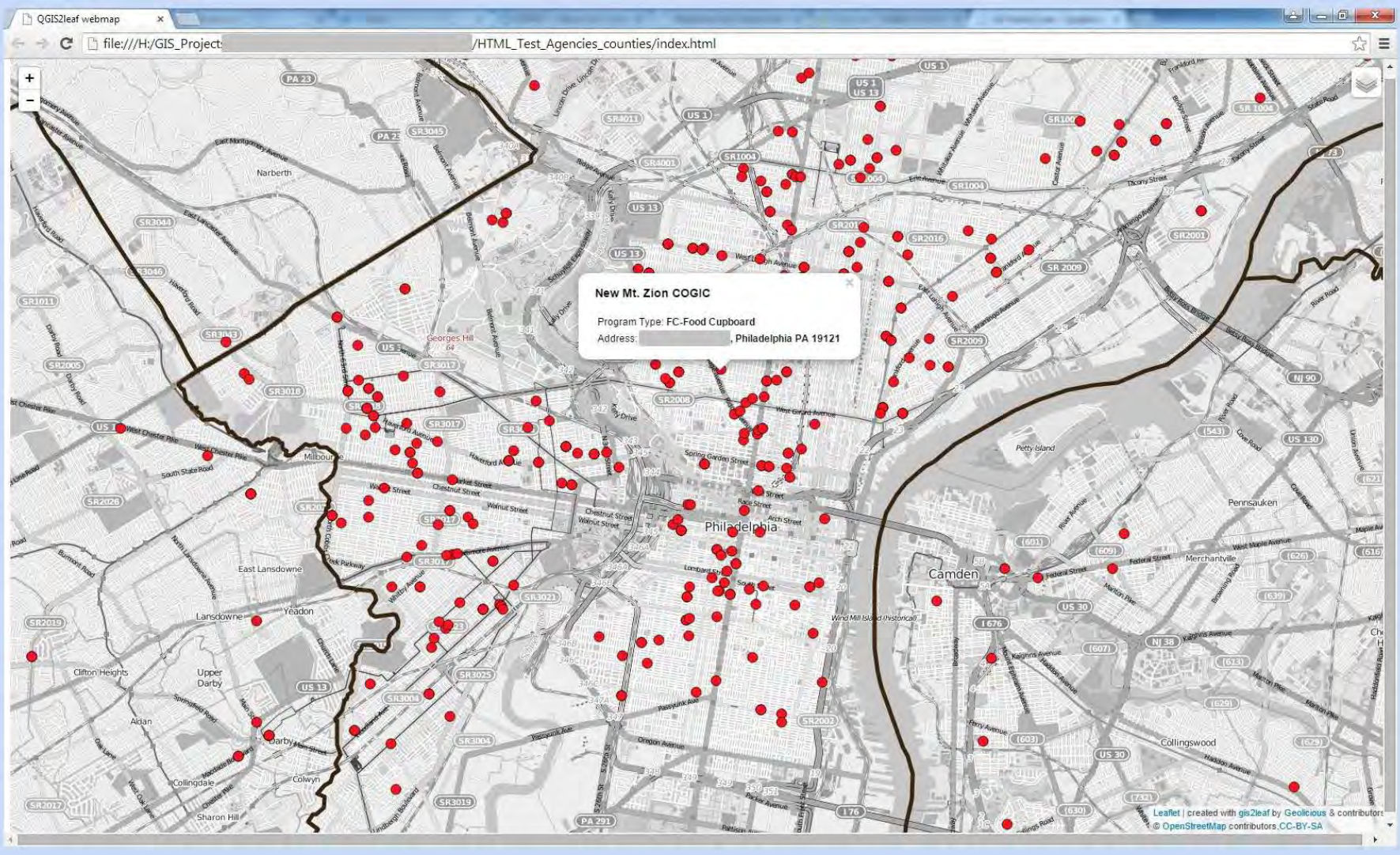
- Print composer
  - Design maps for print or export to image
  - Can do multiple maps
  - Not as intuitive or user-friendly as ArcMap layout (IMHO)
- Web map
  - Plugin: qgis2leaf


Composer 1
Composer
Edit
View
Layout
Atlas
Settings
Add Map
Add Label
Add Scalebar
Add Legend
Add Image
Add Arrow
Add Attribute Table
Add HTML
Move Item V
Move Content C
Group Ctrl+G
Ungroup Ctrl+Shift+G
Raise Ctrl+]
Lower Ctrl+[
Bring to Front Ctrl+Shift+]
Send to Back Ctrl+Shift+[
Lock Selected Items Ctrl+L
Unlock All Ctrl+Shift+L
Items
Command history
Item
Map 0
Composition
Item properties
Atlas generation
Map 0
Main properties
Cache
Update preview
Scale 700000
Map rotation 0.00 °
Draw map canvas items
Lock layers for map item
Extents
X min -61268.069
Y min 186121.828
X max 604742.430
Y max 652329.177
Set to map canvas extent
View extent in map canvas
Controlled by atlas
Grids
Overviews
Position and size
Rotation
x: 42.0288 mm
y: 0 mm
page: 1
95.7%
1 item selected

Median Rent by Census Tract and Distance from Philadelphia City Hall

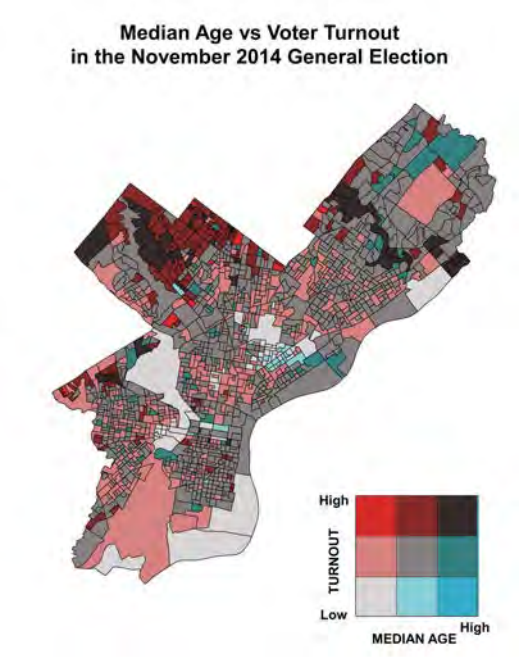


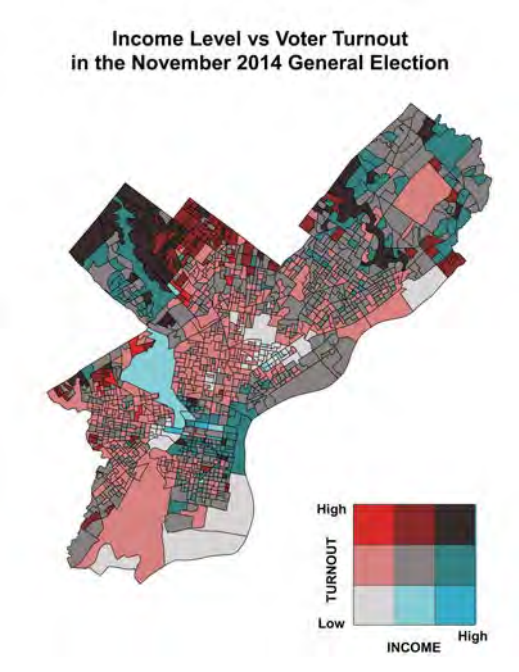
Equidistant projection, Create point, buffer, table join, labeling

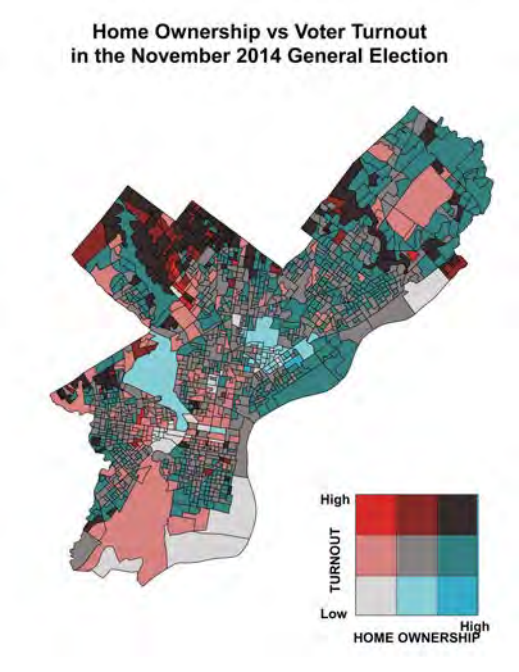

QGIS2leaf webmap
file:///H:/GIS_Project
/HTML_Test_Agencies_counties/index.html
New Mt. Zion COGIC
Program Type: FC-Food Cupboard
Address: , Philadelphia PA 19121
Philadelphia
Camden
Narberth
Lansdowne
Yeadon
East Lansdowne
Upper Darby
Clifton Heights
Darby
Collingdale
Colwyn
Sharon Hill
Millbourne
Pennsauken
Merchantville
Collingswood
Petty Island
Wind Mill Island (historical)
Leaflet | created with gis2leaf by Geolicious & contributors
© OpenStreetMap contributors,CC-BY-SA

Integrate with other programs

- Import SVG from Inkscape

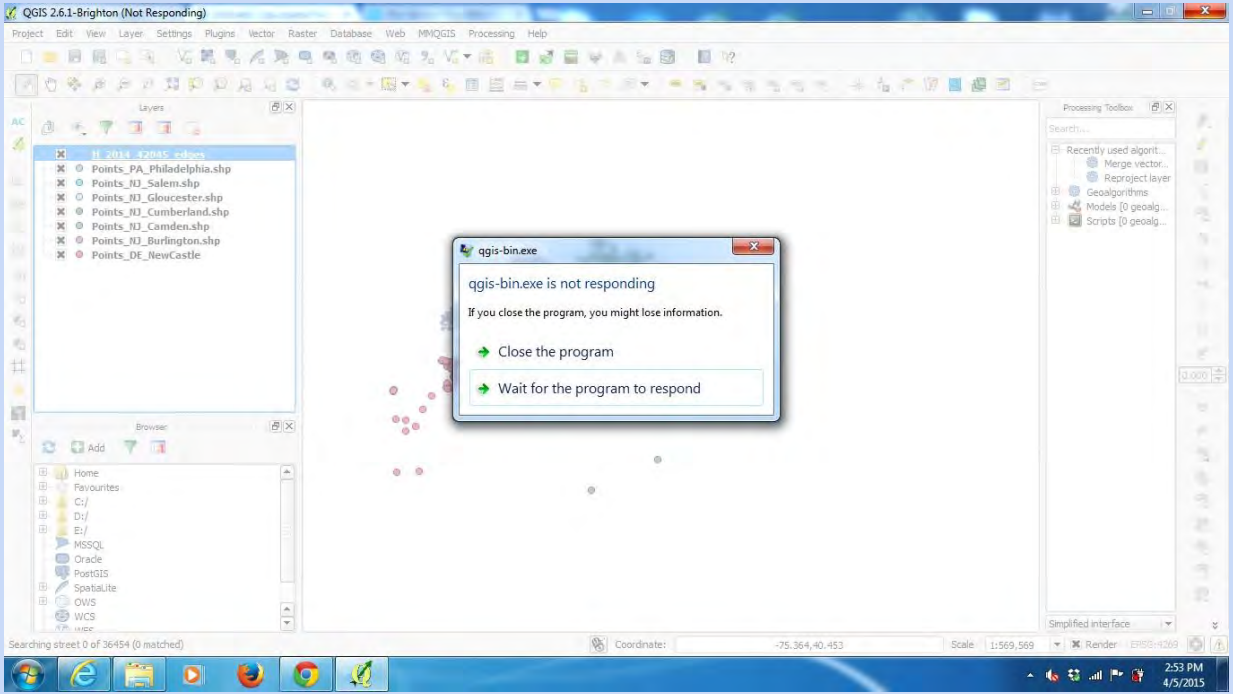






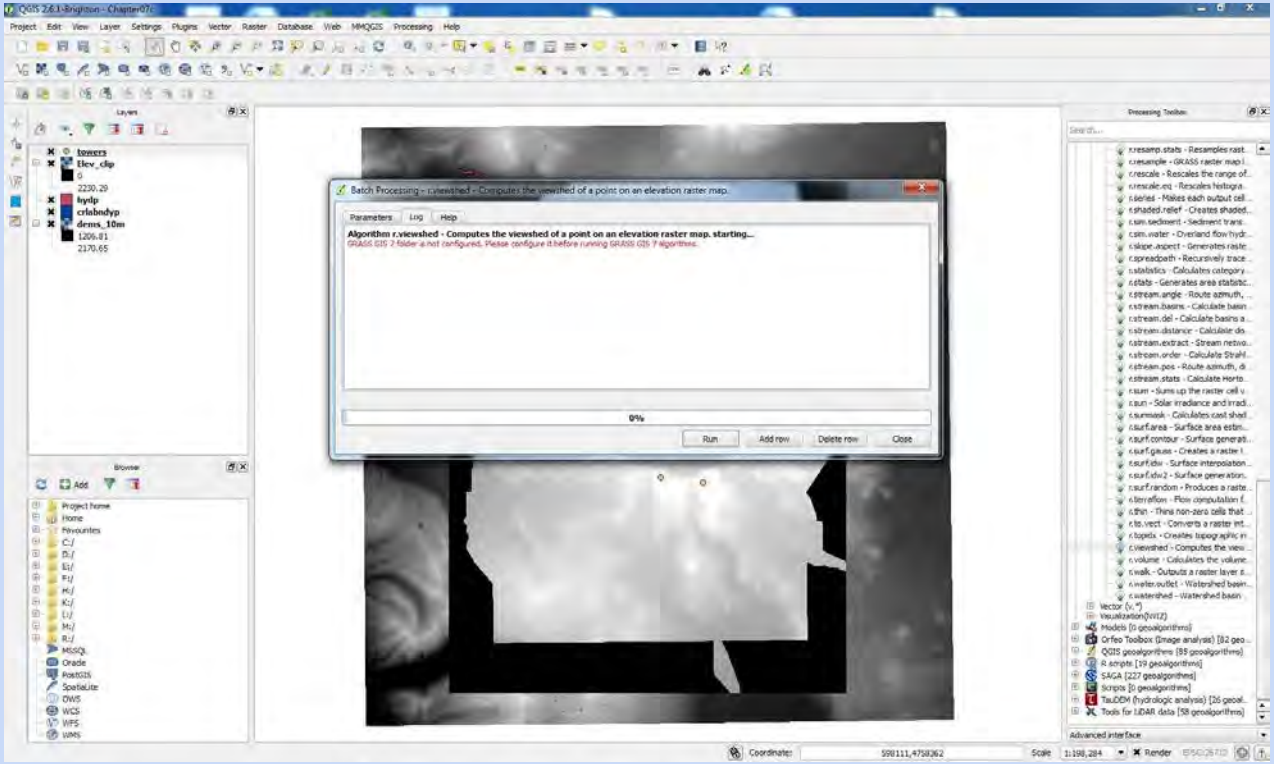
Issues I've run into...

- Geocoding large address tables (i.e. 11k rows)



Issues I've run into...

- Installing processing tools that are experimental or otherwise not stable



Issues I've run into...

- Learning curve (especially if you're already familiar with ArcMap)
  - CSV table join
    - Need .csvt file (define string, integer, real)
  - Scale bar in Print Composer
    - Need to calculate map units per bar unit
      - Meters vs. feet/miles

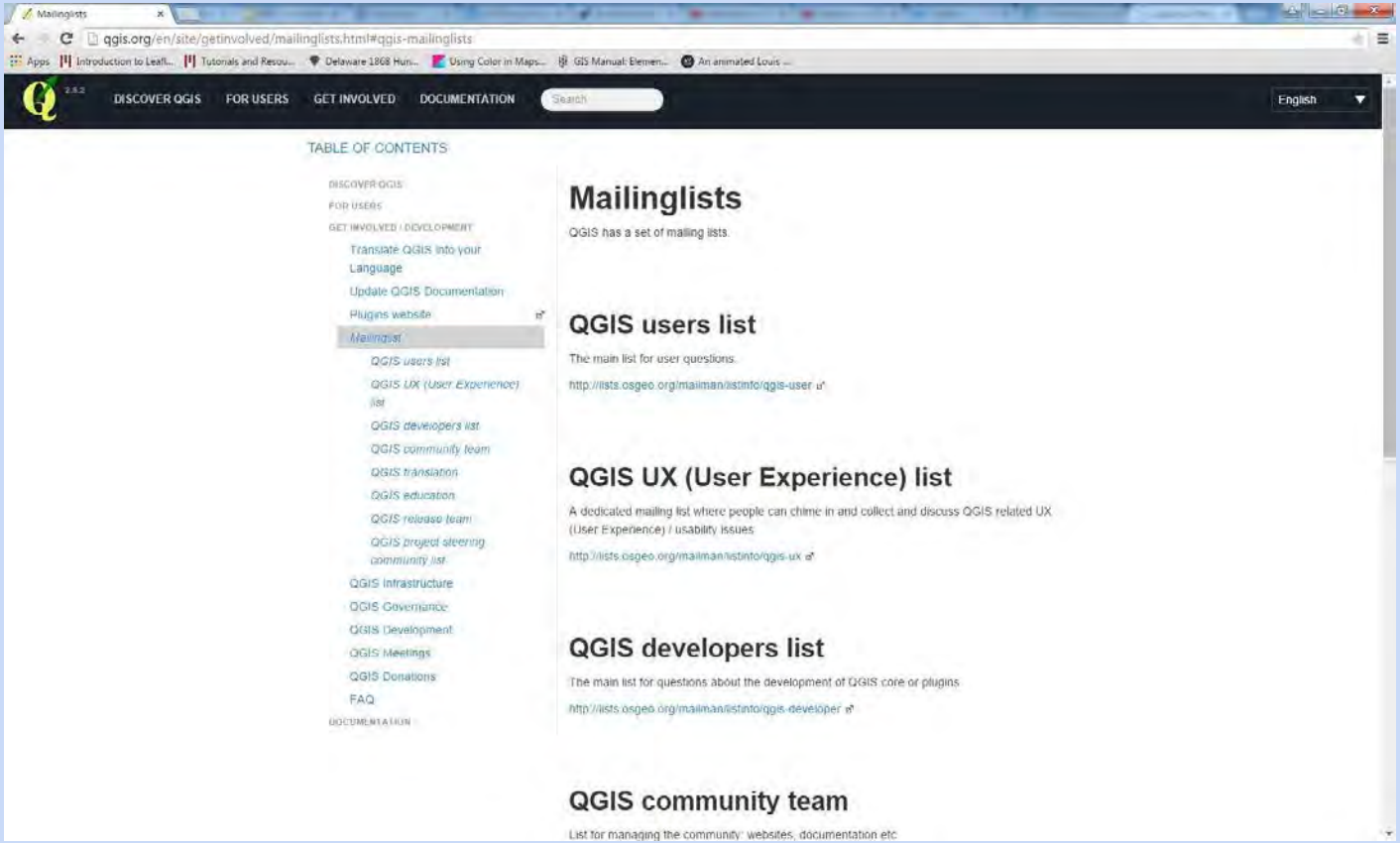
Resources

There is no “1-800-QGIS-HELP”

There ARE:

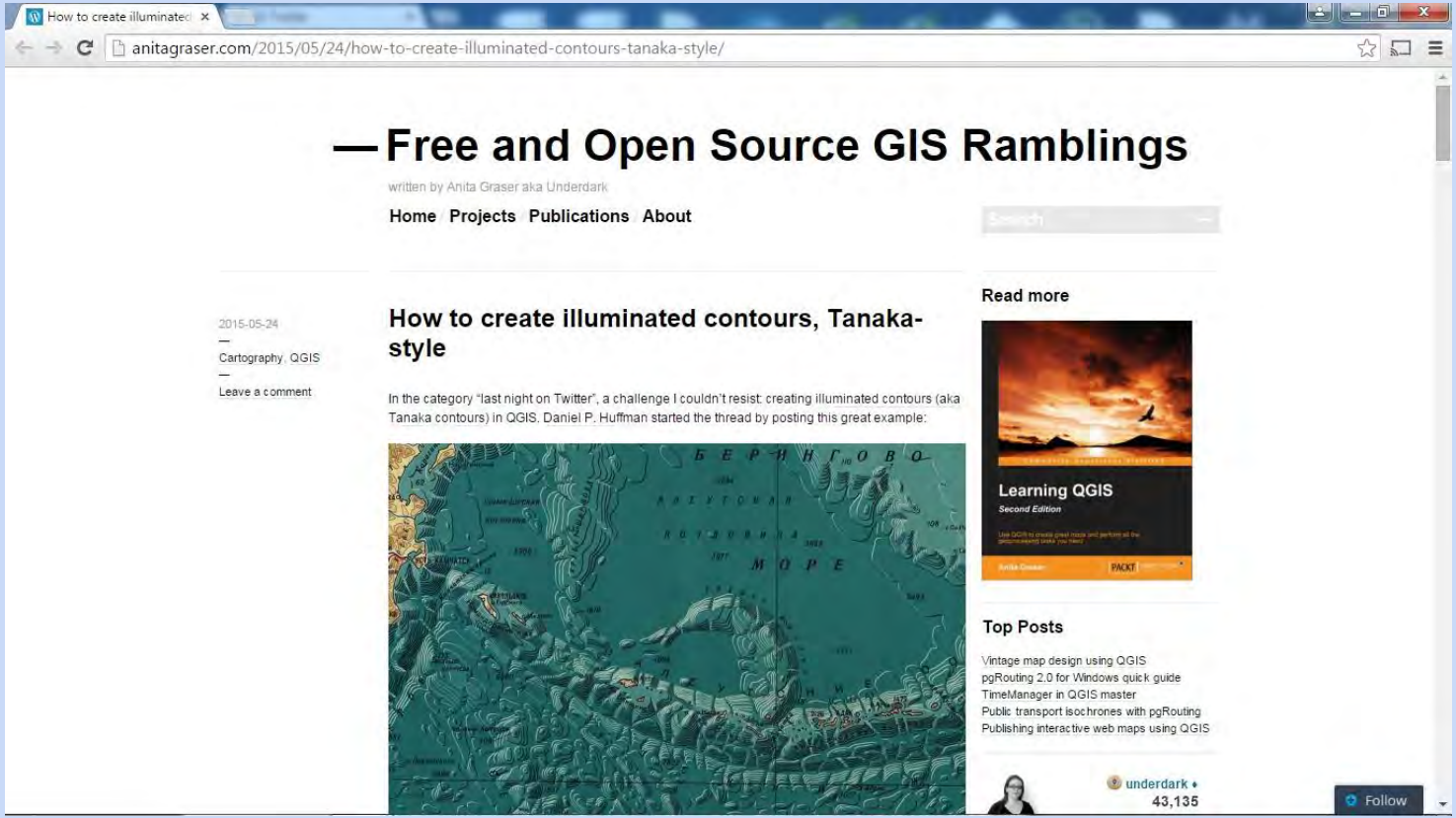
- Dedicated community of developers
- Blogs, forums, mailing lists, online support
- Online tutorials and videos (YouTube)
- Books (ebooks and hard copy)

Resources -- Mailing lists



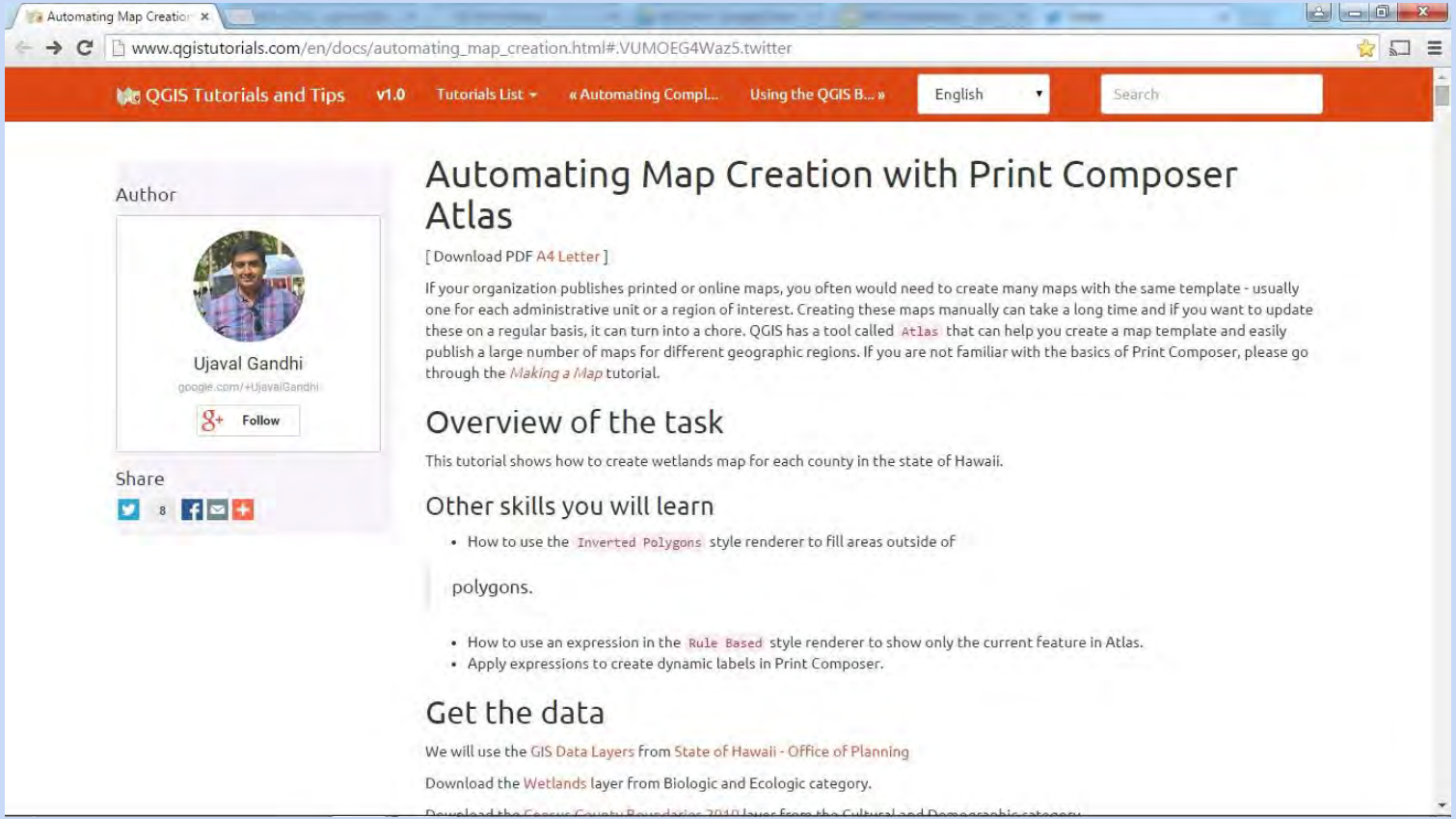
Resources -- Forums

Resources -- Blogs

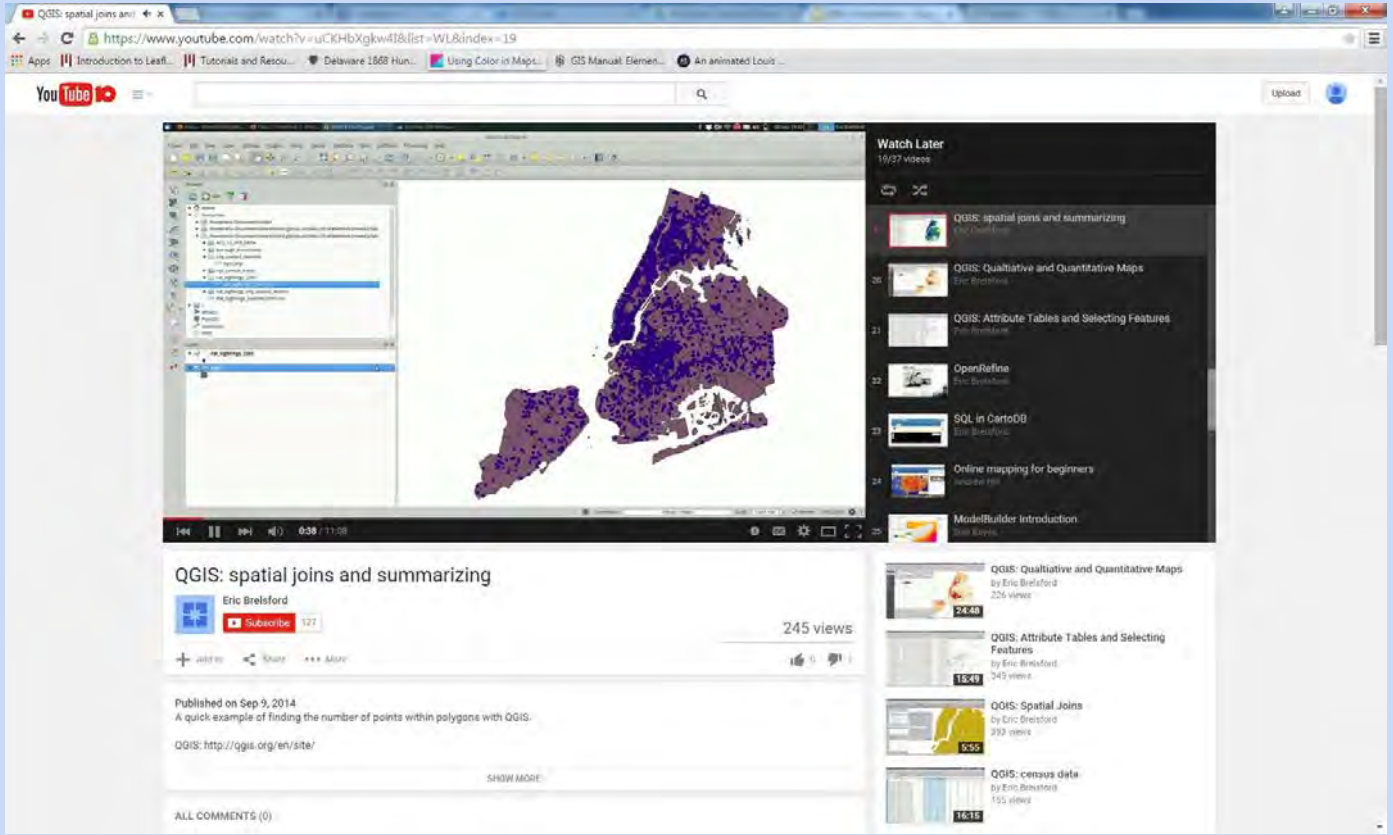


Resources -- Blogs

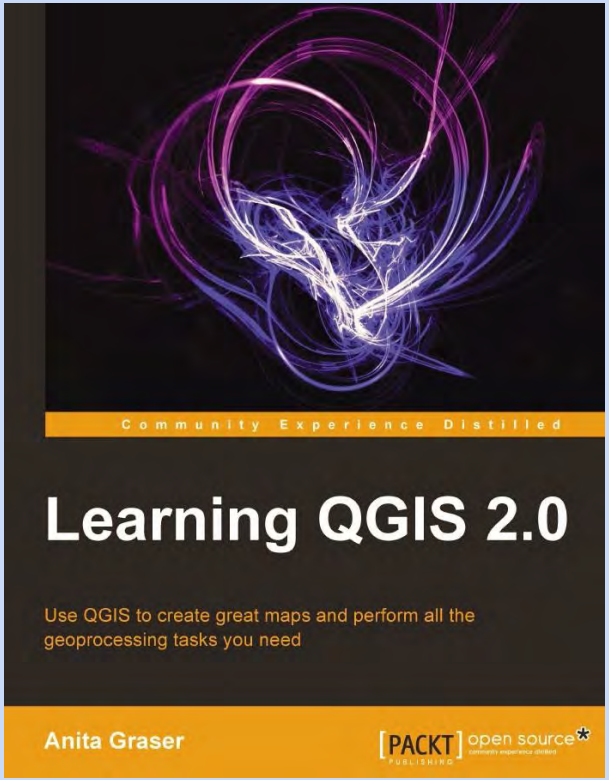
Resources -- Online tutorials

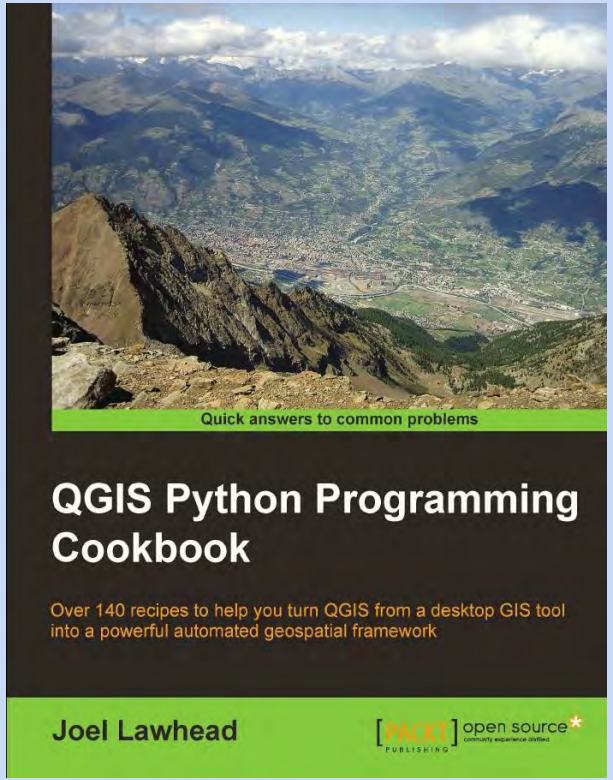


Resources -- Online tutorials



Resources -- Books





*Full disclosure: I have been asked to write Amazon reviews for Packt Publishing.

I've just barely scratched the surface of what QGIS can do.

Its capabilities are limitless.

Thank you.

QUESTIONS?

Predicting bike share usage using city open data

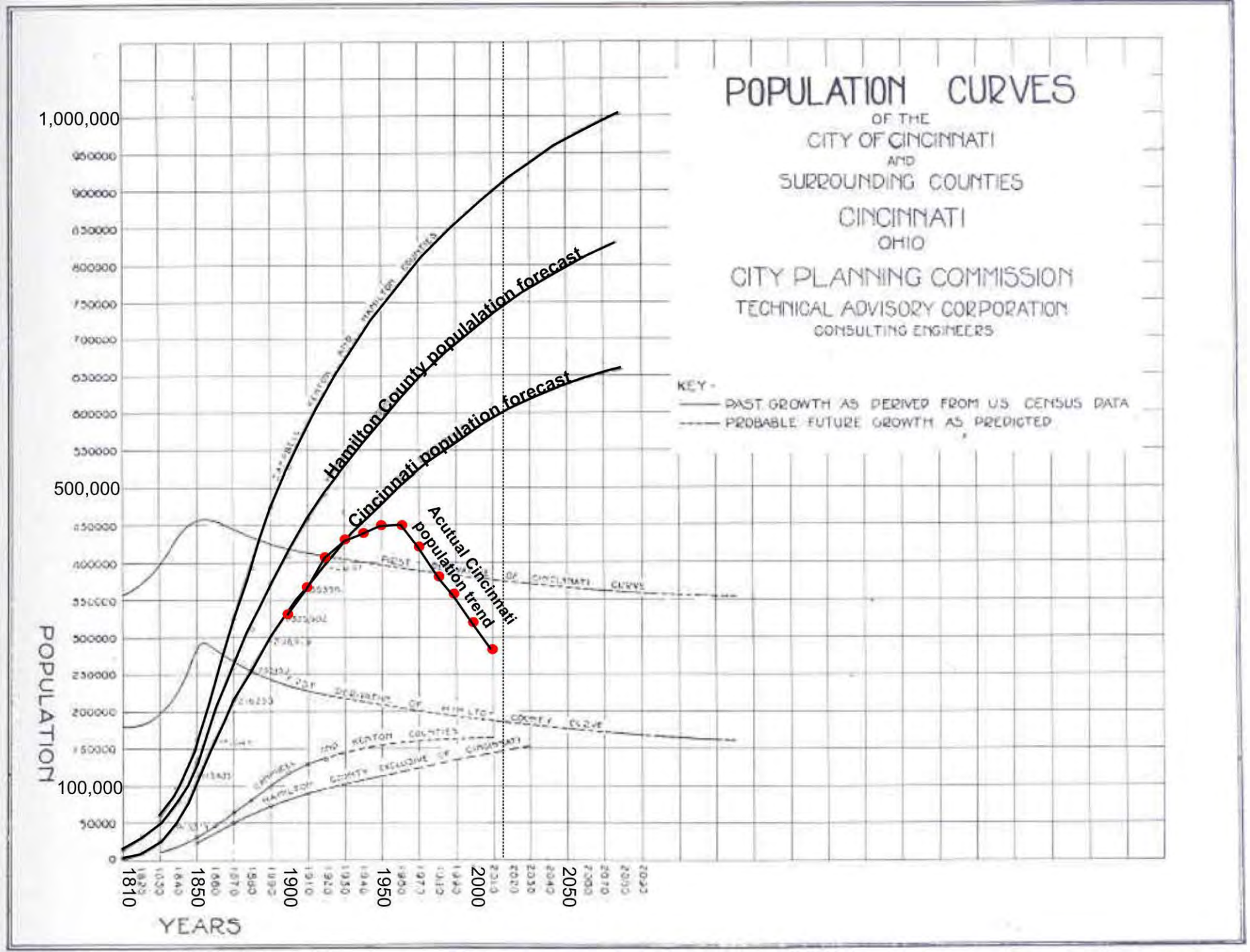
Ken Steif

ksteif@upenn.edu

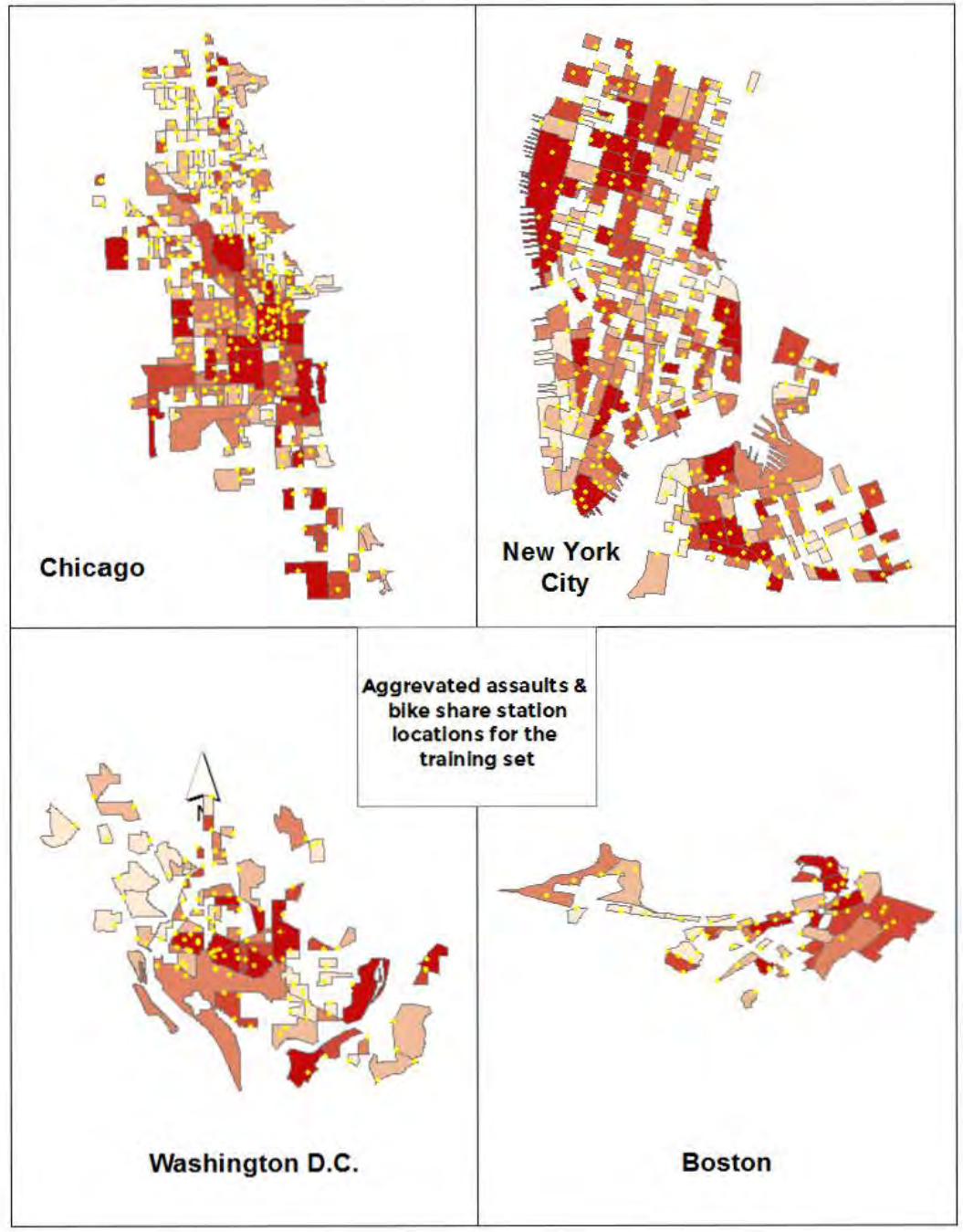
@KenSteif

Department of City & Regional Planning, Univ. of Pennsylvania

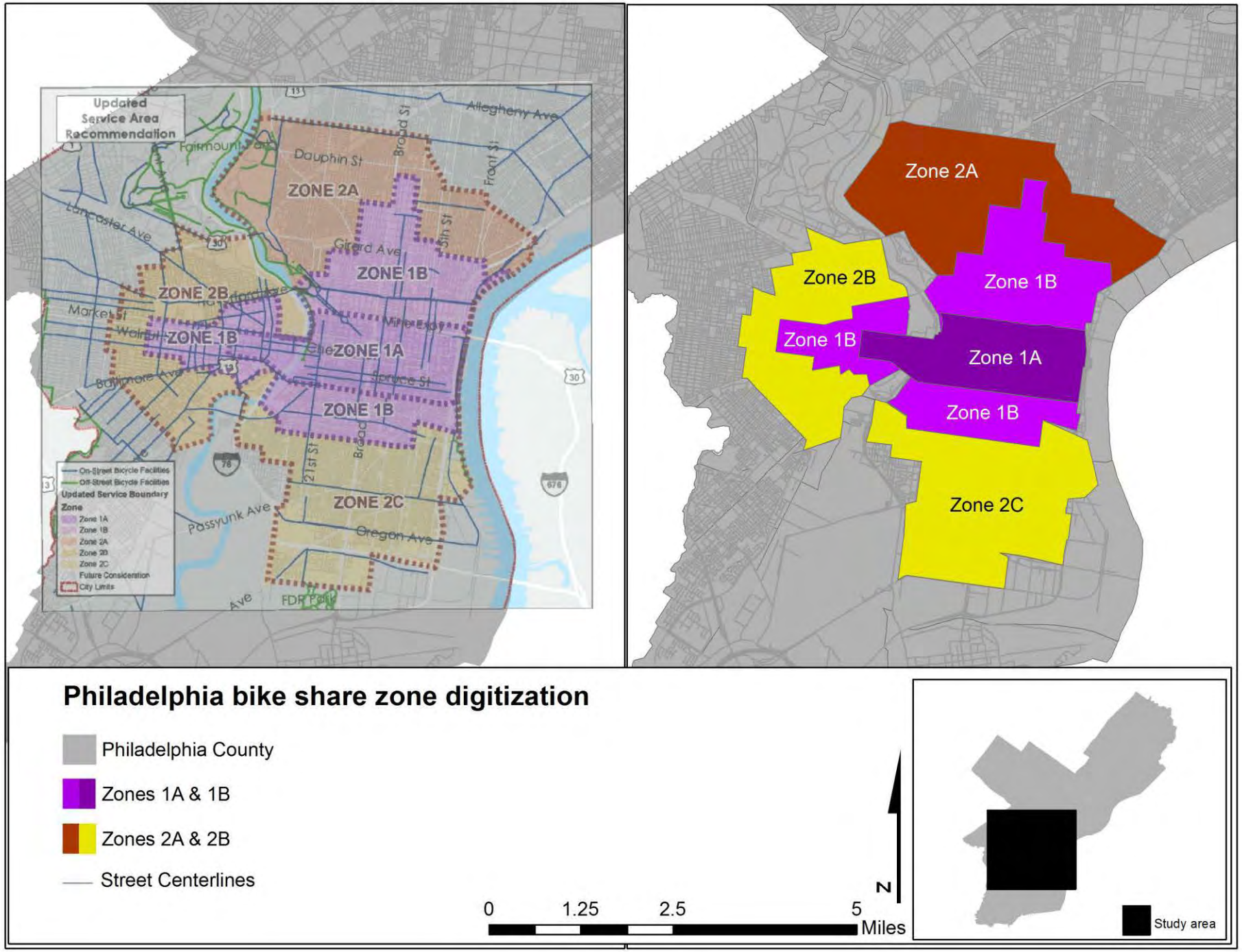
UrbanSpatialAnalytics, LLC

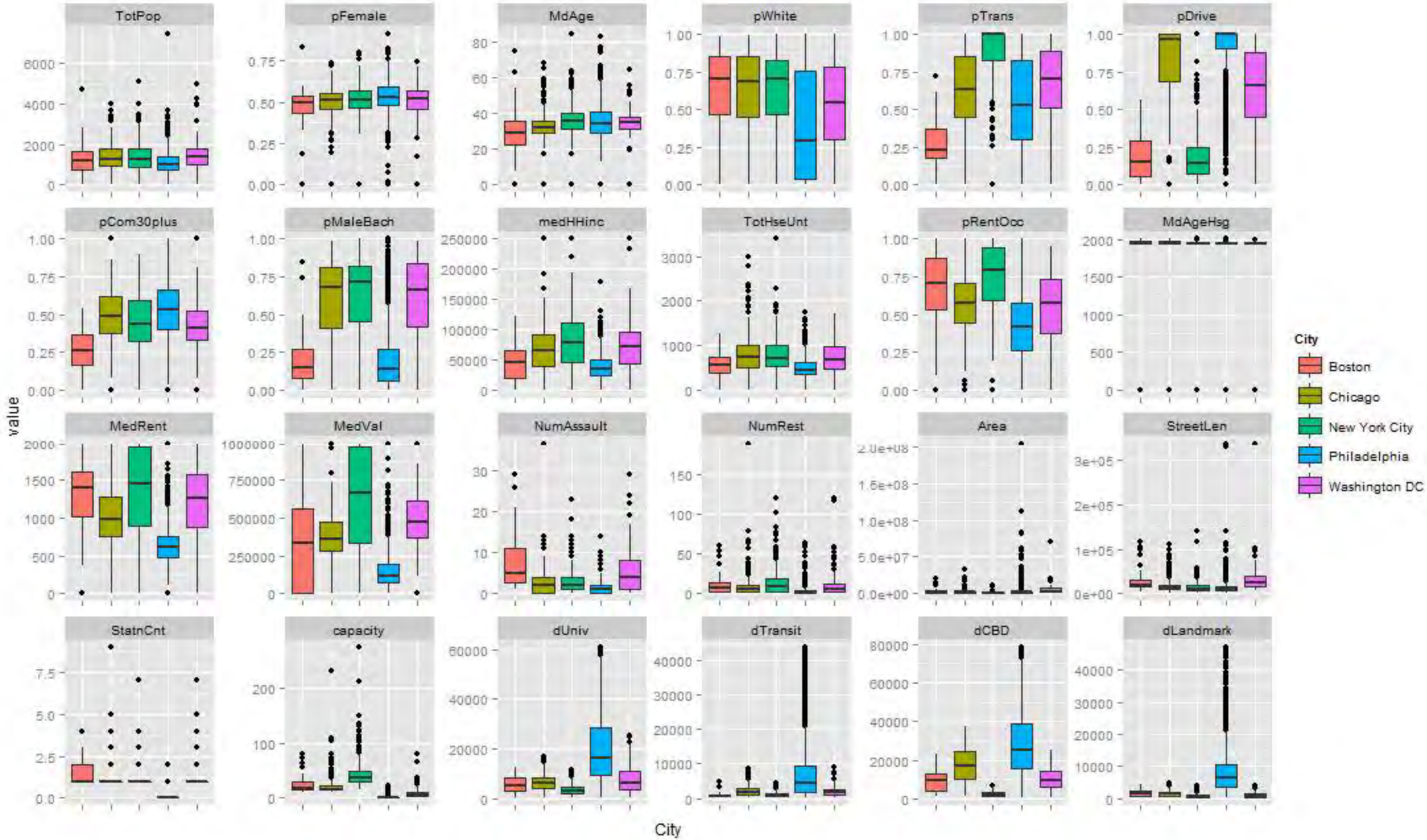

POPULATION CURVES
OF THE
CITY OF CINCINNATI
AND
SURROUNDING COUNTIES
CINCINNATI
OHIO
CITY PLANNING COMMISSION
TECHNICAL ADVISORY CORPORATION
CONSULTING ENGINEERS
KEY -
PAST GROWTH AS DERIVED FROM U.S. CENSUS DATA
PROBABLE FUTURE GROWTH AS PREDICTED
Hamilton County population forecast
Cincinnati population forecast
Acutual Cincinnati population trend
1,000,000
500,000
100,000
50000
0
POPULATION
1810
1850
1900
1950
2000
2050
YEARS

In cities with bike share systems, are ridership patterns sufficiently general enough that they can be used to predict bike share usage in cities **without** such systems?


Chicago
New York City
Aggrevated assaults & bike share station locations for the training set
Washington D.C.
Boston

	Variable	Description	Alternative Source*
Demographic (ACS)	TotPop	Total population	
	pFemale	Percent female	
	MdAge	Median age	
	pWhite	Percent white	
	pTrans	Percent who take transit to work	
	pDrive	Percent who drive	
	pCom30plus	Percent who commute 30+ minutes	
	pMaleBach	Percent of males with a bachelor degree	
	medHHinc	Median household income	
	TotHseUnt	Total housing units	
	pRentOcc	Percent Renter Occupied	
	MdAgeHsg	Median Age of Housing	
	MedRent	Median Rent	
	MedValue	Median House Value	
Built Environment	dLandmark	Distance to nearest Landmark	Washington D.C.: Geocommons.com
	dTransit	Distance to nearest transit station	
	dCBD	Distance to CBD	New York City: John Weir, GitHub
	dUniv	Distance to nearest University w/ > 10k student enrollement	Nat. Center Educ. Stat.: Geocommons
	NumAssault	Number of assault crimes	New York City: Thomas Levine)
	NumRest	Number of full service restaurants	ESRI Business Analyst Extension
	StreetLen	Total length of streets in feet	
	Area	Total area of block group in sq. feet	
Bike	capacity	Number of bikes/station	
	StatnCnt	Count of bike share stations	
	strtTrip	Number of bike share departures	

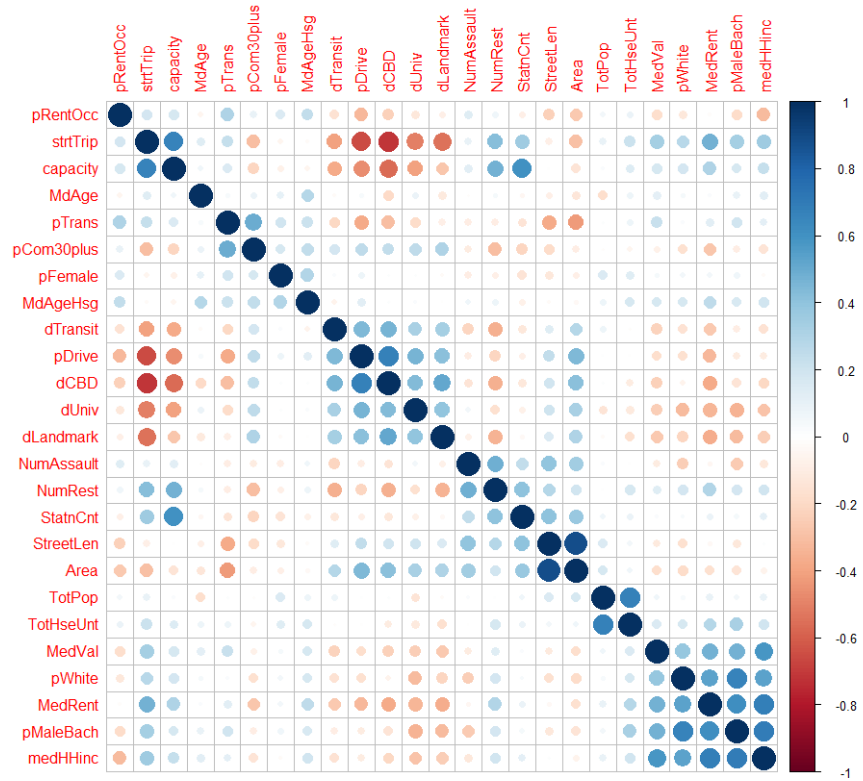

Updated Service Area Recommendation
ZONE 2A
ZONE 1B
ZONE 2B
ZONE 1B
ZONE 1A
ZONE 1B
ZONE 2C
Dauphin St
Girard Ave
Market St
Walnut St
Spruce St
Oregon Ave
Passyunk Ave
Allegheny Ave
Lancaster Ave
Baltimore Ave
FDR Park
On-Street Bicycle Facilities
Off-Street Bicycle Facilities
Updated Service Boundary
Zone
Zone 1A
Zone 1B
Zone 2A
Zone 2B
Zone 2C
Future Consideration
City Limits
Zone 2A
Zone 2B
Zone 1B
Zone 1B
Zone 1A
Zone 1B
Zone 2C
Philadelphia bike share zone digitization
Philadelphia County
Zones 1A & 1B
Zones 2A & 2B
Street Centerlines
N
0
1.25
2.5
5
Miles
Study area


TotPop
pFemale
MdAge
pWhite
pTrans
pDrive
pCom30plus
pMaleBach
medHHinc
TotHseUnt
pRentOcc
MdAgeHsg
MedRent
MedVal
NumAssault
NumRest
Area
StreetLen
StatnCnt
capacity
dUniv
dTransit
dCBD
dLandmark
value
City
City
Boston
Chicago
New York City
Philadelphia
Washington DC

In-sample prediction is not nearly as useful as out of sample prediction for judging the power of the model.

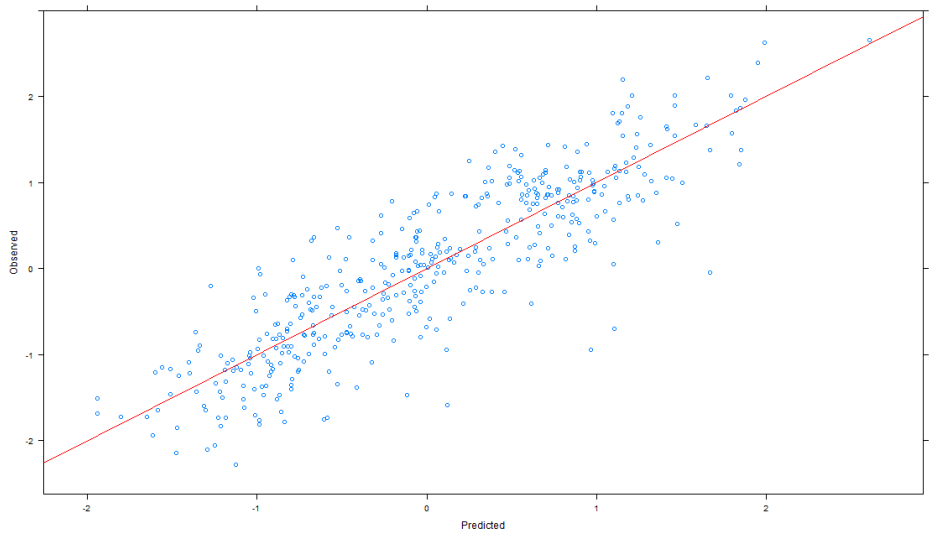
How generalizable is the model?

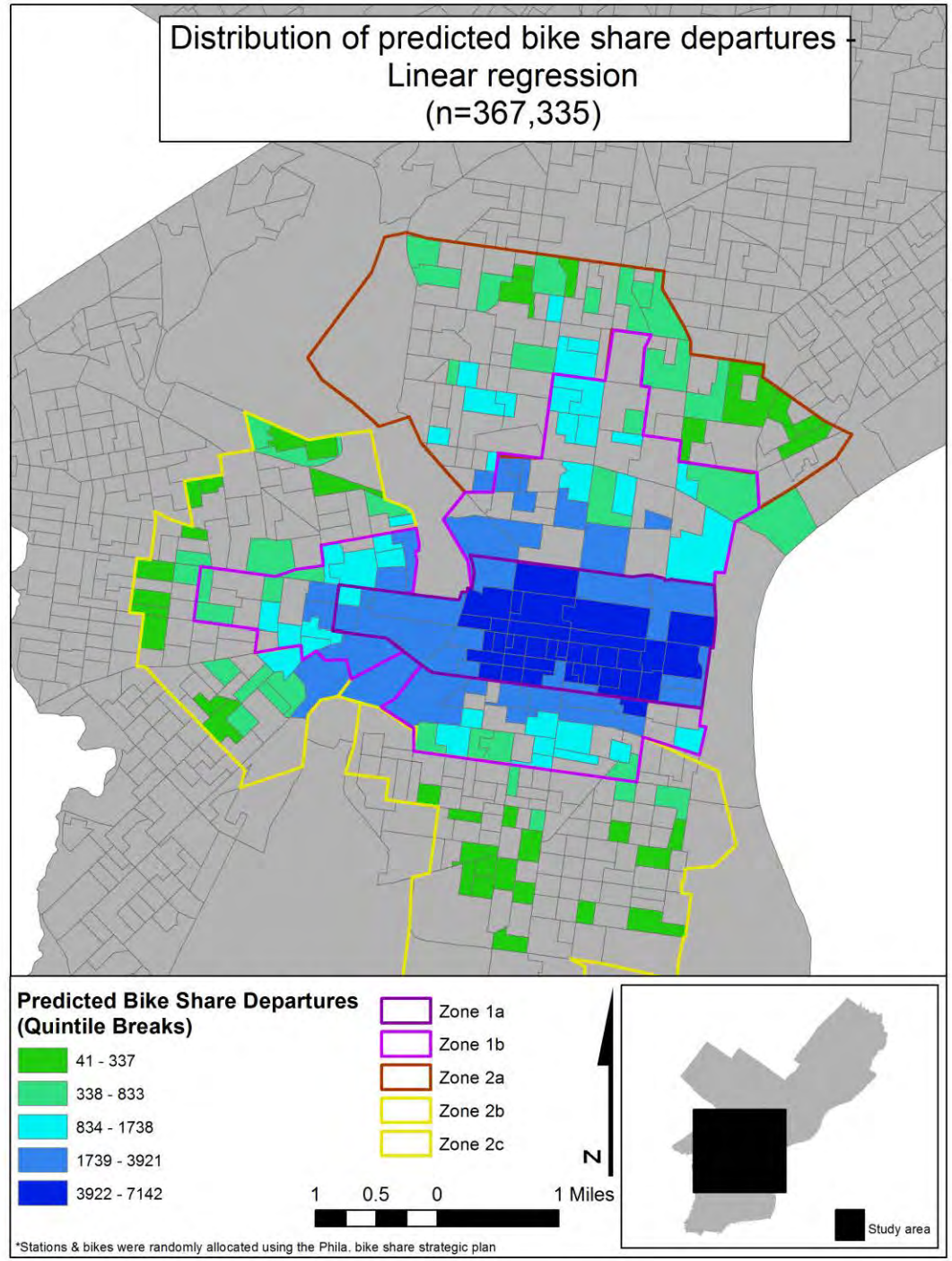
1. Build 3-city training set and to predict for a forth
2. Cross-validation
3. Random sampling

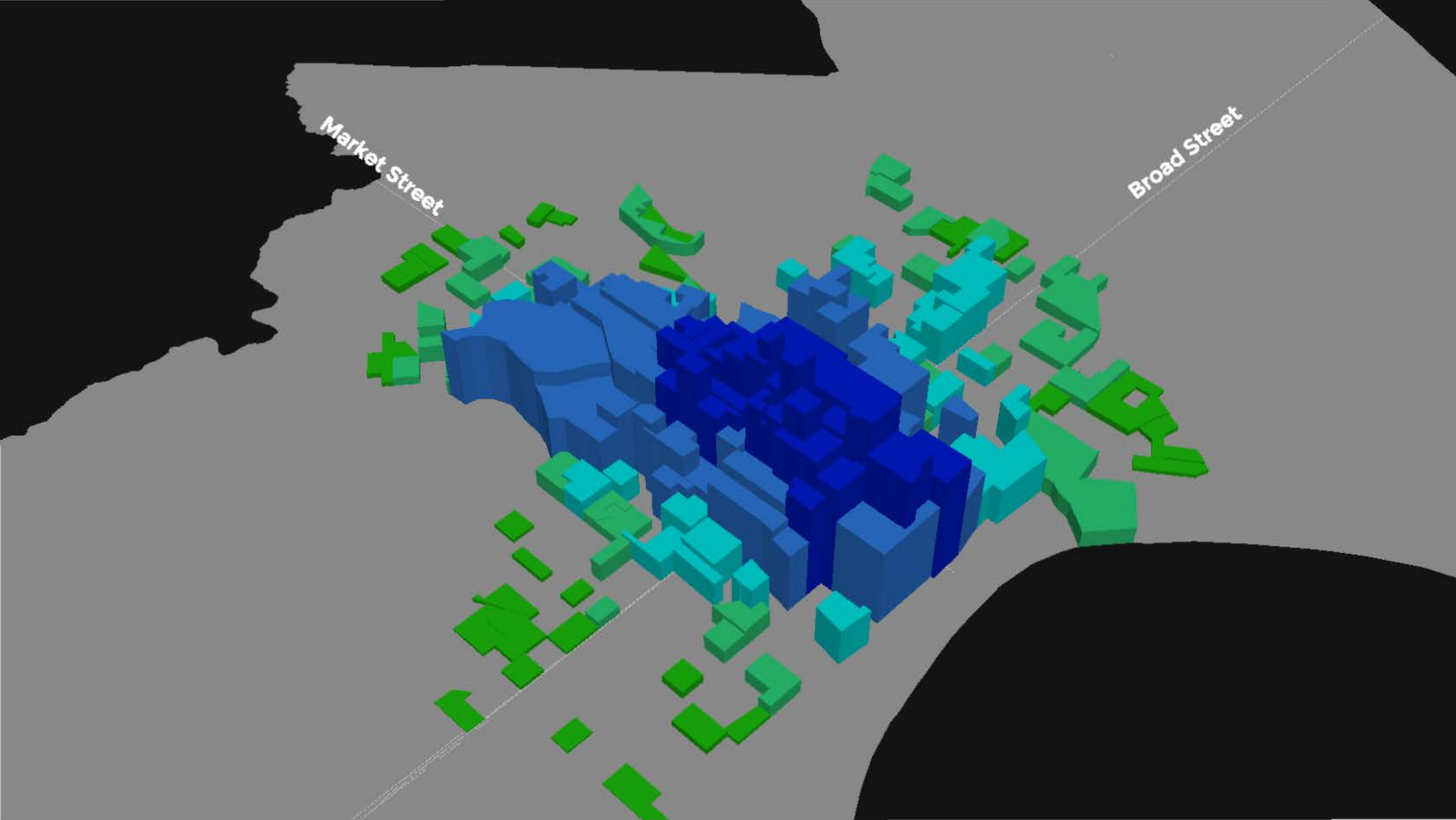


Correlation matrix

Training/Test Set			Test set results	
	Training set	**Test set**	**R-Squared on Test Set**	**RMSE on Test Set**
1.	Chicago, New York, Wash. D.C.	Boston	0.312	0.871
2.	Boston, New York, Wash D.C.	Chicago	0.597	1.03
3.	Boston, Chicago, Wash D.C.	New York	0.413	0.756
4.	Boston, Chicago, New York	Wash D.C.	0.396	1.43
5.	All Cities 75% Sample	25% of four cities	**0.706**	0.572
6.	All Cities 75% Sample	Boston	0.445	0.463
7.	All Cities 75% Sample	Chicago	**0.706**	0.411
8.	All Cities 75% Sample	New York	0.461	0.54
9.	All Cities 75% Sample	Wash D.C.	0.47	0.745
10.	All Cities 100% Sample	25% of four cities	**0.721**	0.557
11.	All Cities 100% Sample	Boston	0.445	0.463
12.	All Cities 100% Sample	Chicago	**0.709**	0.411
13.	All Cities 100% Sample	New York	0.54	0.461
14.	All Cities 100% Sample	Wash D.C.	0.47	0.746




Distribution of predicted bike share departures - Linear regression
(n=367,335)
Predicted Bike Share Departures (Quintile Breaks)
41 - 337
338 - 833
834 - 1738
1739 - 3921
3922 - 7142
Zone 1a
Zone 1b
Zone 2a
Zone 2b
Zone 2c
N
1 0.5 0 1 Miles
Study area
*Stations & bikes were randomly allocated using the Phila. bike share strategic plan


Market Street
Broad Street

Model type	OLS	Random Forest	Gradient Boosting
# of predicted trips	367,355	295,051	267,211

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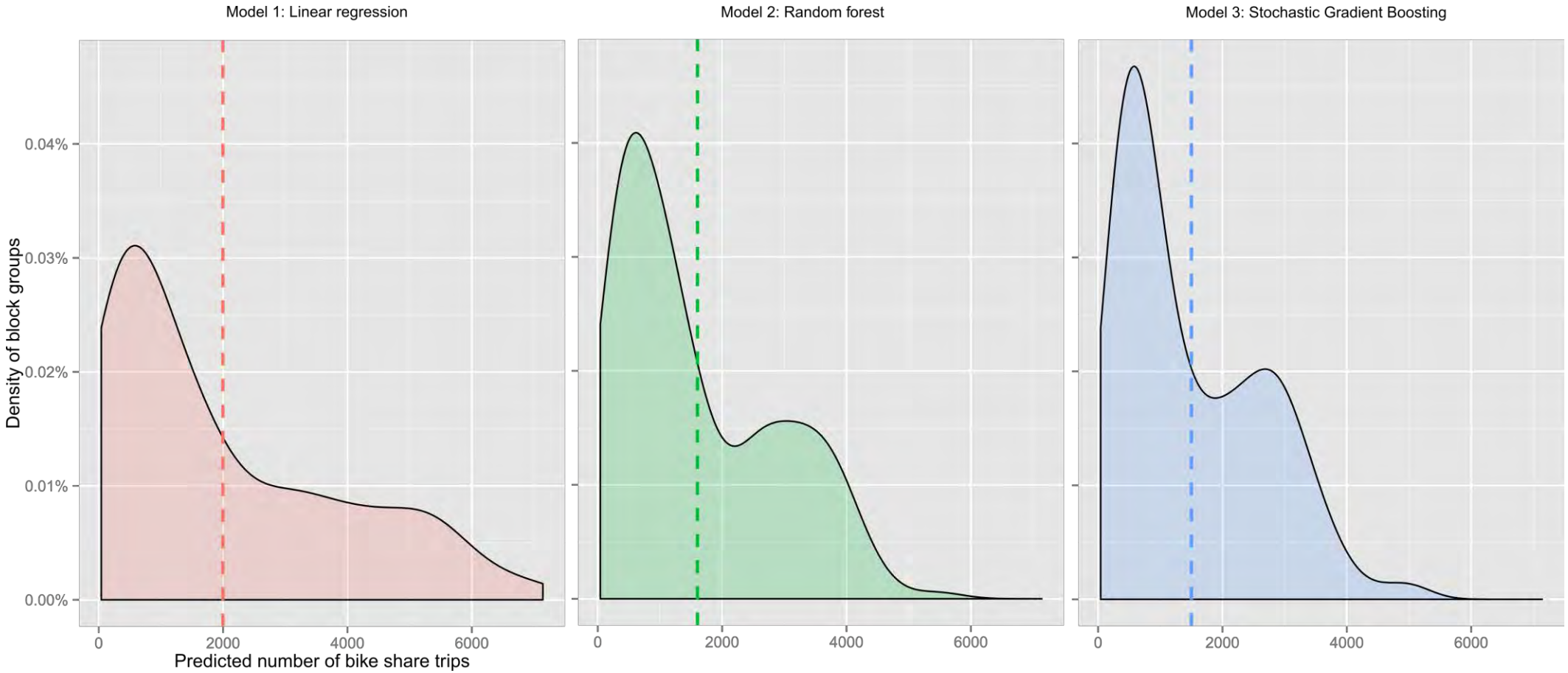
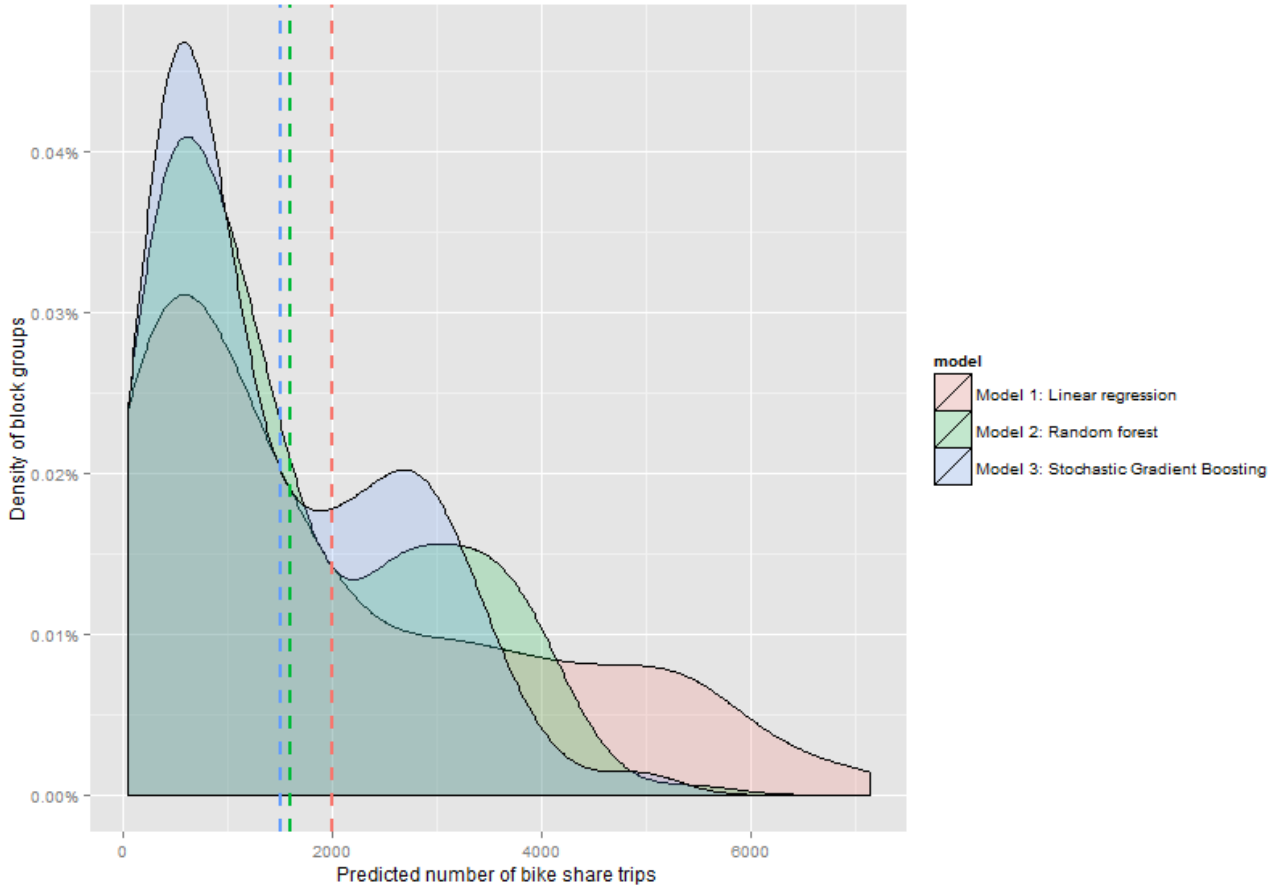
# of predicted trips	367,355	295,051	267,211



Model type	OLS	Random Forest	Gradient Boosting
# of predicted trips	367,355	295,051	267,211



Model type	OLS	Random Forest	Gradient Boosting
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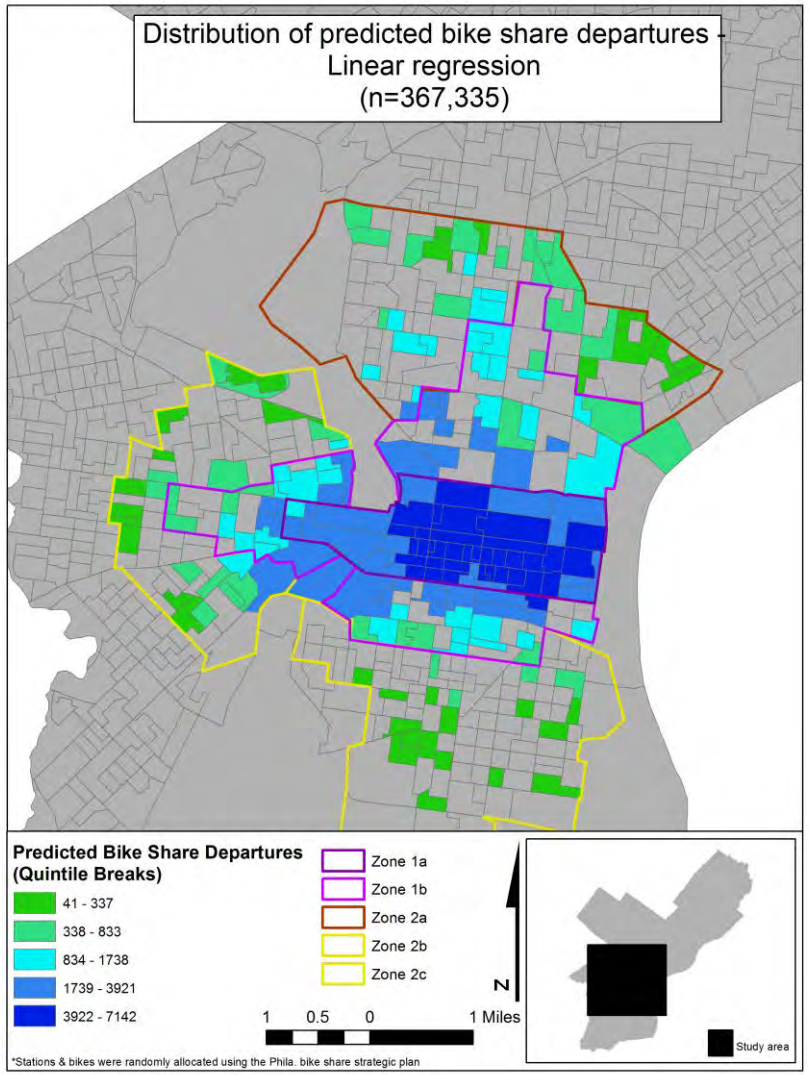

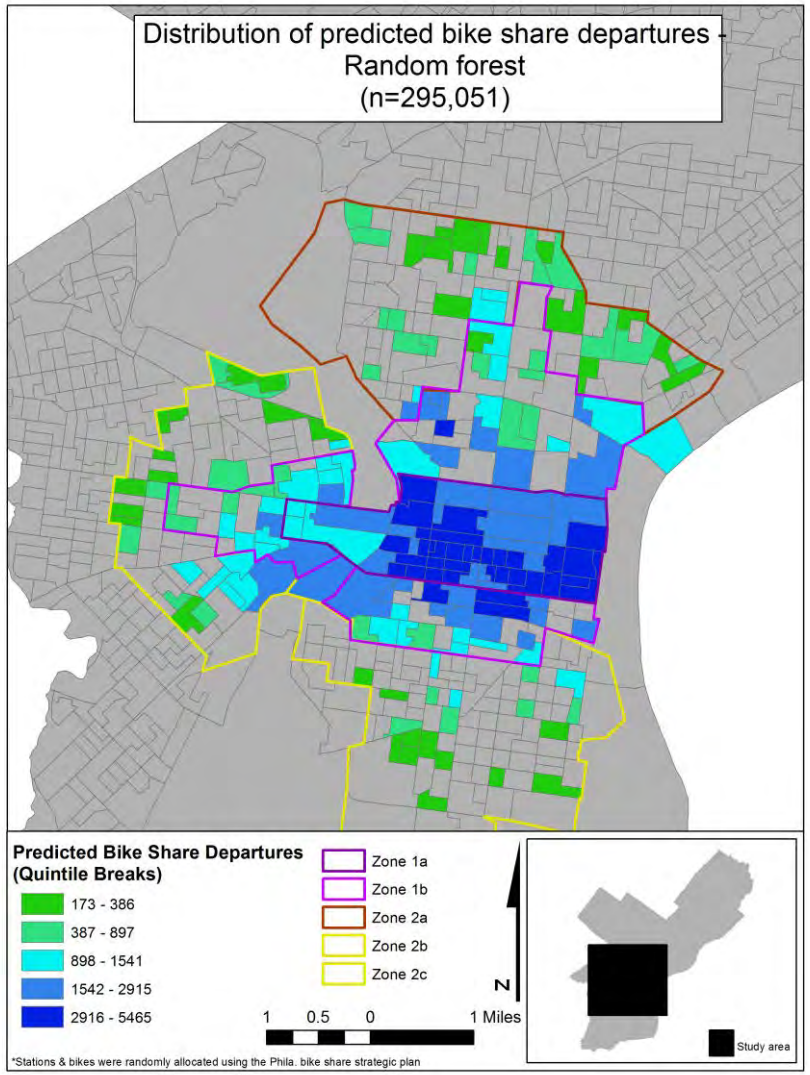

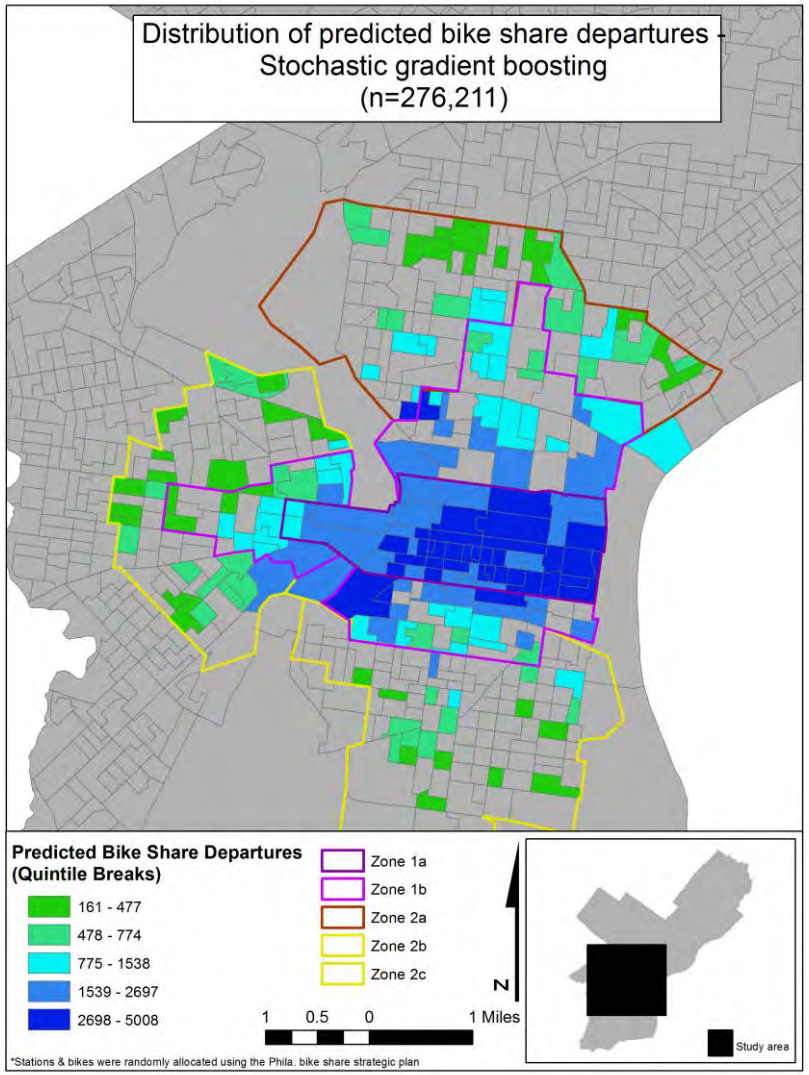

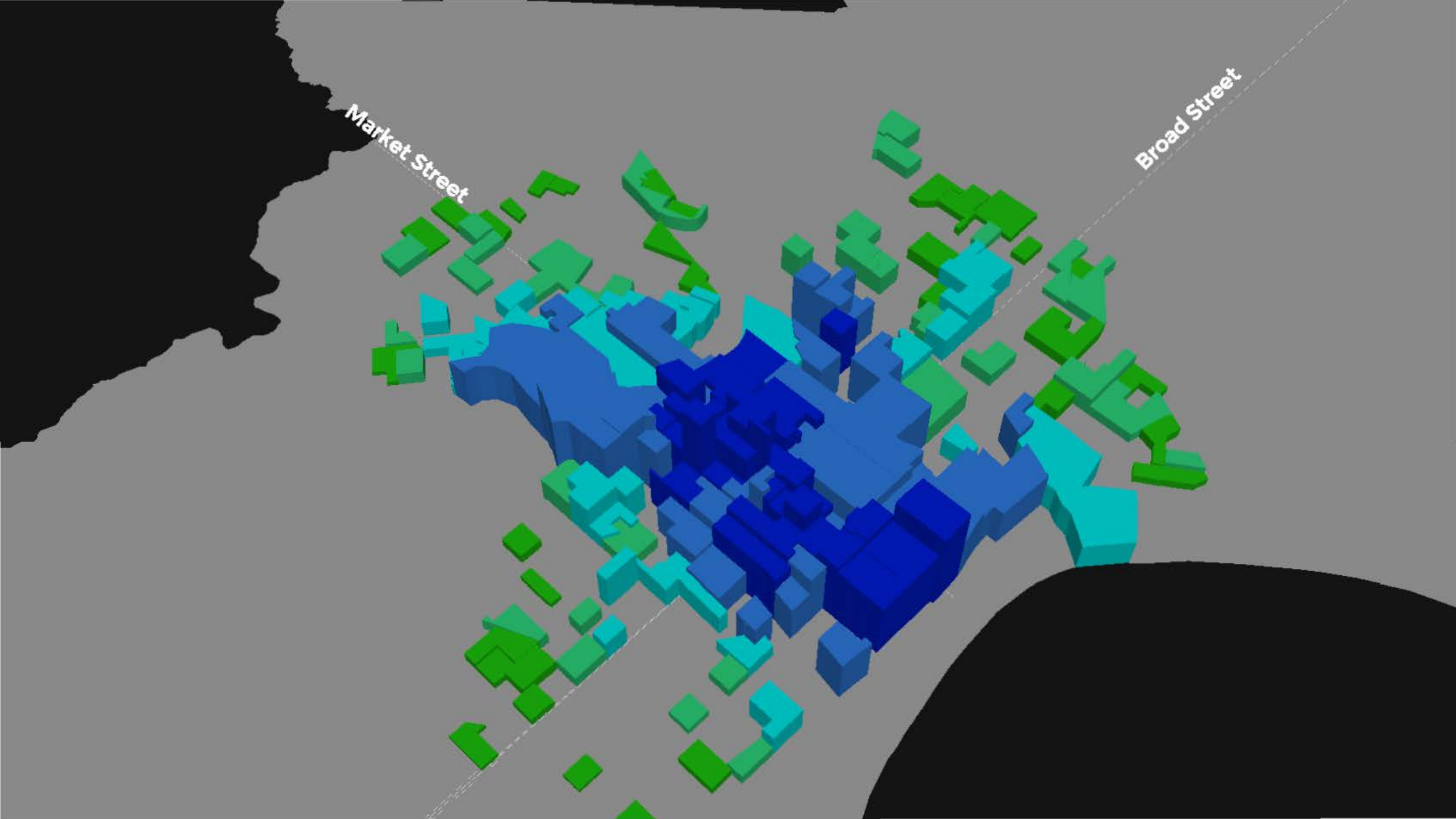
Market Street
Broad Street

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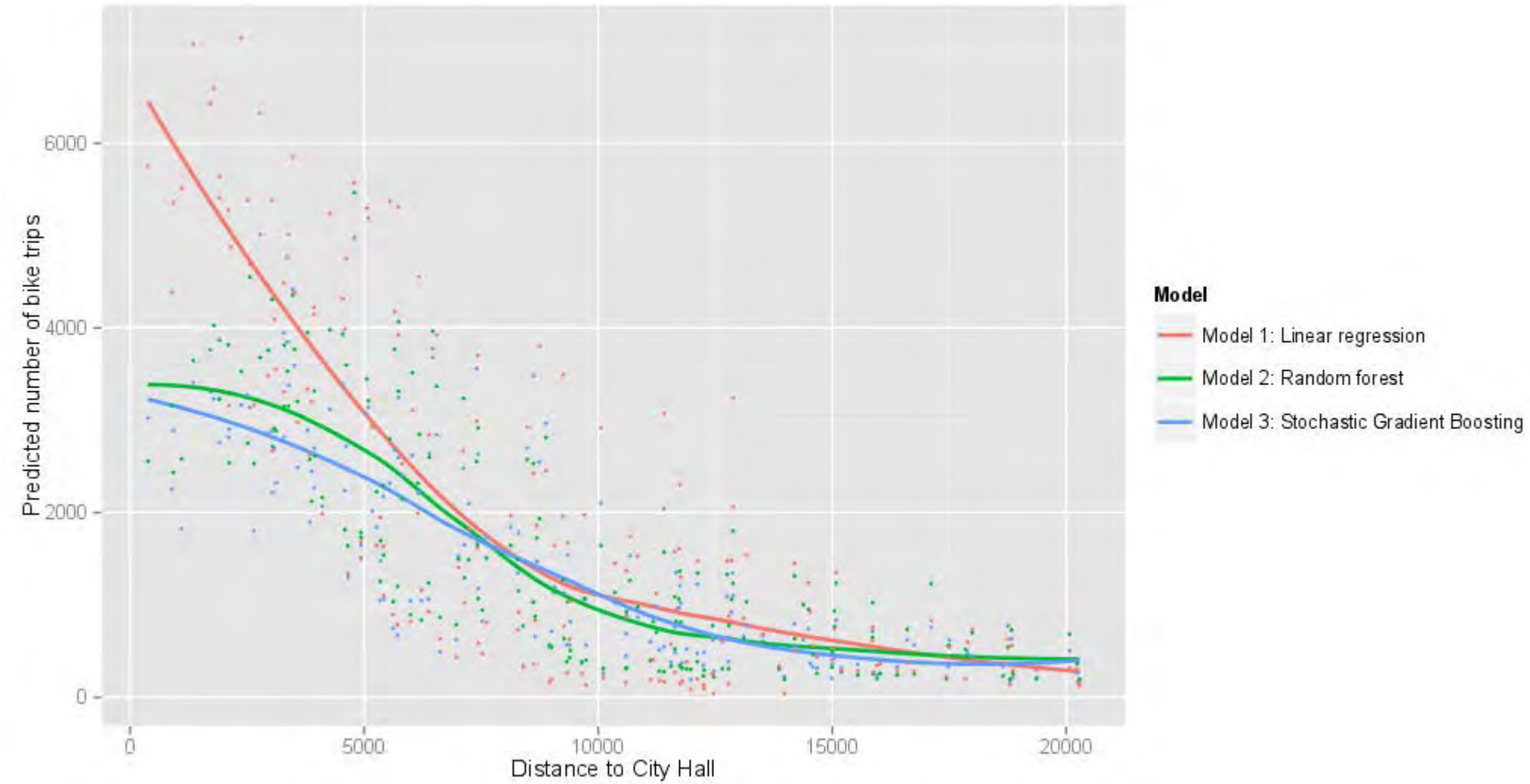


bikesharepredictio.com

Bike share predictive tool

dvrpc urbanspatialanalysis, LLC

Computer

Click above link to upload block groups for which you want ridership predictions

Current test dataset:

Richmond_BGs.shp

Dataset verified?

Verified

Count of block groups

163

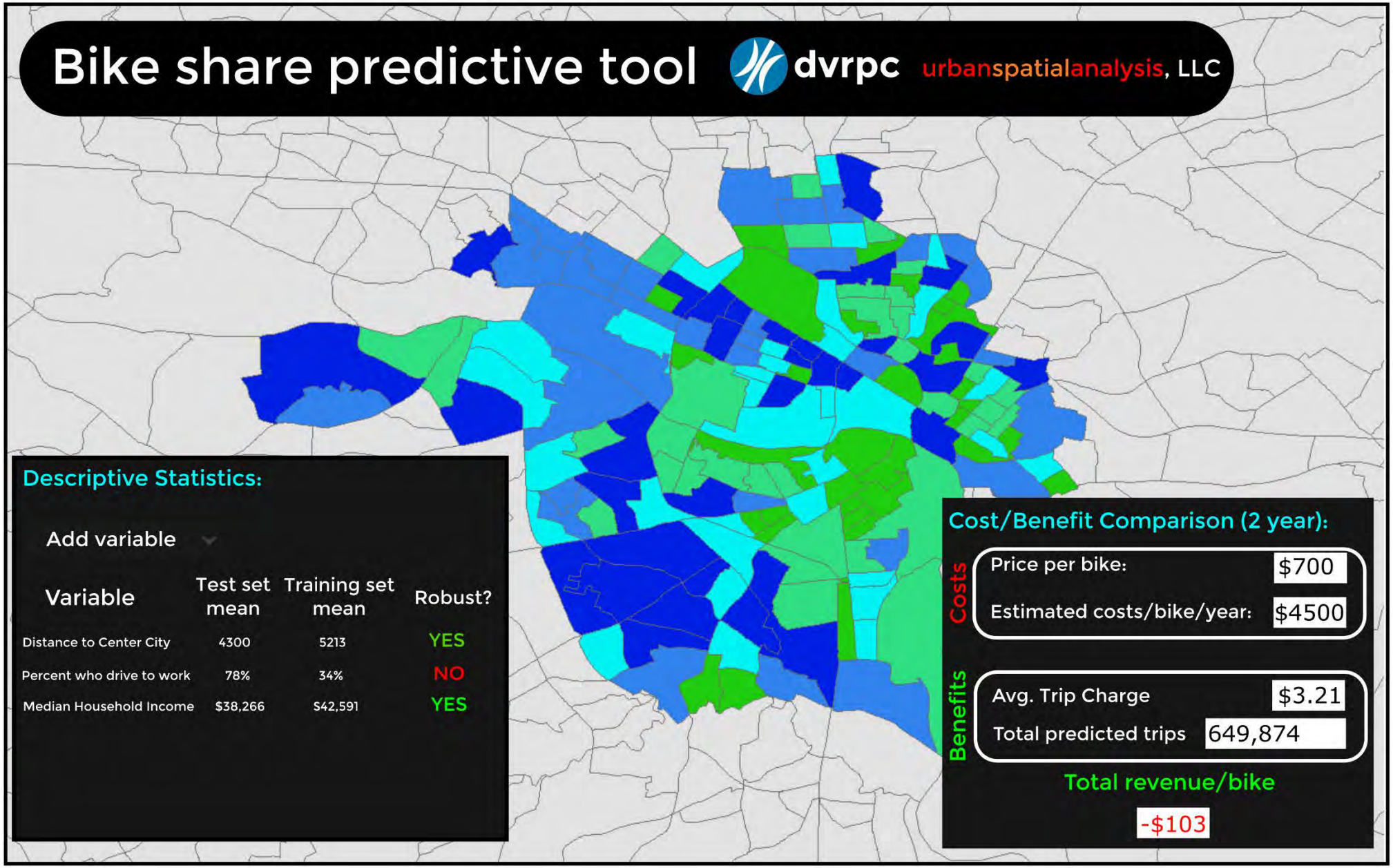
Calculate descriptive statistics

Calculated

Press button below to calculate predictions for each block group:

Calculate!

Predicting.....Complete!



Descriptive Statistics:

Add variable

Variable	Test set mean	Training set mean	Robust?
Distance to Center City	4300	5213	YES
Percent who drive to work	78%	34%	NO
Median Household Income	$38,266	$42,591	YES

Cost/Benefit Comparison (2 year):

Costs

Price per bike: $700

Estimated costs/bike/year: $4500

Benefits

Avg. Trip Charge $3.21

Total predicted trips 649,874

Total revenue/bike

-$103

Predicting bike share usage using city open data

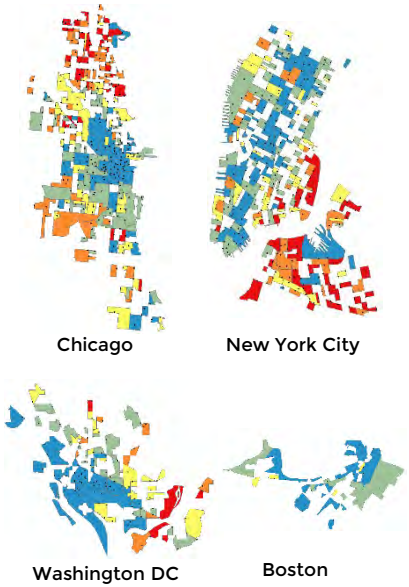
Ken Steif

ksteif@upenn.edu

@KenSteif

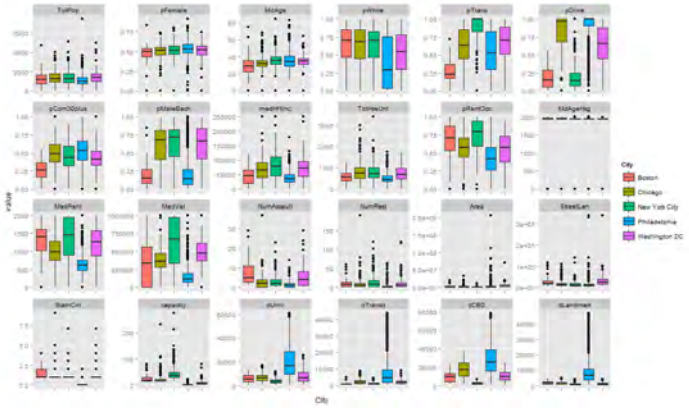
Department of City & Regional Planning, Univ. of Pennsylvania

UrbanSpatialAnalytics, LLC



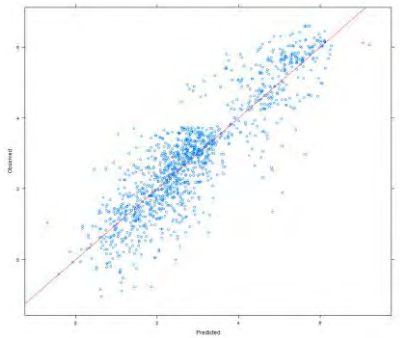
Step 1: Data collection

What variables *might* be important for predicting bike share usage?

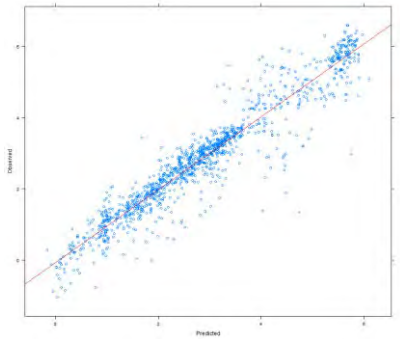


Step 2: Feature Selection

What variables are *actually* important for predicting bike share usage?



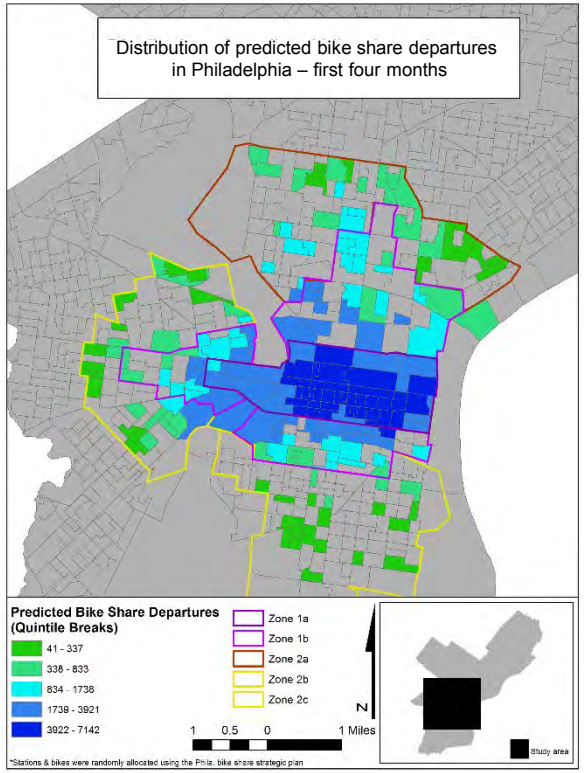
Model 1



Model 2

Step 3: Model Selection

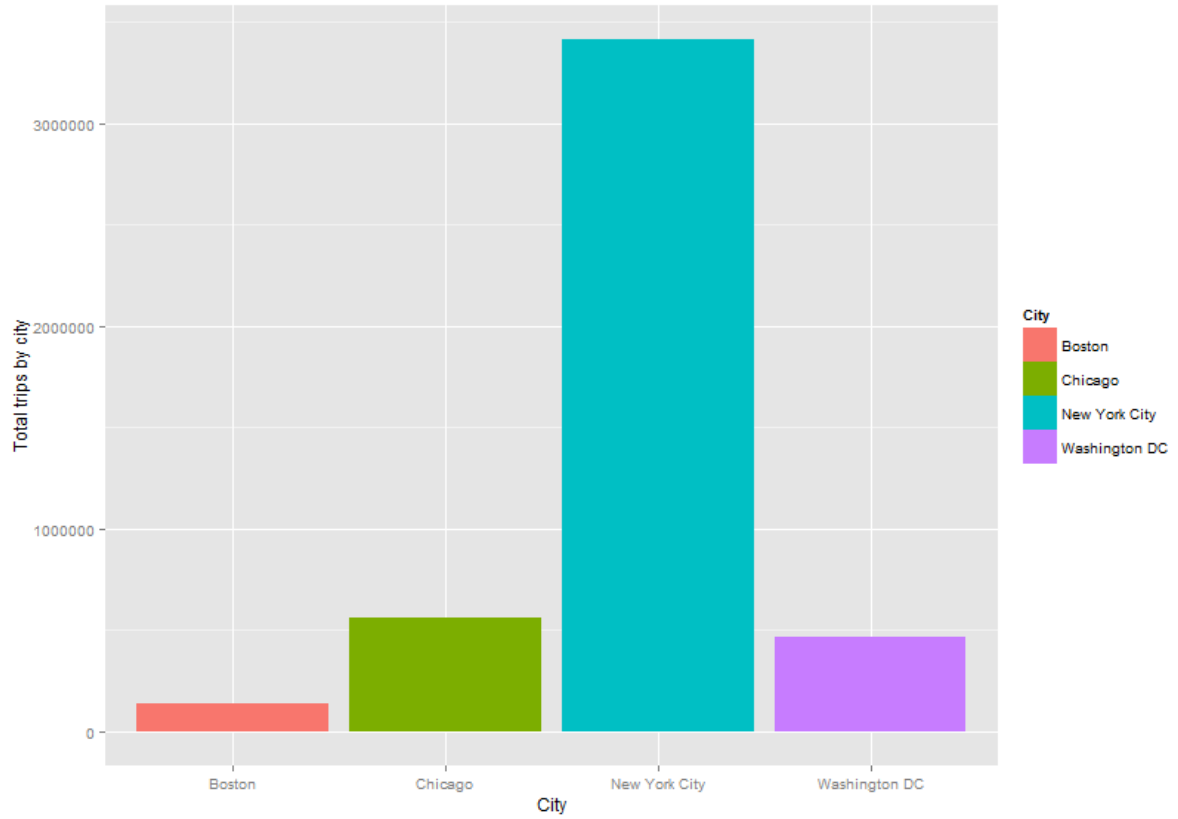
Which algorithms lead to the most accurate predictions?



Step 4: Prediction Evaluation

Visualization and dissemination

Model type	OLS	Random Forest	Gradient Boosting
# of predicted trips	367,355	295,051	267,211



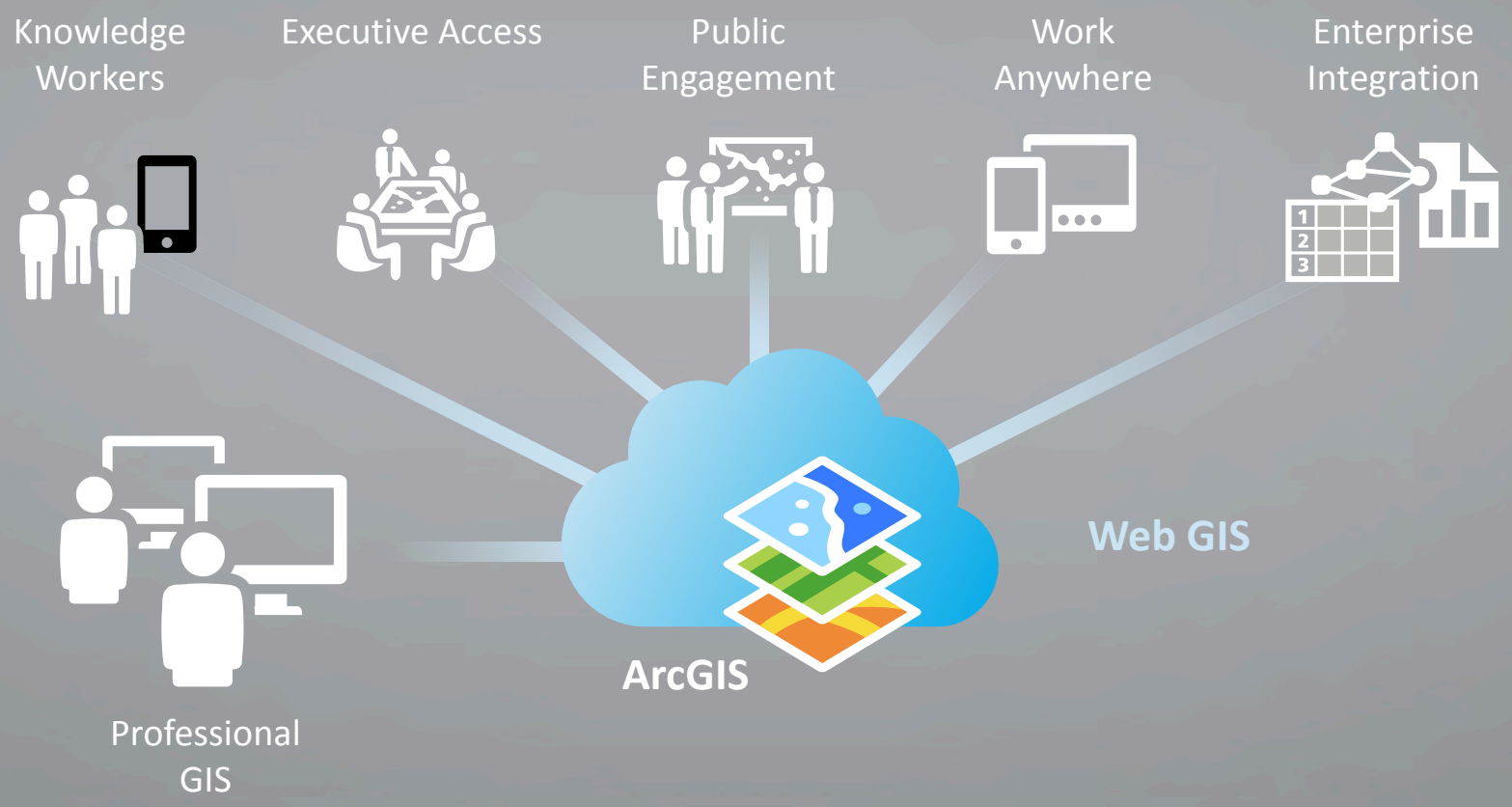
Web AppBuilder for ArcGIS

Lauri Dafner – Solution Engineer

6/10/2016

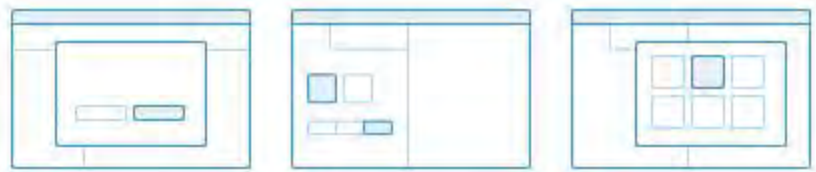
ArcGIS is a Platform

Making mapping and location aware apps available across your organization



Web AppBuilder for ArcGIS

Create web apps for your organization that run across any device



1 Create new app

2 Pick style

3 Select map

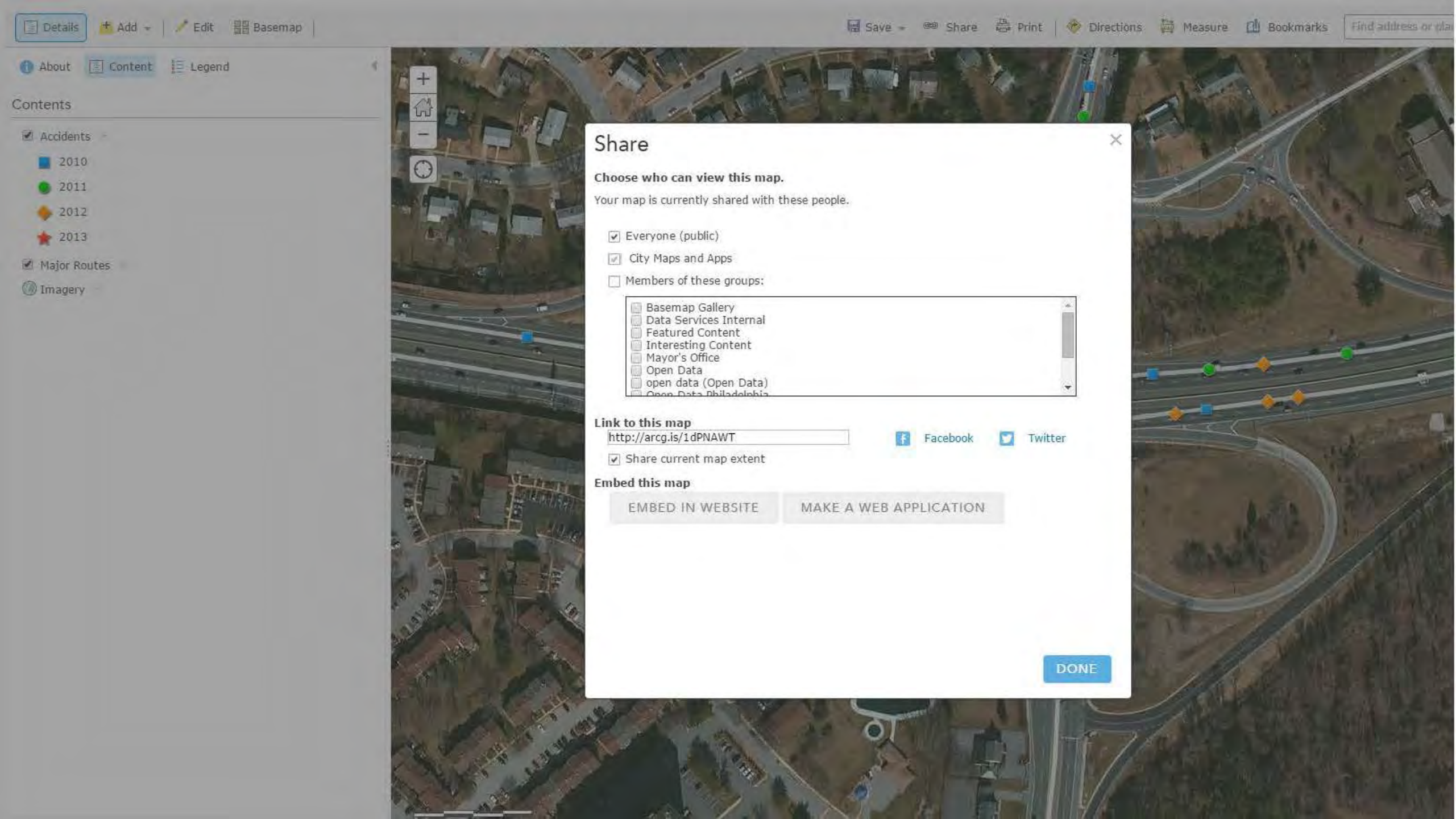
4 Add widgets

5 Configure attributes

6 Preview and publish

Contents

- Accidents
  - 2010
  - 2011
  - 2012
  - 2013
- Major Routes
- Imagery


Details
Add
Edit
Basemap
Save
Share
Print
Directions
Measure
Bookmarks
About
Content
Legend
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Accidents
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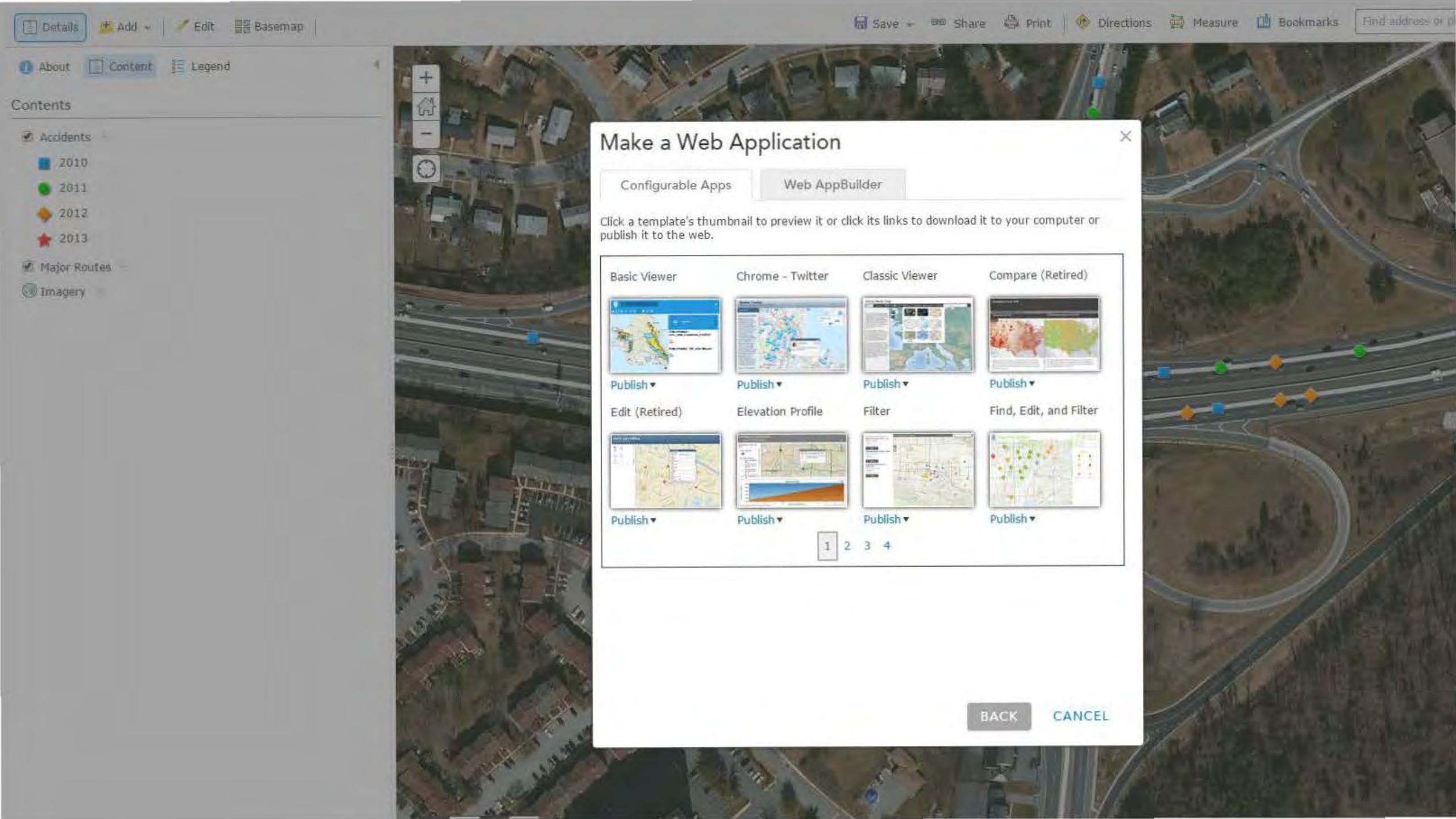
2012
2013
Major Routes
Imagery
Share
Choose who can view this map.
Your map is currently shared with these people.
Everyone (public)
City Maps and Apps
Members of these groups:
Basemap Gallery
Data Services Internal
Featured Content
Interesting Content
Mayor's Office
Open Data
open data (Open Data)
Link to this map
http://arcg.is/1dPNAWT
Facebook
Twitter
Share current map extent
Embed this map
EMBED IN WEBSITE
MAKE A WEB APPLICATION
DONE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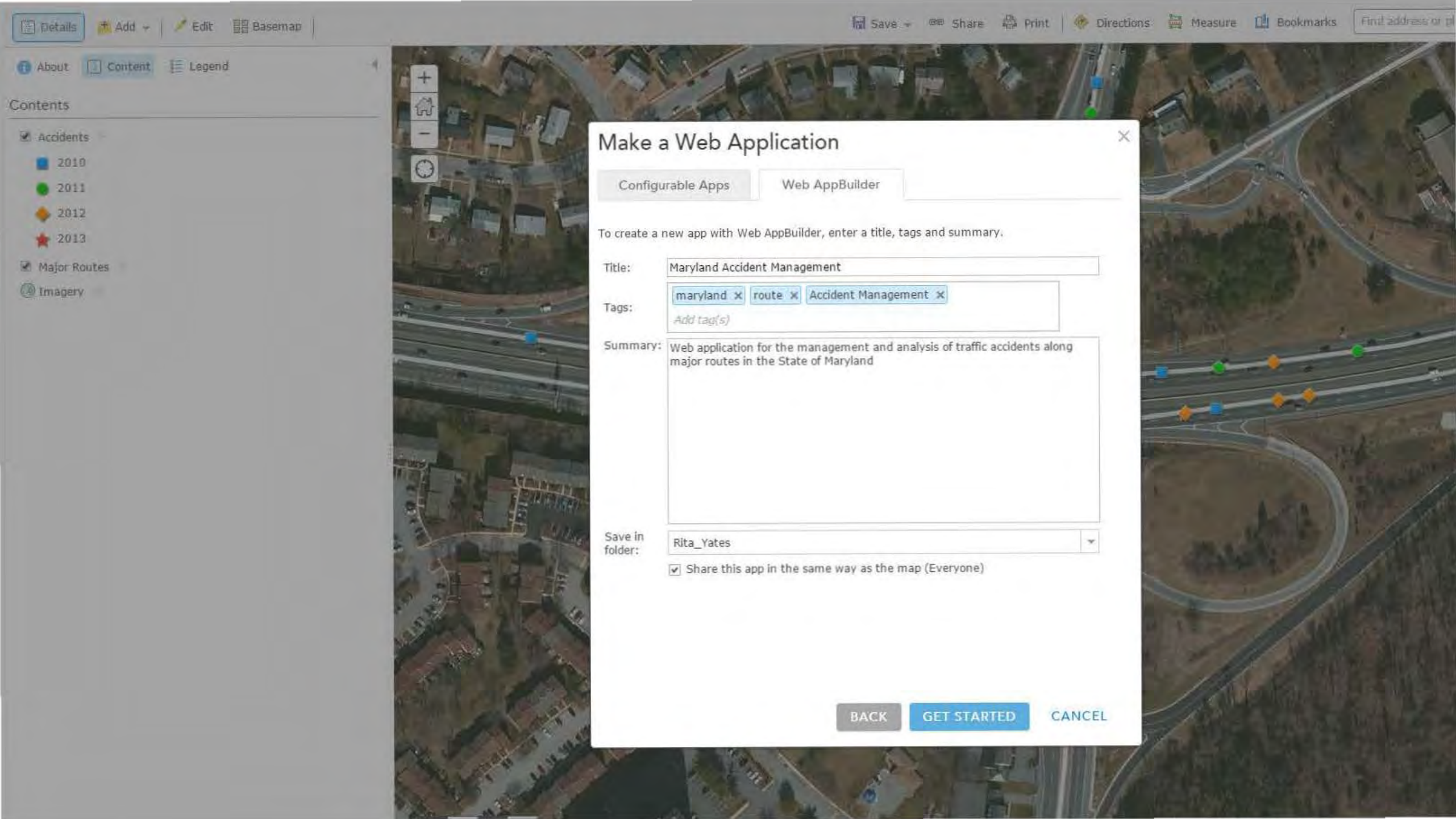
Imagery
Make a Web Application
Configurable Apps
Web AppBuilder
Click a template's thumbnail to preview it or click its links to download it to your computer or publish it to the web.
Basic Viewer
Chrome - Twitter
Classic Viewer
Compare (Retired)
Publish
Publish
Publish
Publish
Edit (Retired)
Elevation Profile
Filter
Find, Edit, and Filter
Publish
Publish
Publish
Publish
1
2
3
4
BACK
CANCEL


Details
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Share
Print
Directions
Measure
Bookmarks
About
Content
Legend
Contents
Accidents
2010
2011
2012
2013
Major Routes
Imagery
Make a Web Application
Configurable Apps
Web AppBuilder
To create a new app with Web AppBuilder, enter a title, tags and summary.
Title:
Maryland Accident Management
Tags:
maryland
route
Accident Management
Add tag(s)
Summary:
Web application for the management and analysis of traffic accidents along major routes in the State of Maryland
Save in folder:
Rita_Yates
Share this app in the same way as the map (Everyone)
BACK
GET STARTED
CANCEL

Themes | Map | Widget | Attribute

Foldable Theme

Tab Theme

Style

Layout

Launch | Previews | Saved

Maryland Accident Management

with Web AppBuilder for ArcGIS

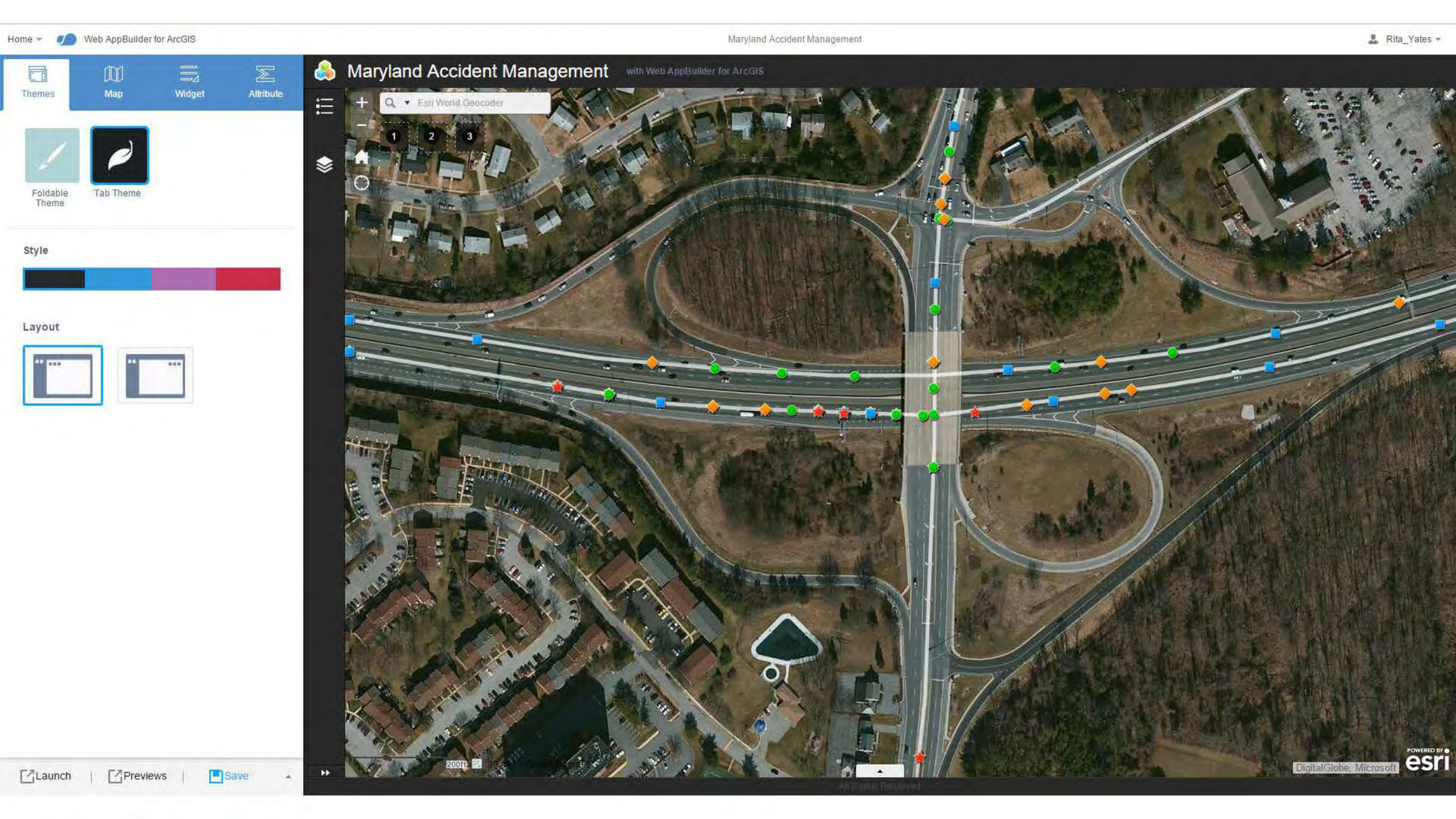
Esri World Geocoder

1 2 3

200ft

DigitalGlobe, Microsoft

POWERED BY esri


Home
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Maryland Accident Management
Rita_Yates
Themes
Map
Widget
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Foldable Theme
Tab Theme
Style
Layout
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Previews
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Maryland Accident Management
with Web AppBuilder for ArcGIS
Esri World Geocoder
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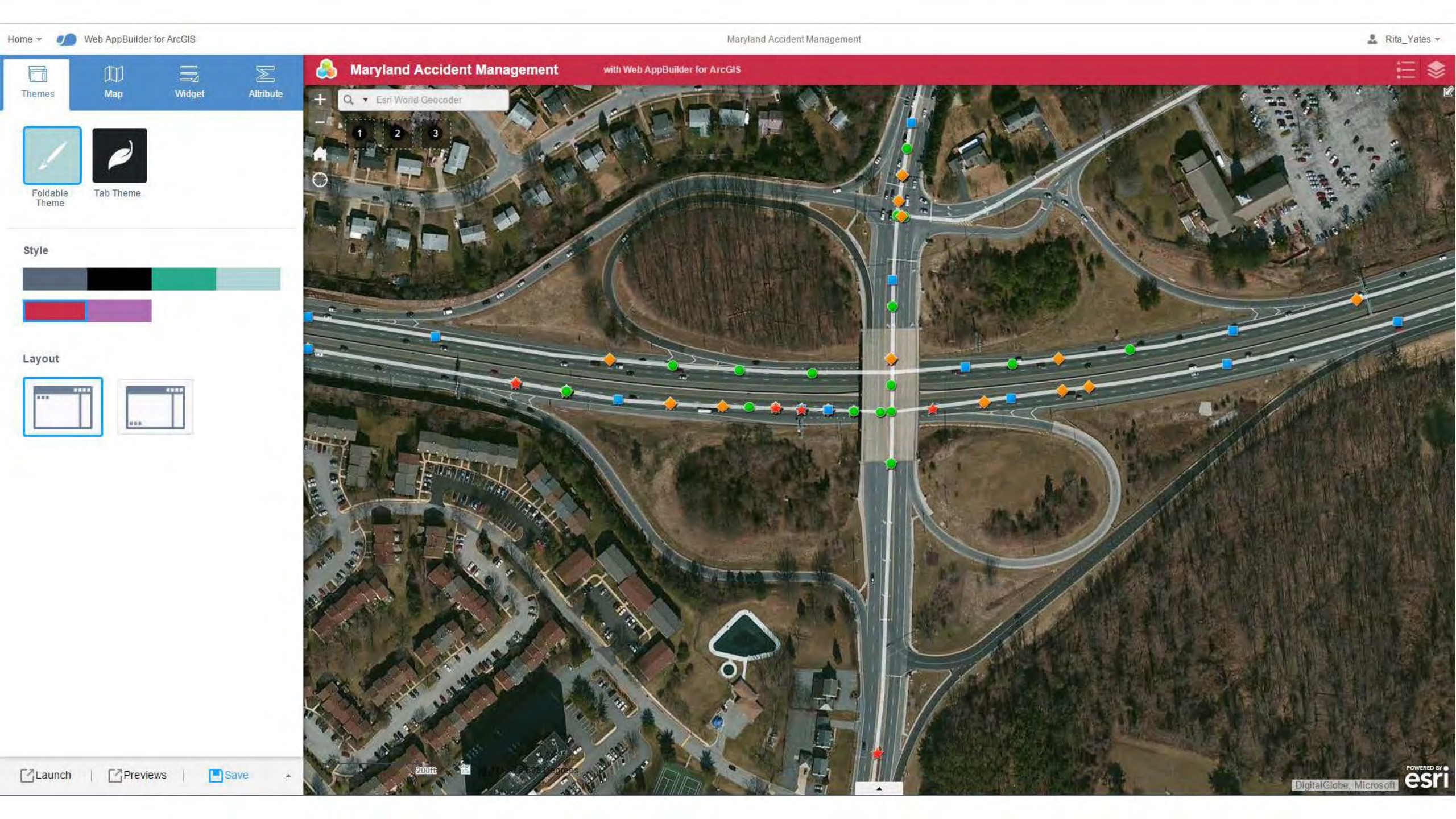
DigitalGlobe, Microsoft
esri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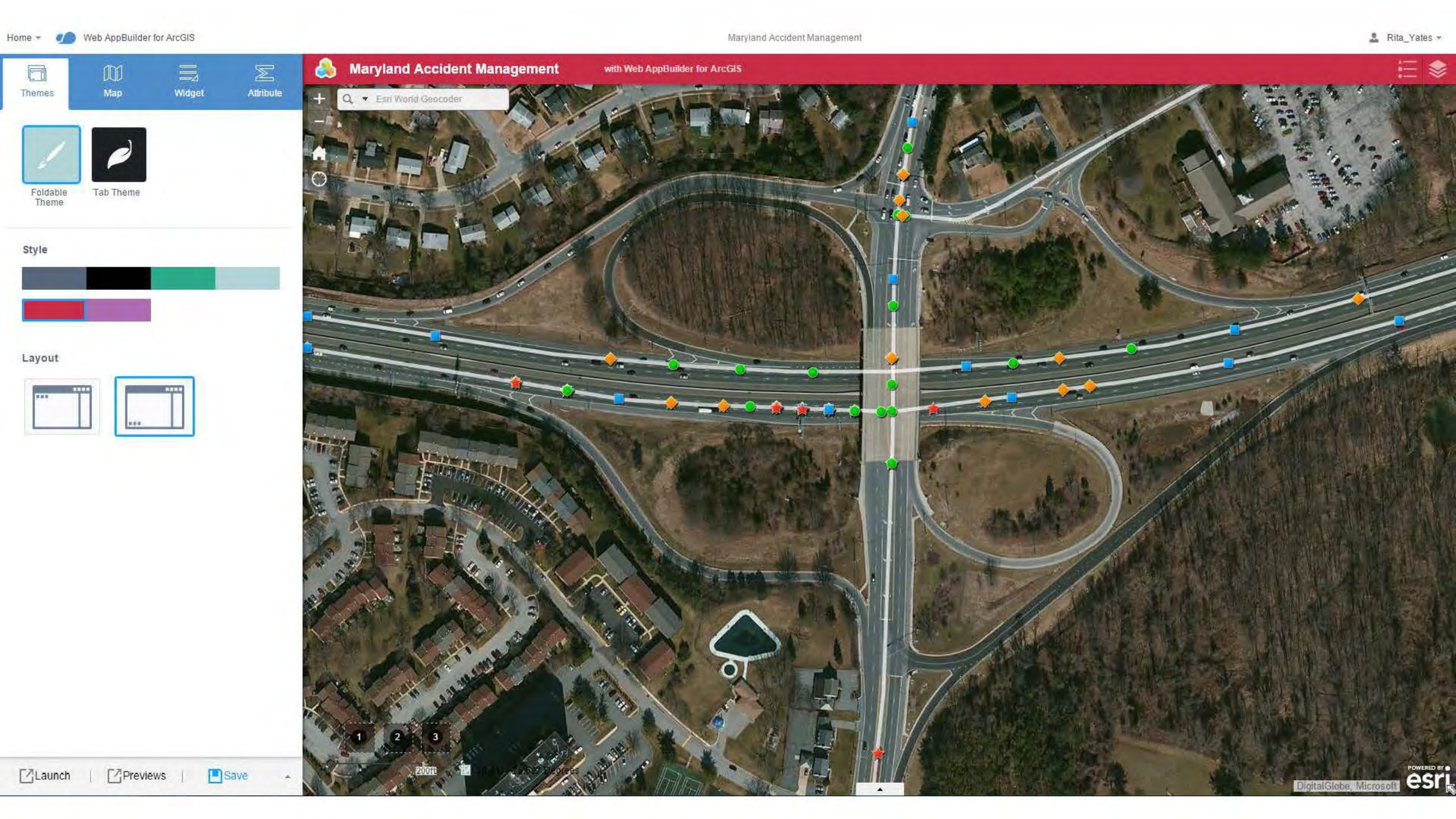
POWERED BY esri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Foldable Theme
Tab Theme
Style
Layout
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Maryland Accident Management
with Web AppBuilder for ArcGIS
Esri World Geocoder
1
2
3
200ft
DigitalGlobe, Microsoft
esri

Themes | Map | Widget | Attribute

Web Map
Owner Matthew_Ken...
Last Modified:
3/5/2015
More Details...

Choose Web Map

Maryland Route Map

Map of major routes with traffic accidents since 2010

Set Initial Extent

Specify the initial map extent when the application starts up.

Use Current Map View

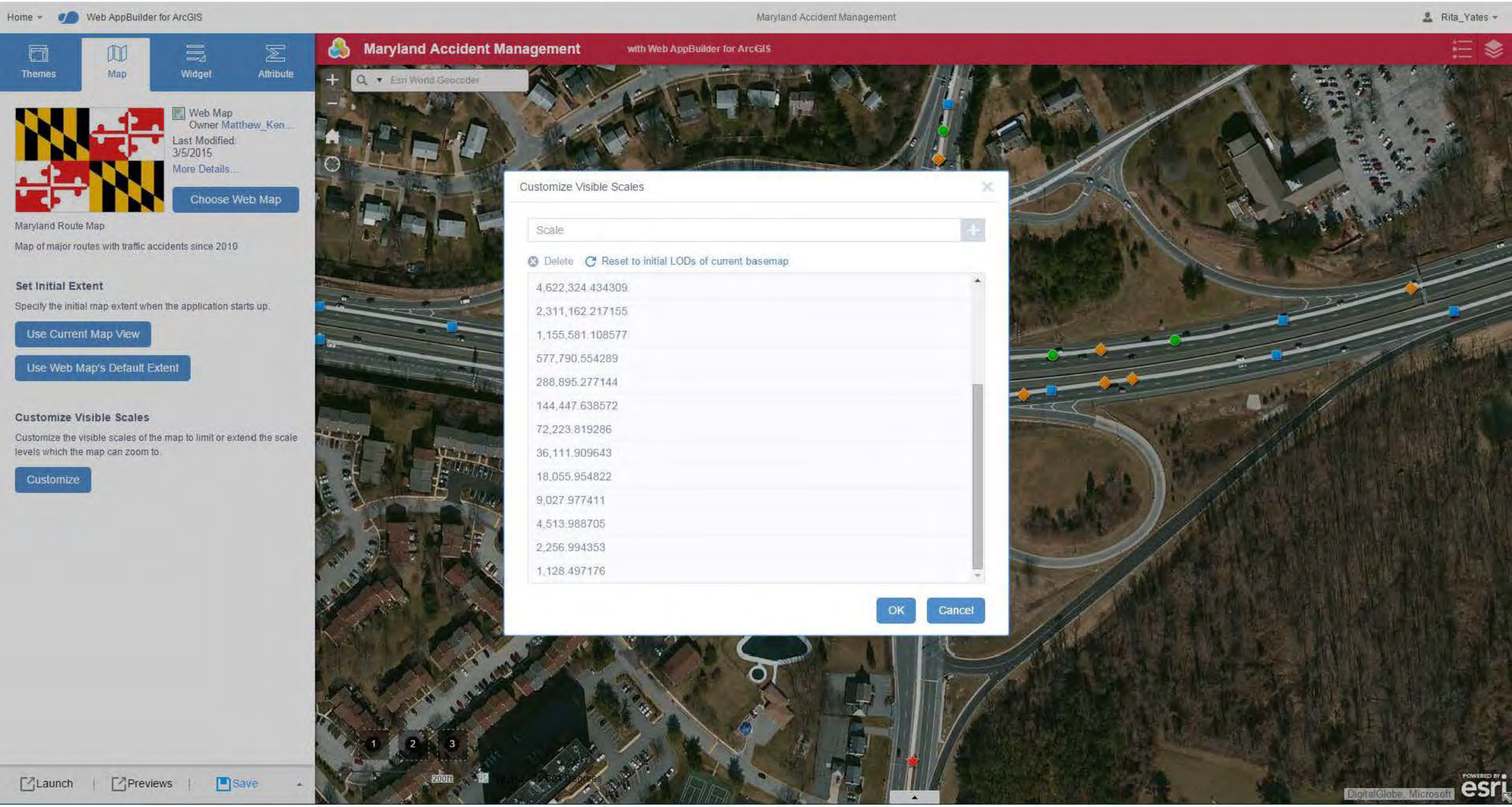
Use Web Map's Default Extent

Customize Visible Scales

Customize the visible scales of the map to limit or extend the scale levels which the map can zoom to.

Customize

Launch | Previews | Save


Home
Web AppBuilder for ArcGIS
Maryland Accident Management
Rita_Yates
Themes
Map
Widget
Attribute
Web Map
Owner Matthew_Ken...
Last Modified:
3/5/2015
More Details...
Choose Web Map
Maryland Route Map
Map of major routes with traffic accidents since 2010
Set Initial Extent
Specify the initial map extent when the application starts up.
Use Current Map View
Use Web Map's Default Extent
Customize Visible Scales
Customize the visible scales of the map to limit or extend the scale levels which the map can zoom to.
Customize
Launch
Previews
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Maryland Accident Management
with Web AppBuilder for ArcGIS
Esri World Geocoder
Customize Visible Scales
Scale
Delete
Reset to initial LODs of current basemap
4,622,324.434309
2,311,162.217155
1,155,581.108577
577,790.554289
288,895.277144
144,447.638572
72,223.819286
36,111.909643
18,055.954822
9,027.977411
4,513.988705
2,256.994353
1,128.497176
OK
Cancel
DigitalGlobe, Microsoft
esri

Themes | Map | Widget | Attribute

Set the widgets in this controller

Header Controller

Attribute Table | Coordinate | Geocoder | Home Button

My Location | Overview Map | Scalebar | Splash

Swipe | Time Slider | Widget | Widget

Widget

Launch | Previews | Save

Maryland Accident Management

with Web AppBuilder for ArcGIS

Esri World Geocoder

200ft

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Themes | Map | Widget | Attribute

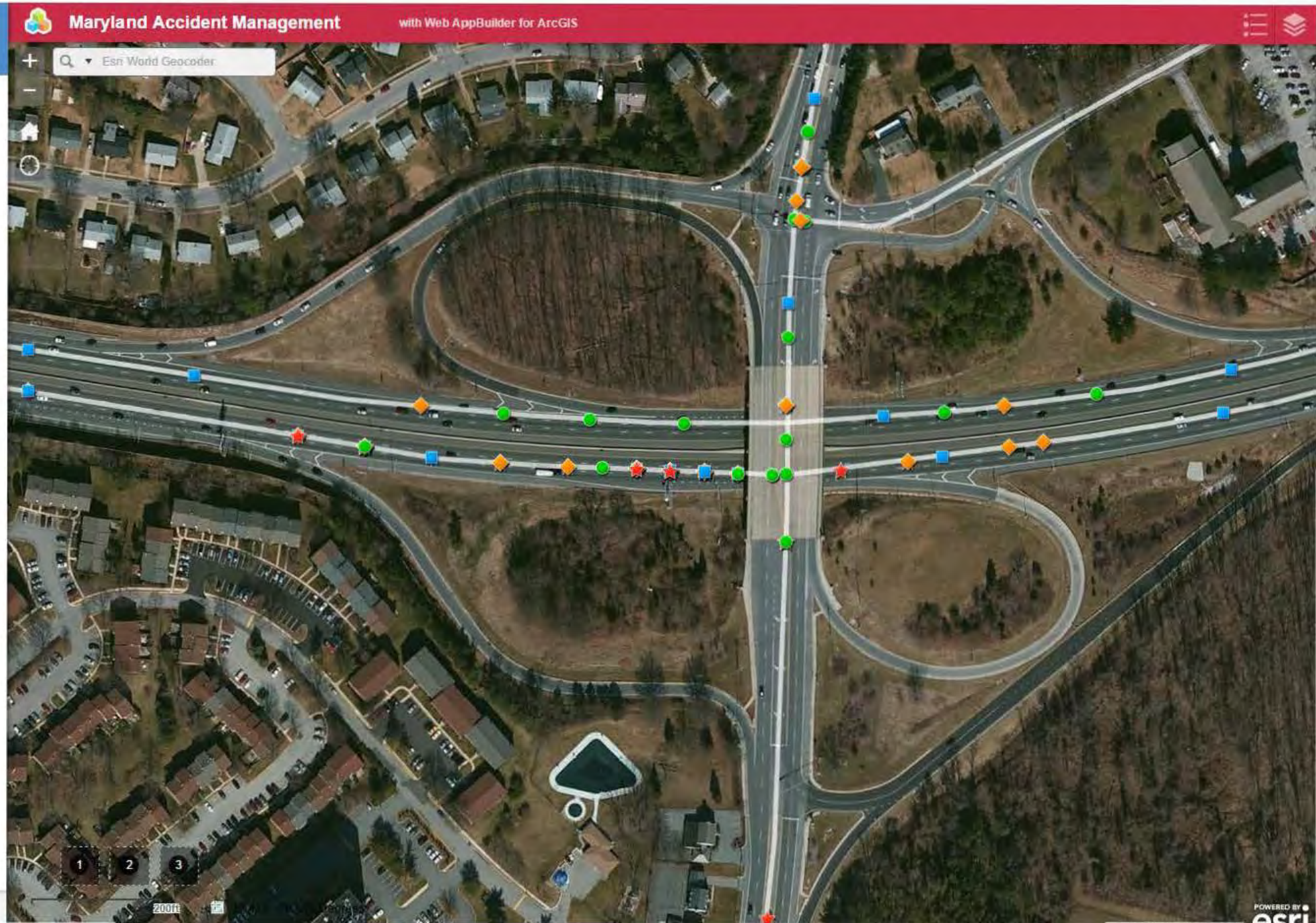
Widgets

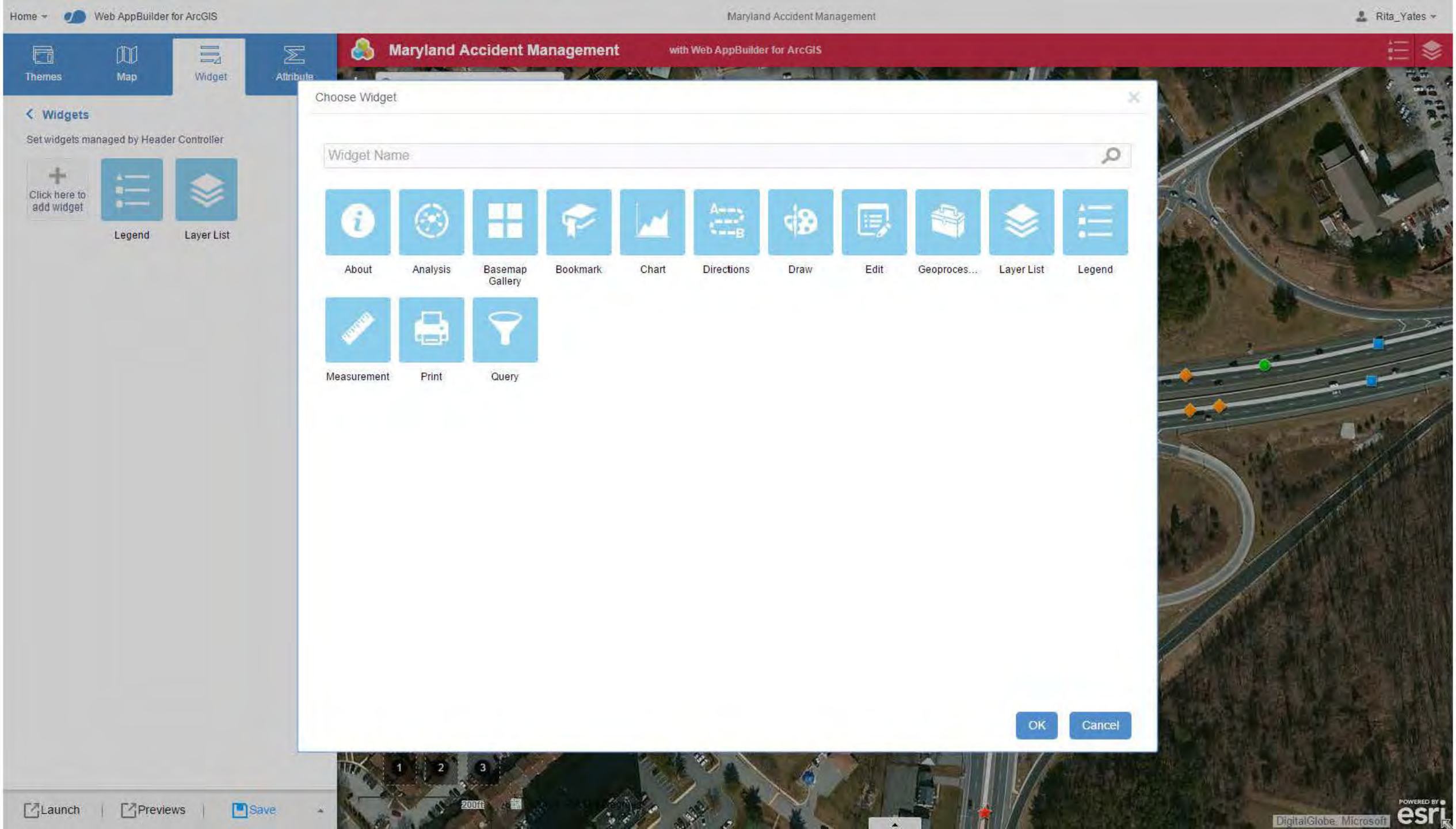
Set widgets managed by Header Controller

Click here to add widget

Legend

Layer List




Home
Web AppBuilder for ArcGIS
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Rita_Yates
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Maryland Accident Management
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Widgets
Set widgets managed by Header Controller
Click here to add widget
Legend
Layer List
Choose Widget
Widget Name
About
Analysis
Basemap Gallery
Bookmark
Chart
Directions
Draw
Edit
Geoproces...
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Legend
Measurement
Print
Query
OK
Cancel
Launch
Previews
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DigitalGlobe, Microsoft
esri

Themes | Map | Widget | Attribute

Maryland Accident Management with Web AppBuilder for ArcGIS

Widgets

Set widgets managed by Header Controller

Click here to add widget

Legend

Layer List

Launch | Previews | Save

Configure Basemap Gallery

Basemap Gallery

change widget icon

Learn more about this widget

Click to Add a New Basemap

Dark Gray Canvas

Imagery

Imagery with Labels

Light Gray Canvas

National Geographic

Oceans

OpenStreetMap

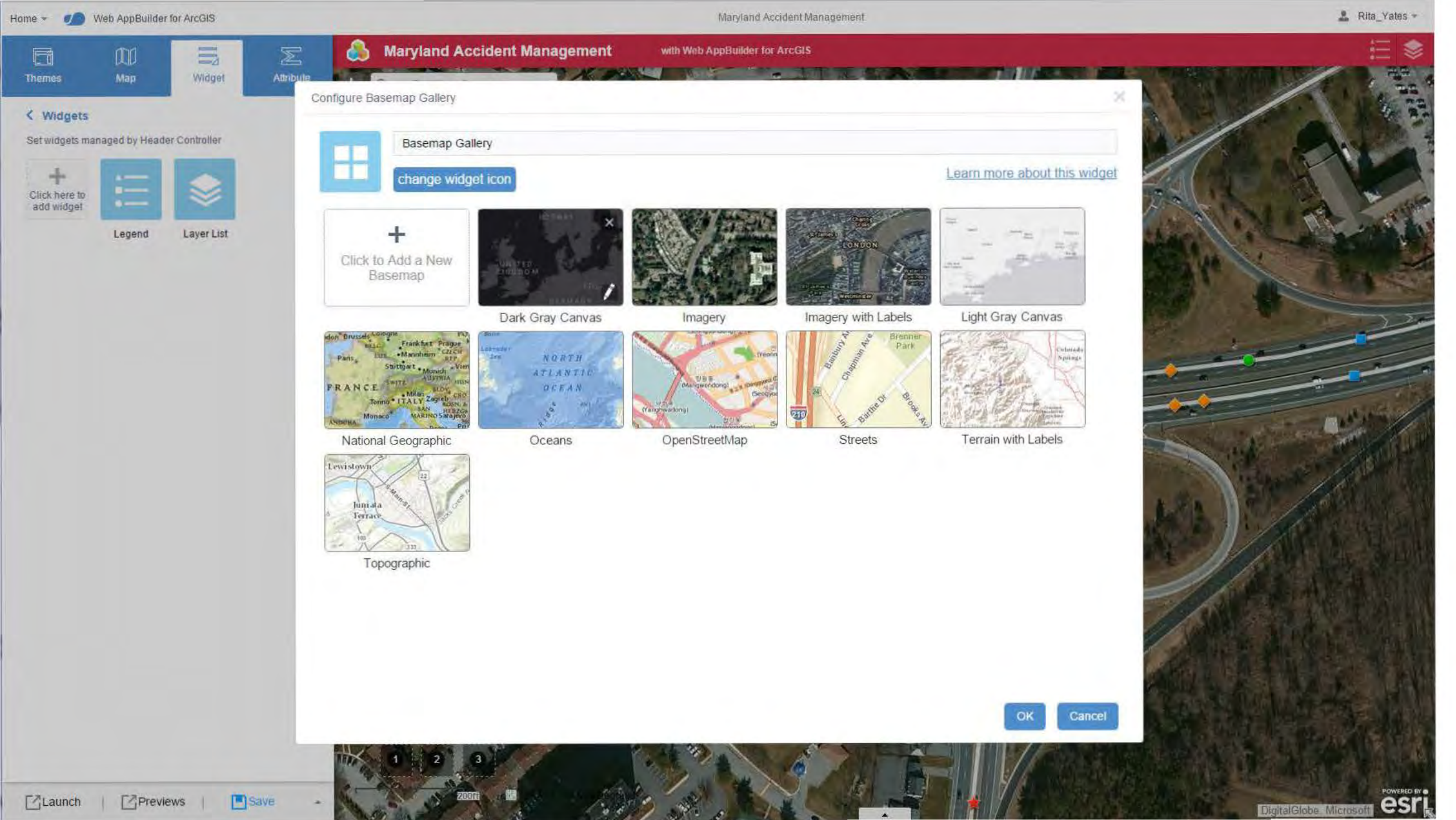
Streets

Terrain with Labels

Topographic

OK

Cancel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Imagery
Imagery with Labels
Light Gray Canvas
National Geographic
Oceans
OpenStreetMap
Streets
Terrain with Labels
Topographic
OK
Cancel
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DigitalGlobe Microsoft
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Themes | Map | Widget | Attribute

Maryland Accident Management with Web AppBuilder for ArcGIS

Widgets

Set widgets managed by Header Controller

Click here to add widget

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Configure Basemap Gallery

Basemap Gallery

change widget icon

Learn more about this widget

Click to Add a New Basemap

Imagery

Imagery with Labels

Streets

Topographic

OK | Cancel

Launch | Previews | Save

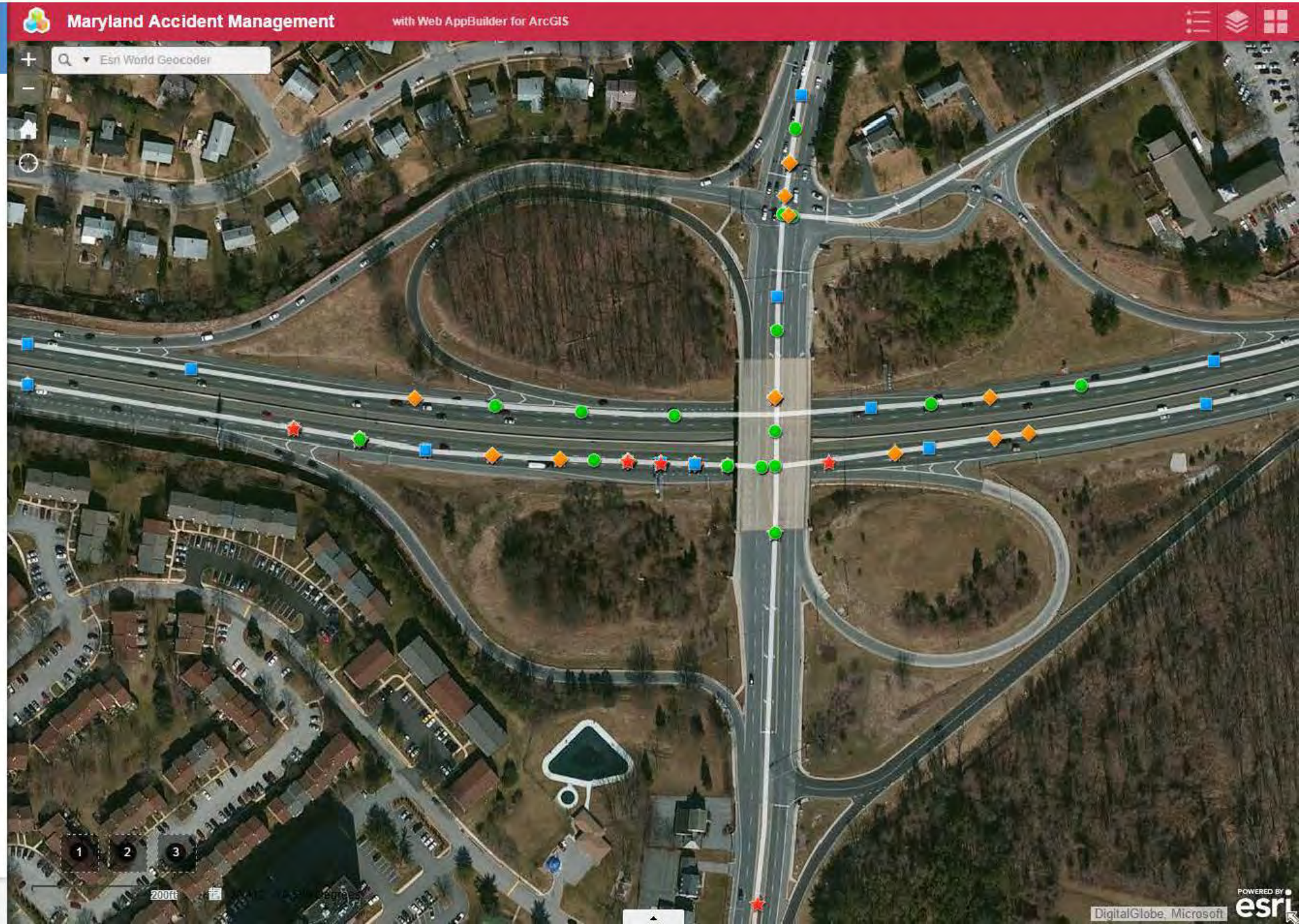
Themes | Map | Widget | Attribute

Widgets

Set widgets managed by Header Controller

Click here to add widget

Legend | Layer List | Basemap Gallery



Launch | Previews | Save

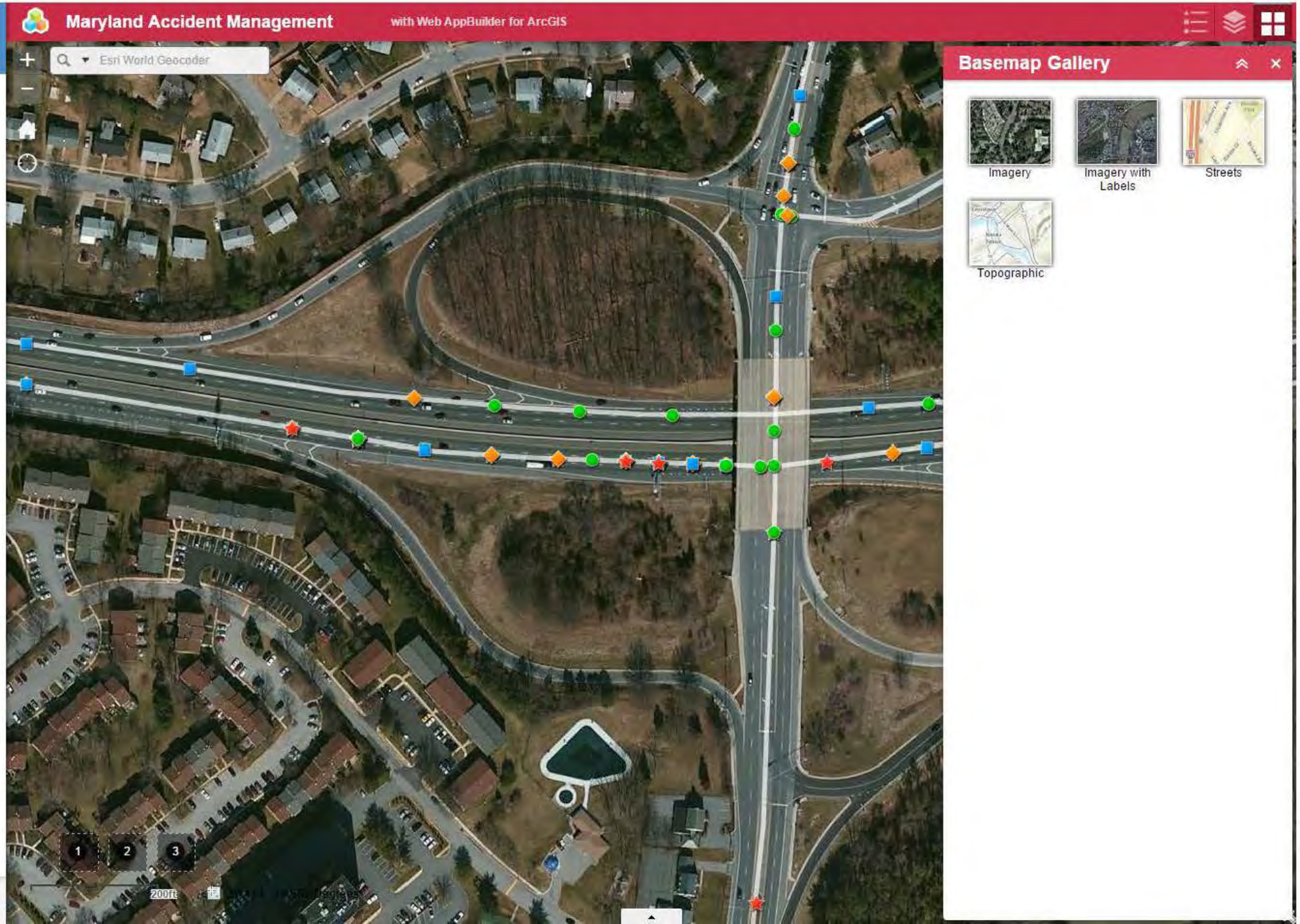
Themes | Map | Widget | Attribute

Widgets

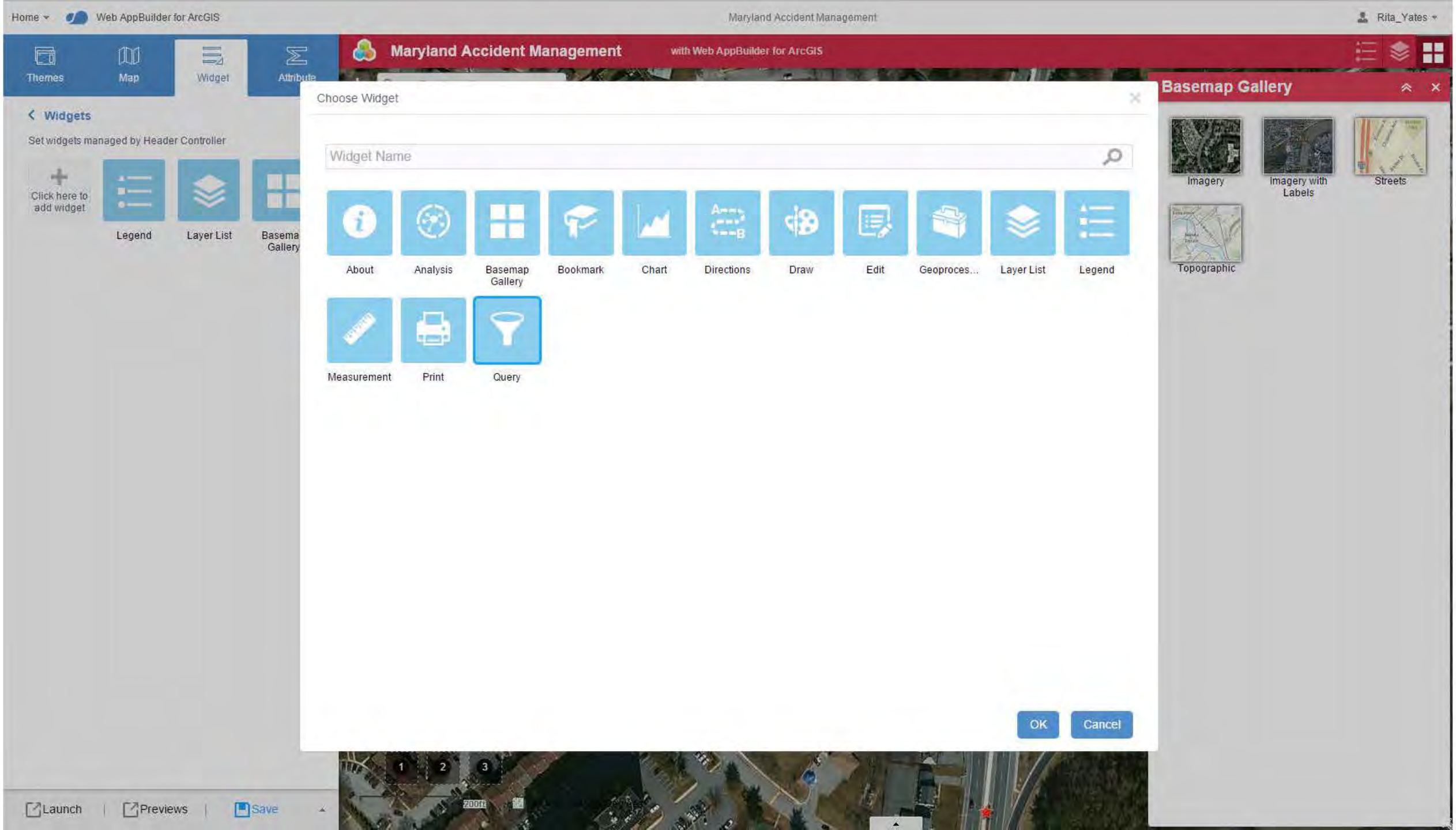
Set widgets managed by Header Controller

Click here to add widget

Legend | Layer List | Basemap Gallery



Launch | Previews | Save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Cancel
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Imagery
Imagery with Labels
Streets
Topographic
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Previews
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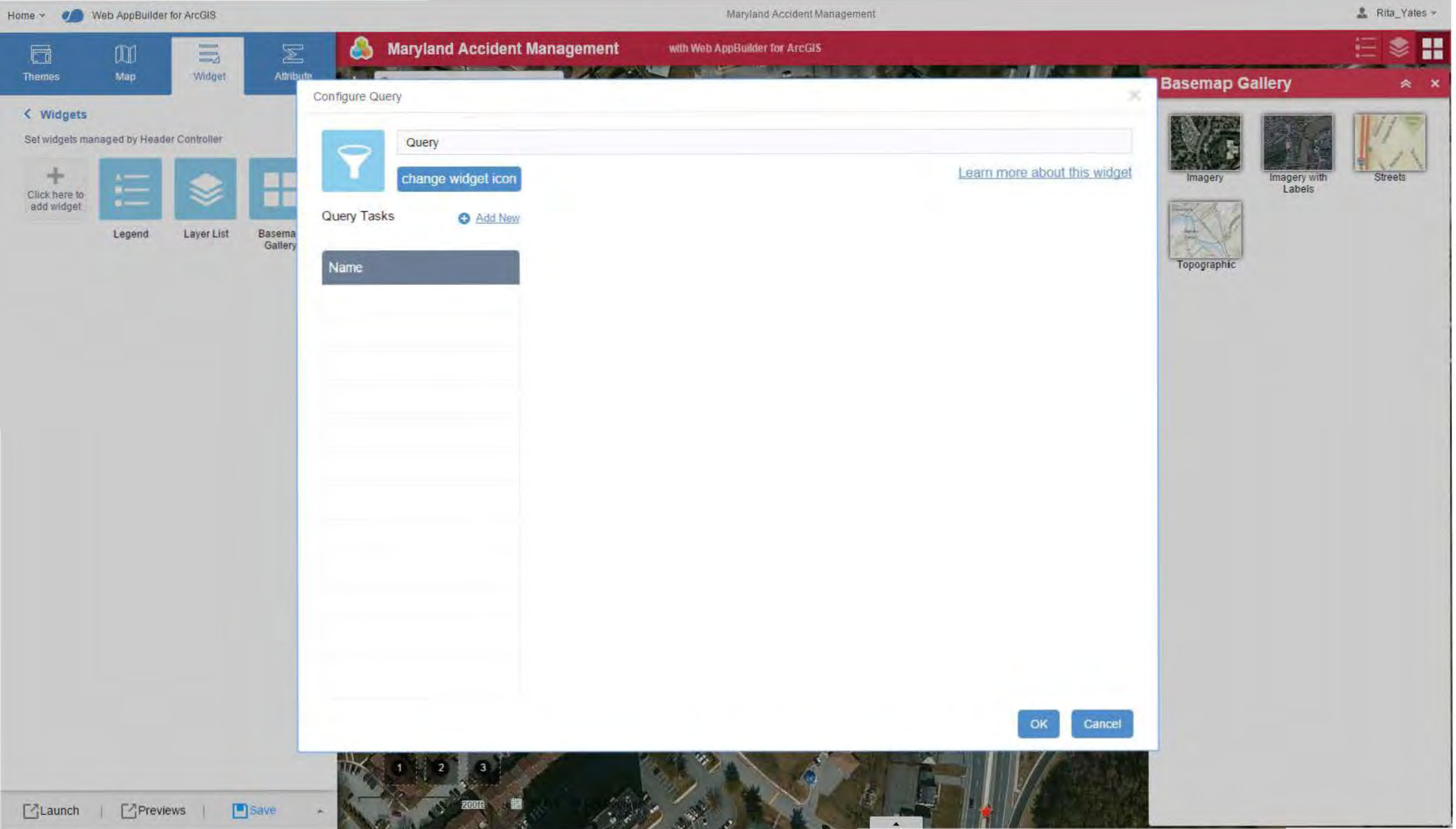
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Set widgets managed by Header Controller
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change widget icon
Learn more about this widget
Query Tasks
Add New
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OK
Cancel
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Imagery with Labels
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Previews
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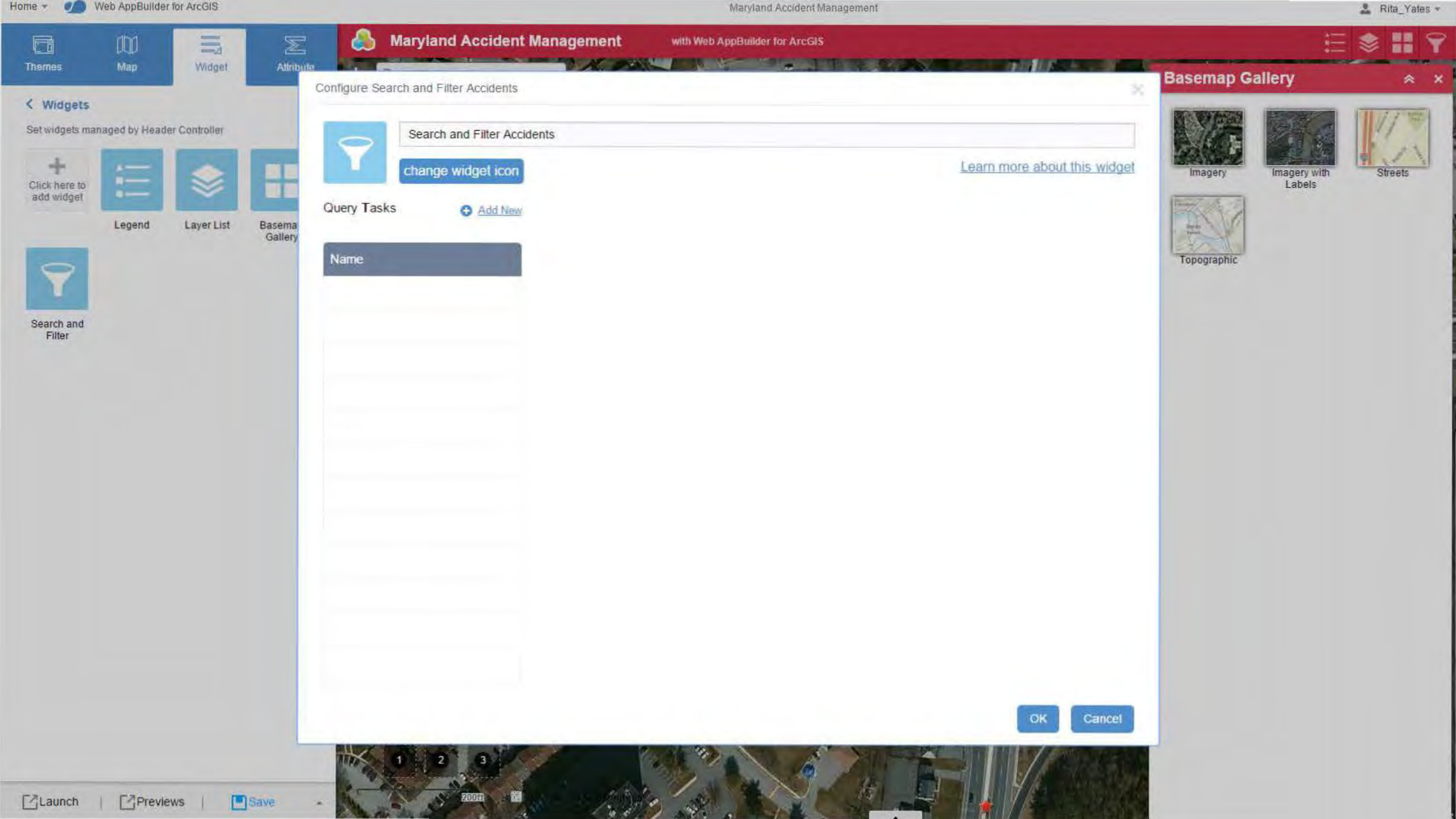
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Click here to add widget
Legend
Layer List
Basema Gallery
Search and Filter
Configure Search and Filter Accidents
Search and Filter Accidents
change widget icon
Learn more about this widget
Query Tasks
Add New
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OK
Cancel
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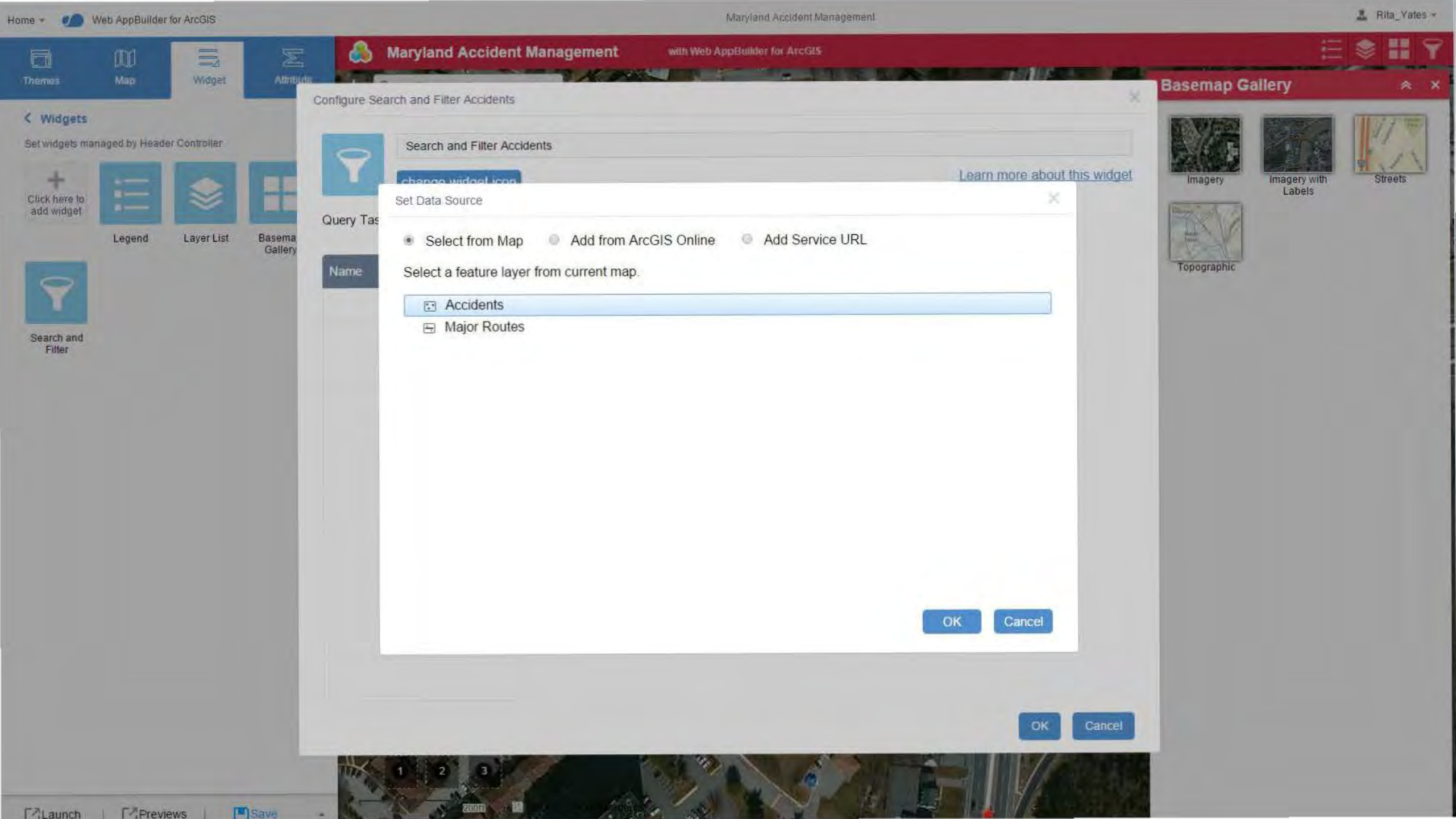
Imagery
Imagery with Labels
Streets
Topographic
Launch
Previews
Save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Click here to add widget
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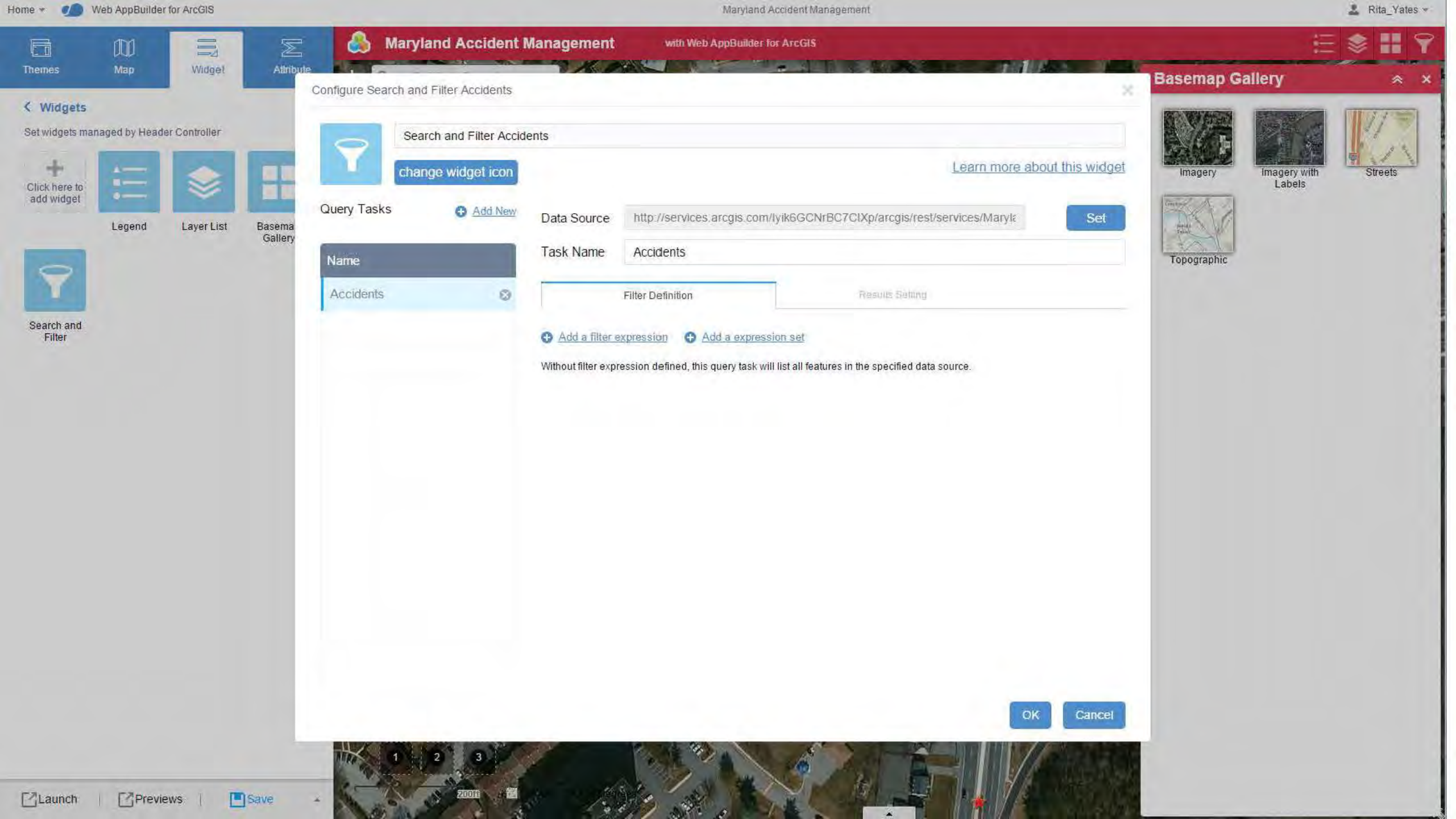
Search and Filter
Launch
Previews
Save
Configure Search and Filter Accidents
Search and Filter Accidents
change widget icon
Learn more about this widget
Query Tas
Name
Set Data Source
Select from Map
Add from ArcGIS Online
Add Service URL
Select a feature layer from current map.
Accidents
Major Routes
OK
Cancel
OK
Cancel
Basemap Gallery
Imagery
Imagery with Labels
Streets
Topographic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Maryland Accident Management
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Set widgets managed by Header Controller
Click here to add widget
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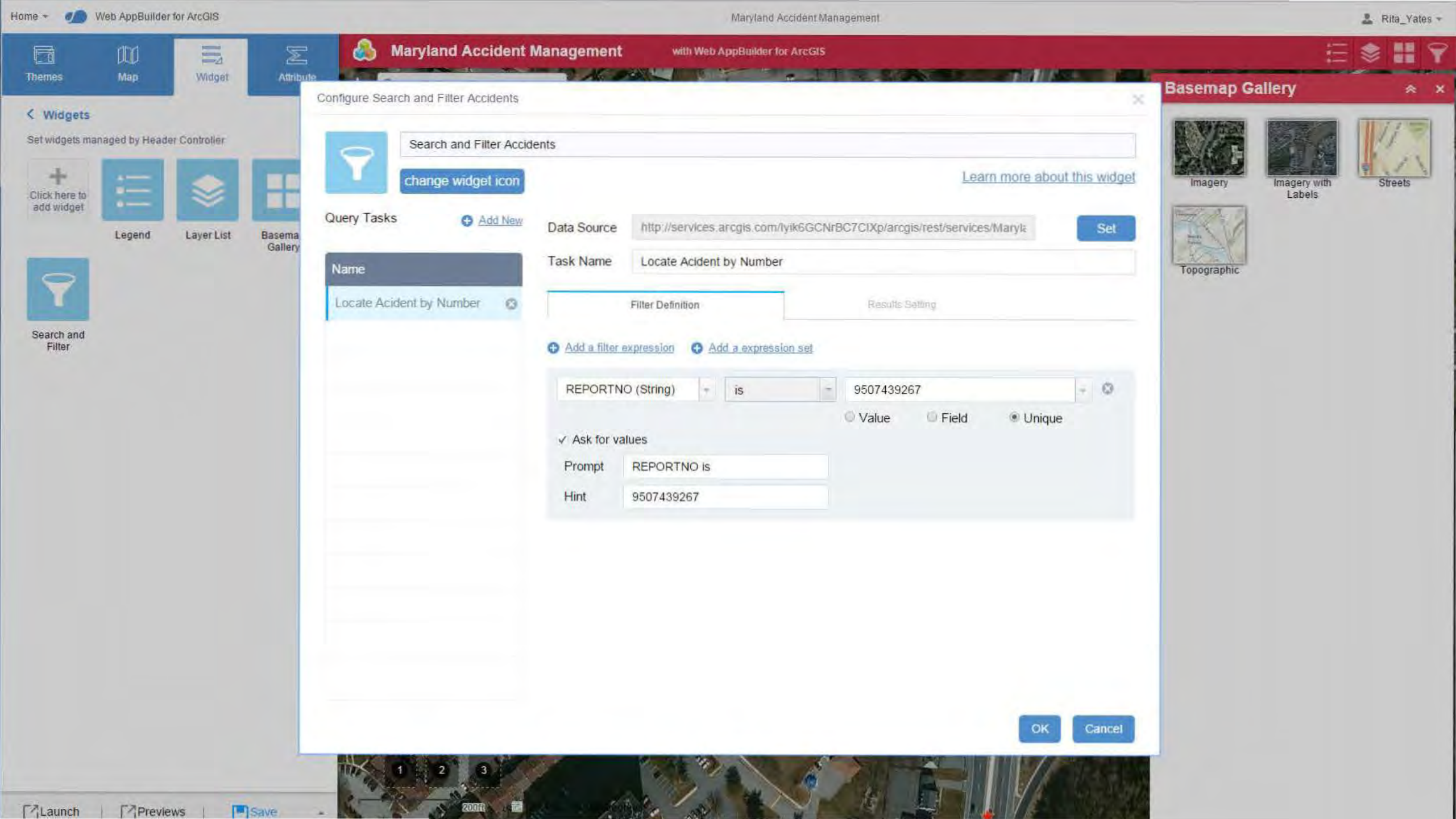
Basema Gallery
Search and Filter
Configure Search and Filter Accidents
Search and Filter Accidents
change widget icon
Learn more about this widget
Query Tasks
Add New
Name
Accidents
Data Source
http://services.arcgis.com/lyik6GCNrBC7CIXp/arcgis/rest/services/Maryl
Set
Task Name
Accidents
Filter Definition
Results Setting
Add a filter expression
Add a expression set
Without filter expression defined, this query task will list all features in the specified data source.
OK
Cancel
Basemap Gallery
Imagery
Imagery with Labels
Streets
Topographic
Launch
Previews
Save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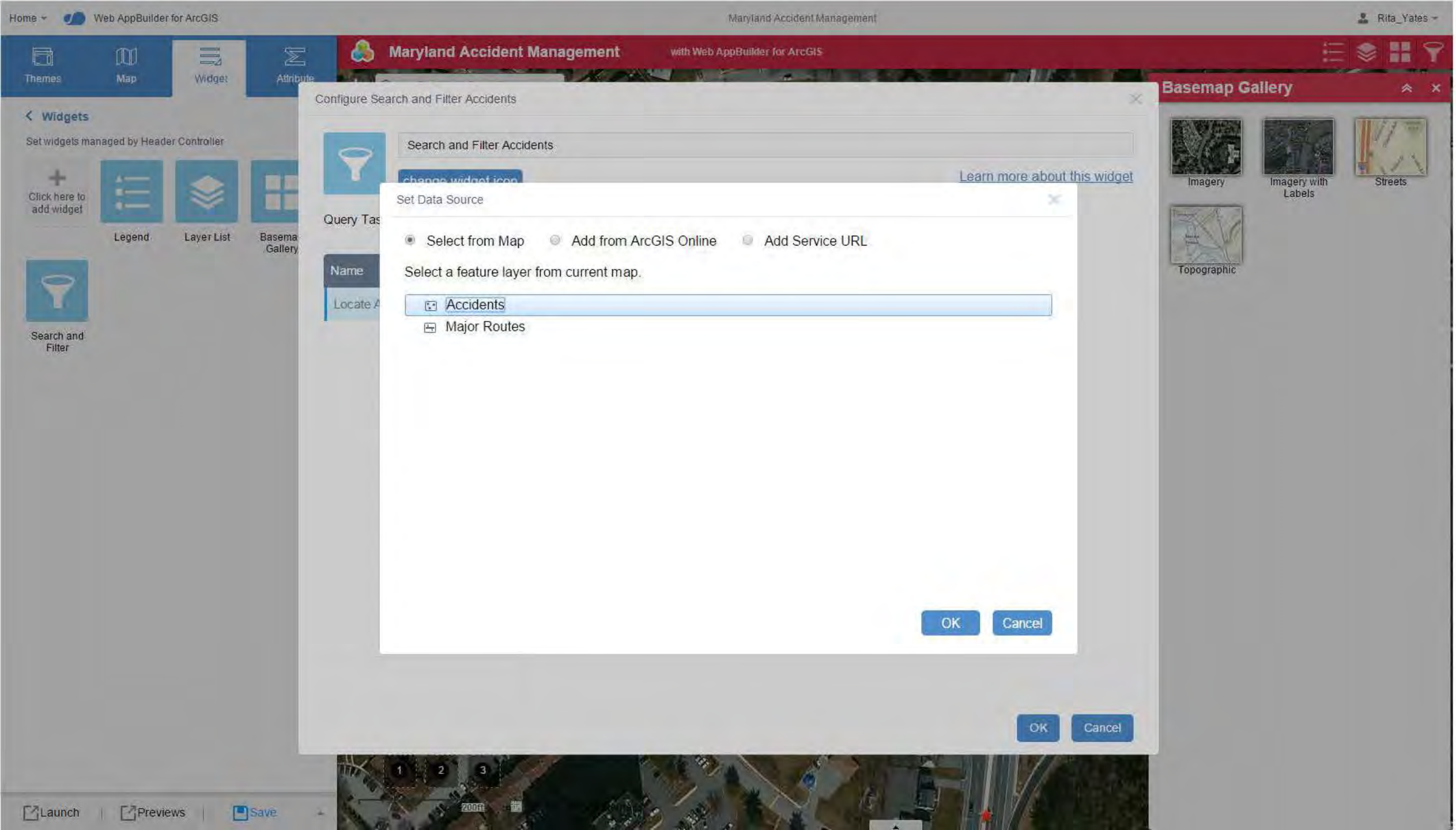
Search and Filter
Configure Search and Filter Accidents
Search and Filter Accidents
change widget icon
Learn more about this widget
Query Tasks
Add New
Name
Locate Acident by Number
Data Source
http://services.arcgis.com/lyik6GCNrBC7CIXp/arcgis/rest/services/Maryl
Set
Task Name
Locate Acident by Number
Filter Definition
Results Setting
Add a filter expression
Add a expression set
REPORTNO (String)
is
9507439267
Value
Field
Unique
Ask for values
Prompt
REPORTNO is
Hint
9507439267
OK
Cancel
Basemap Gallery
Imagery
Imagery with Labels
Streets
Topographic
Launch
Previews
Save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Search and Filter Accidents
change widget icon
Learn more about this widget
Query Tas
Name
Locate A
Set Data Source
Select from Map
Add from ArcGIS Online
Add Service URL
Select a feature layer from current map.
Accidents
Major Routes
OK
Cancel
OK
Cancel
Basemap Gallery
Imagery
Imagery with Labels
Streets
Topographic
Launch
Previews
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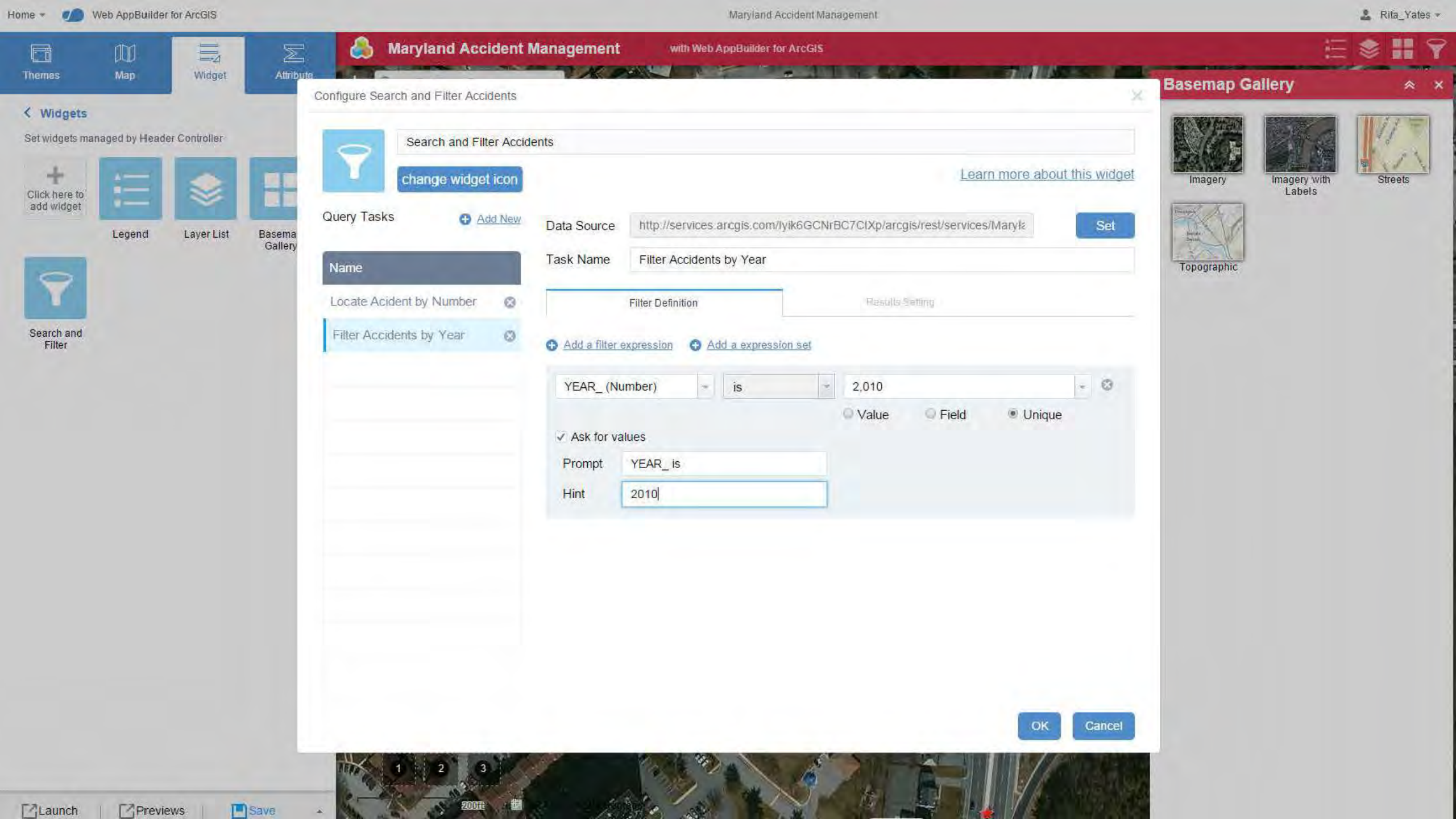
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Set widgets managed by Header Controller
Click here to add widget
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Configure Search and Filter Accidents
Search and Filter Accidents
change widget icon
Learn more about this widget
Query Tasks
Add New
Name
Locate Acident by Number
Filter Accidents by Year
Data Source
http://services.arcgis.com/lyik6GCNrBC7ClXp/arcgis/rest/services/Maryl
Set
Task Name
Filter Accidents by Year
Filter Definition
Results Setting
Add a filter expression
Add a expression set
YEAR_ (Number)
is
2,010
Value
Field
Unique
Ask for values
Prompt
YEAR_ is
Hint
2010
OK
Cancel
Basemap Gallery
Imagery
Imagery with Labels
Streets
Topographic
Launch
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Themes | Map | Widget | Attribute

Widgets

Set widgets managed by Header Controller

Click here to add widget

Legend | Layer List | Basemap Gallery

Search and Filter

Launch | Previews | Save

Maryland Accident Management

with Web AppBuilder for ArcGIS

Esri World Geocoder

Search and Filter Accidents

Click one of the following task items to execute the query.

- Locate Acident by Number
- Filter Accidents by Year

Clear Results

1 2 3

200ft

Themes | Map | Widget | Attribute

Widgets

Set widgets managed by Header Controller

Click here to add widget

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Layer List

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Search and Filter

Launch | Previews | Save

Maryland Accident Management

with Web AppBuilder for ArcGIS

Esri World Geocoder

1 2 3

200ft

Search and Filter Accidents

QUERIES | Options | APPLY

Specify parameters for this task :

REPORTNO is 9507439267

Use spatial filter to limit features

Add result as operational layer

With this option checked, results will be kept on the map until the "Clear Results" button clicked

Clear Results

Themes | Map | Widget | Attribute

Set the widgets in this controller

Header Controller

Attribute Table | Coordinate | Geocoder | Home Button

My Location | Overview Map | Scalebar | Splash

Swipe | Time Slider | Widget | Widget

Widget

Launch | Previews | Save

Maryland Accident Management

with Web AppBuilder for ArcGIS

Esri World Geocoder

Search and Filter Accidents

QUERIES | Options | APPLY

Specify parameters for this task :

REPORTNO is 9507439267

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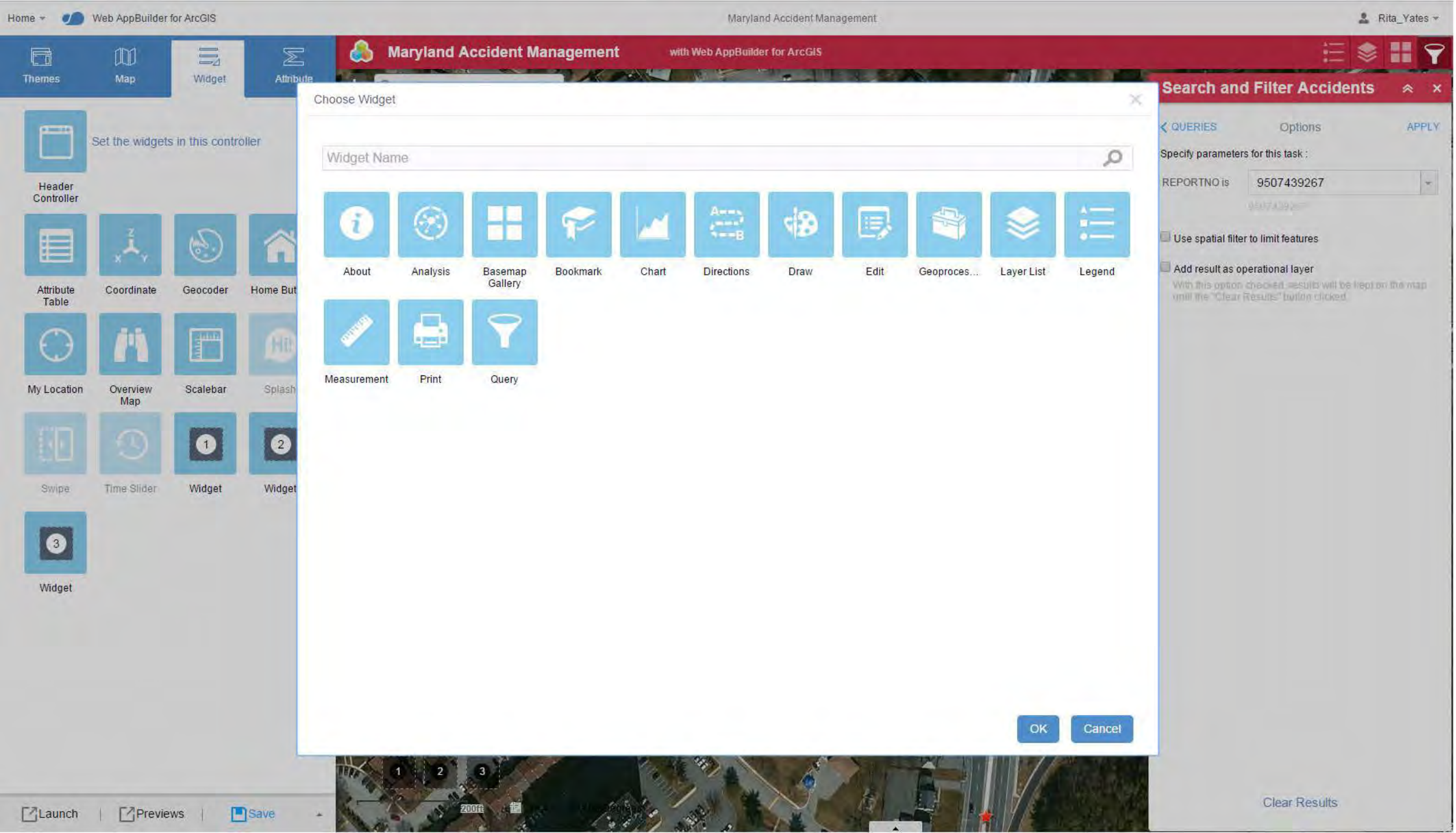
Add result as operational layer

With this option checked, results will be kept on the map until the "Clear Results" button clicked

Clear Results


Home
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Search and Filter Accidents
Choose Widget
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Splash
Measurement
Print
Query
Swipe
Time Slider
Widget
Widget
Widget
OK
Cancel
QUERIES
Options
APPLY
Specify parameters for this task :
REPORTNO is
9507439267
Use spatial filter to limit features
Add result as operational layer
With this option checked, results will be kept on the map until the "Clear Results" button clicked.
Clear Results
Launch
Previews
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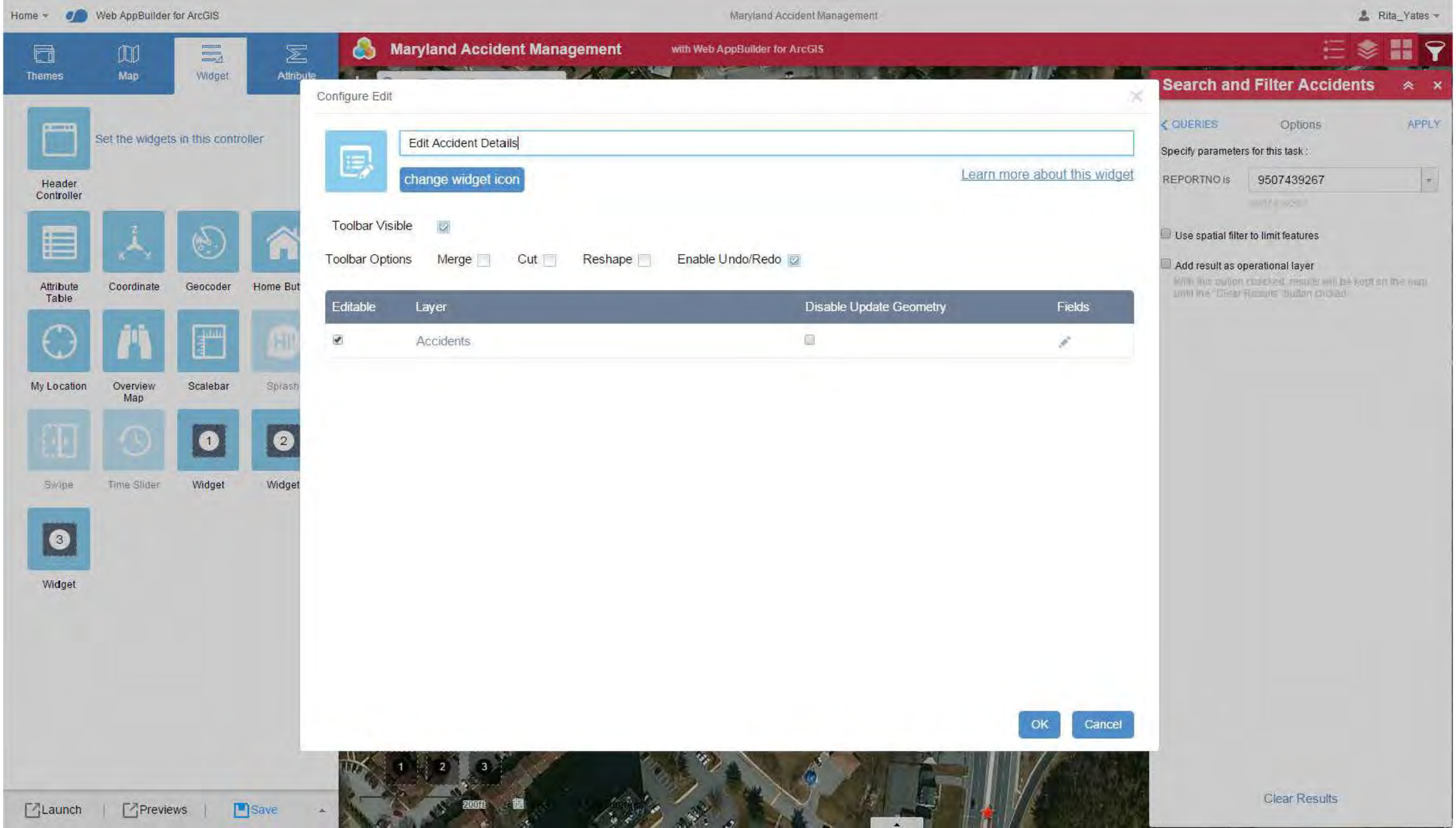
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Learn more about this widget
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Toolbar Options
Merge
Cut
Reshape
Enable Undo/Redo
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OK
Cancel
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Options
APPLY
Specify parameters for this task :
REPORTNO is
9507439267
Use spatial filter to limit features
Add result as operational layer
Clear Results
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Previews
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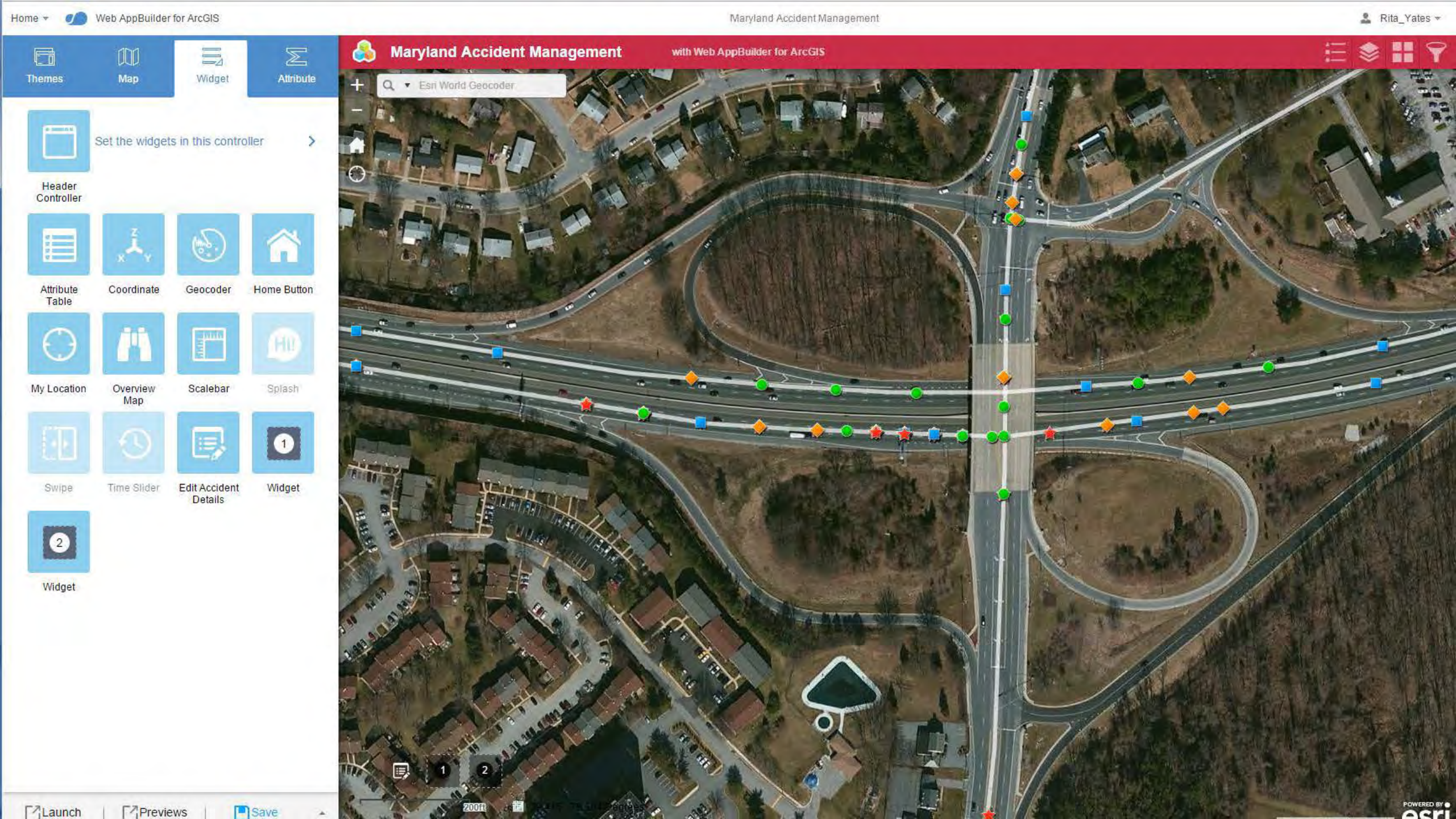
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Maryland Accident Management
with Web AppBuilder for ArcGIS
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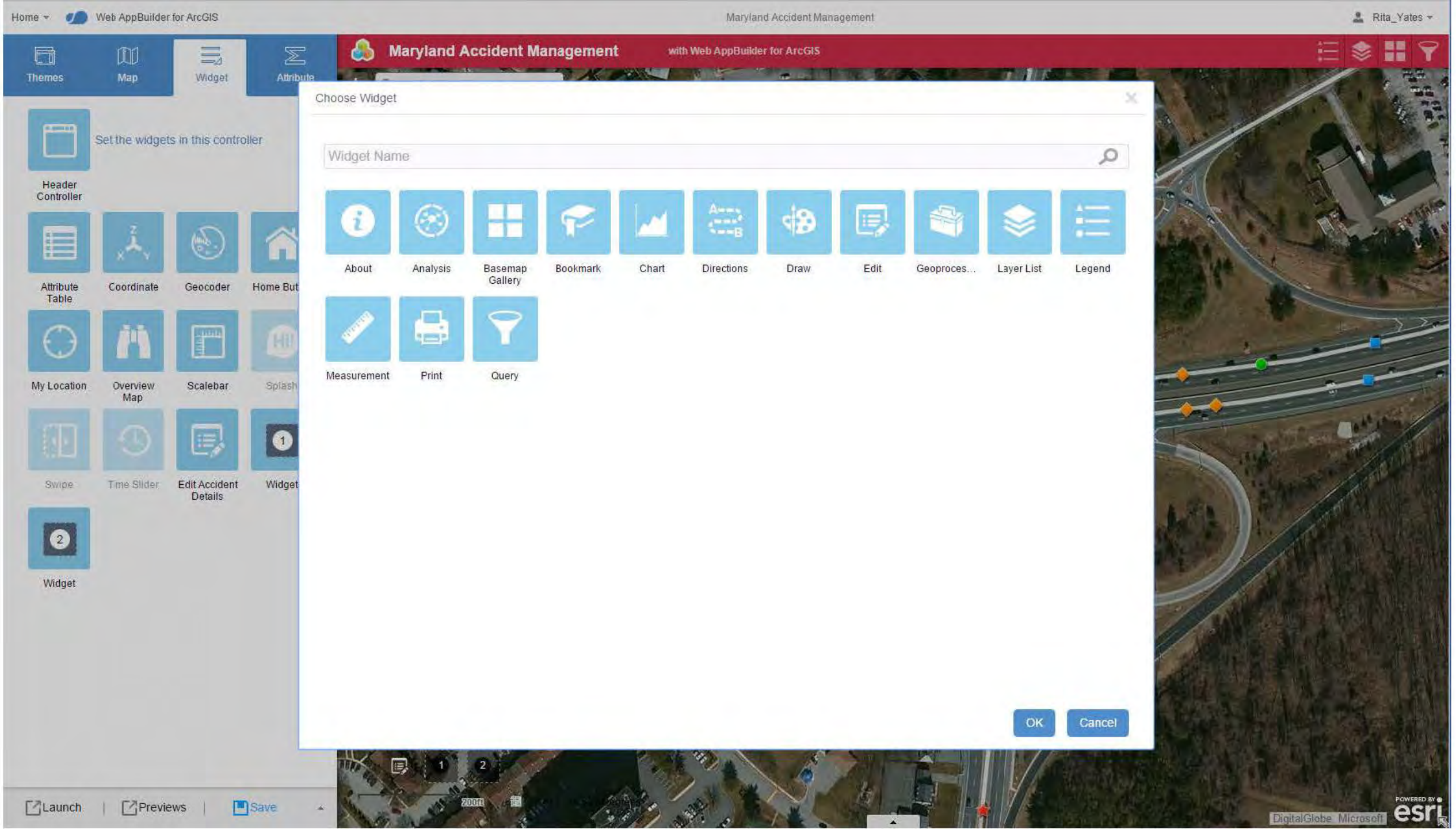
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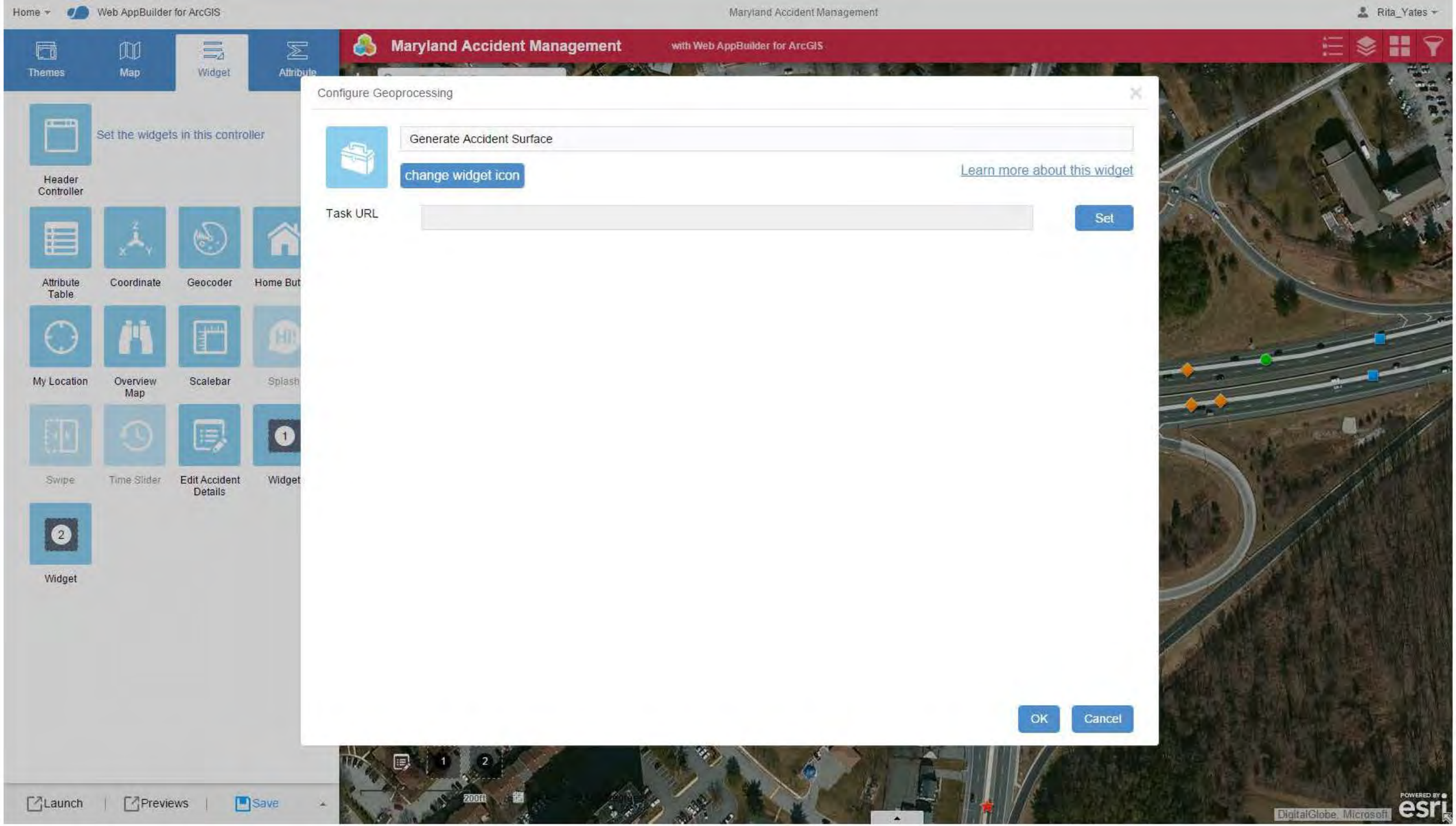
200ft
DigitalGlobe Microsoft
POWERED BY esri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Generate Accident Surface
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Learn more about this widget
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DigitalGlobe, Microsoft
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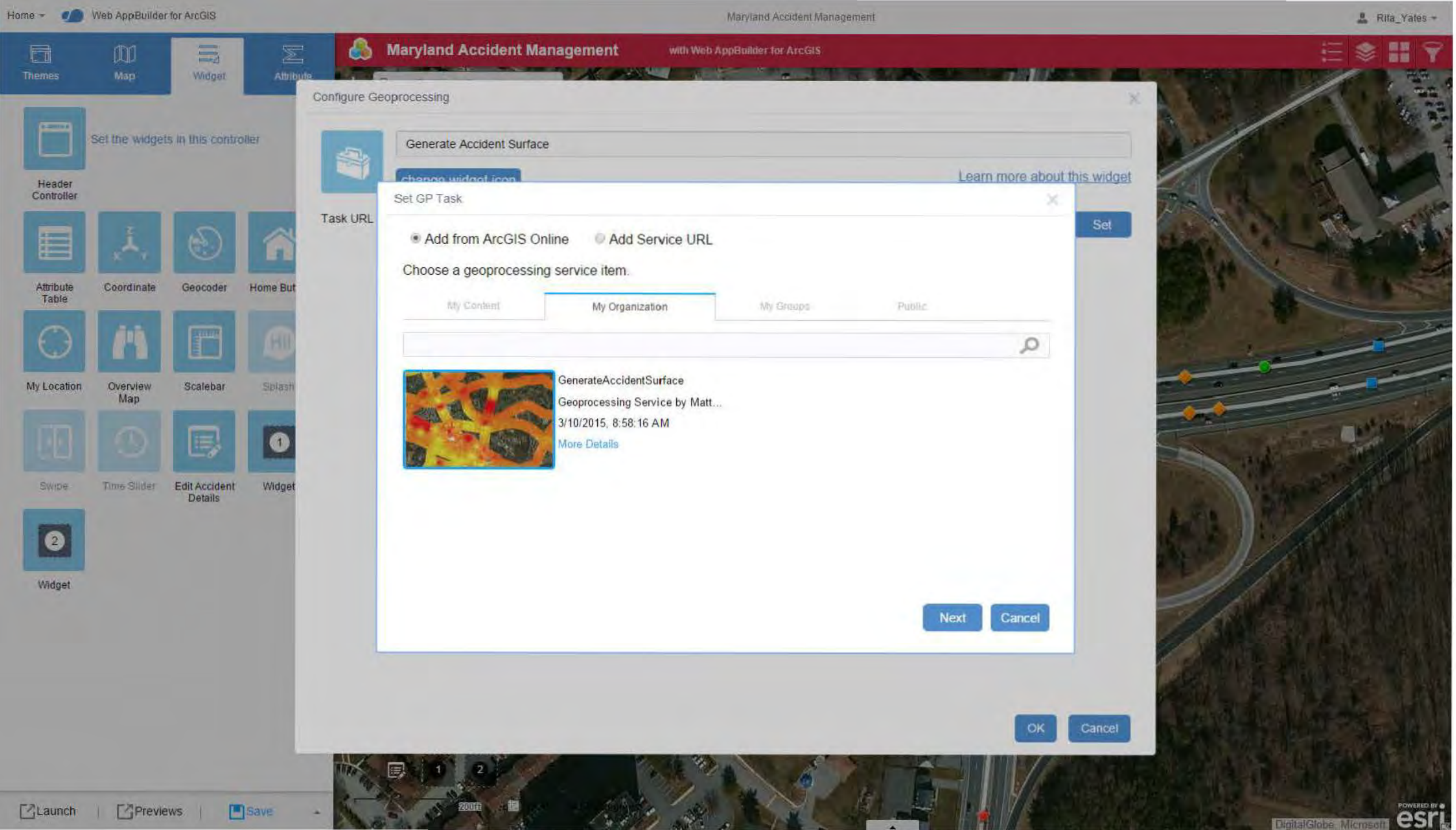
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My Location
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Scalebar
Splash
Swipe
Time Slider
Edit Accident Details
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Configure Geoprocessing
Generate Accident Surface
change widget icon
Learn more about this widget
Task URL
Set
Set GP Task
Add from ArcGIS Online
Add Service URL
Choose a geoprocessing service item.
My Content
My Organization
My Groups
Public
GenerateAccidentSurface
Geoprocessing Service by Matt...
3/10/2015, 8:58:16 AM
More Details
Next
Cancel
OK
Cancel
Launch
Previews
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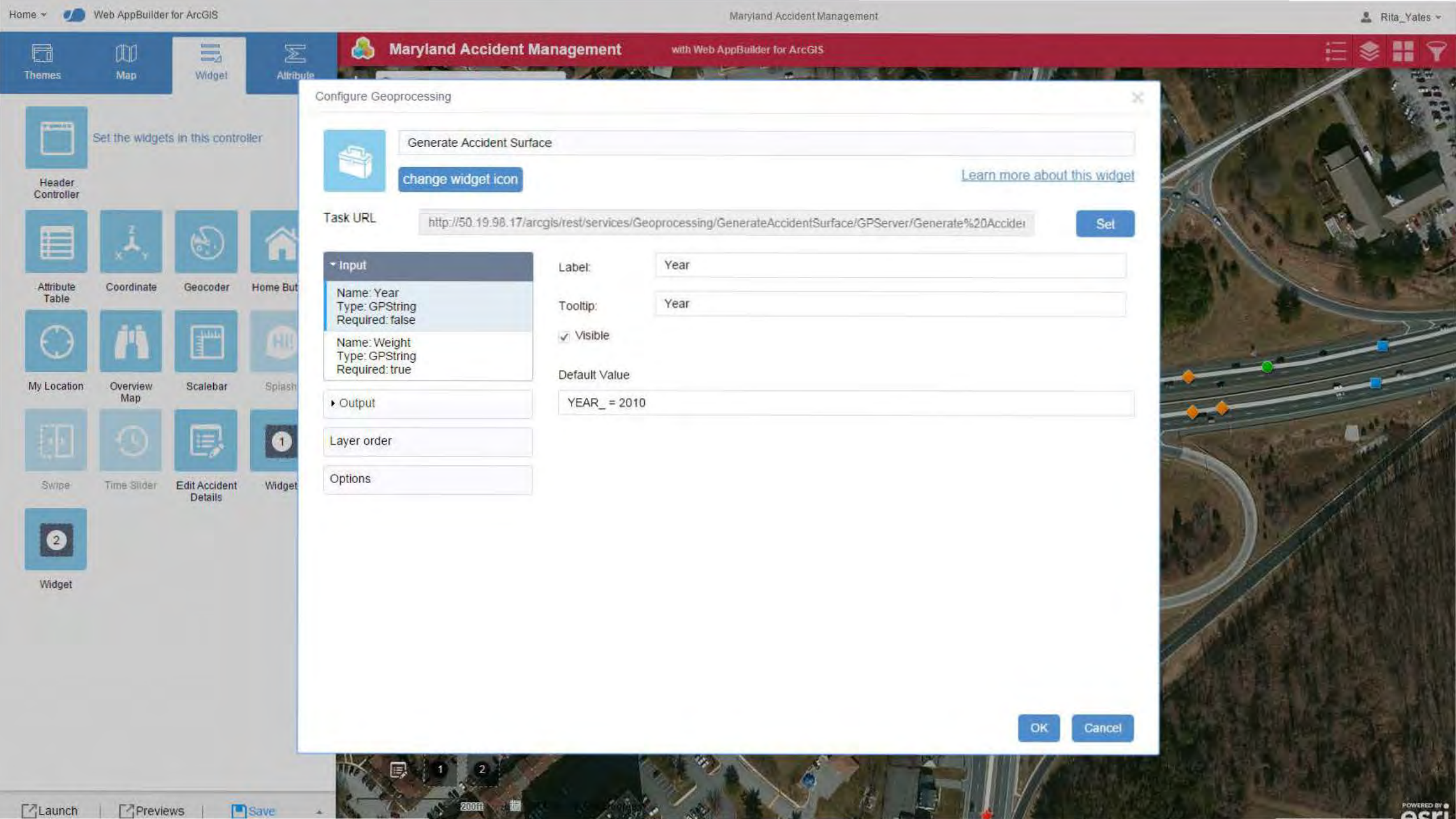
200ft
DigitalGlobe, Microsoft
esri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Home But
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Overview Map
Scalebar
Splash
Swipe
Time Slider
Edit Accident Details
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Widget
Launch
Previews
Save
Configure Geoprocessing
Generate Accident Surface
change widget icon
Learn more about this widget
Task URL
http://50.19.98.17/arcgis/rest/services/Geoprocessing/GenerateAccidentSurface/GPServer/Generate%20Accide
Set
Input
Name: Year
Type: GPString
Required: false
Name: Weight
Type: GPString
Required: true
Output
Layer order
Options
Label:
Year
Tooltip:
Year
Visible
Default Value
YEAR_ = 2010
OK
Cancel
200ft

Themes | Map | Widget | Attribute

Set the widgets in this controller

Header Controller

Attribute Table | Coordinate | Geocoder | Home Button

My Location | Overview Map | Scalebar | Splash

Swipe | Time Slider | Edit Accident Details | Generate Accident

Widget

Launch | Previews | Save

Maryland Accident Management

with Web AppBuilder for ArcGIS

Esri World Geocoder

Generate Accident Surface

Input | Output

Year

YEAR_ = 2010

Weight*

DOC_INJR

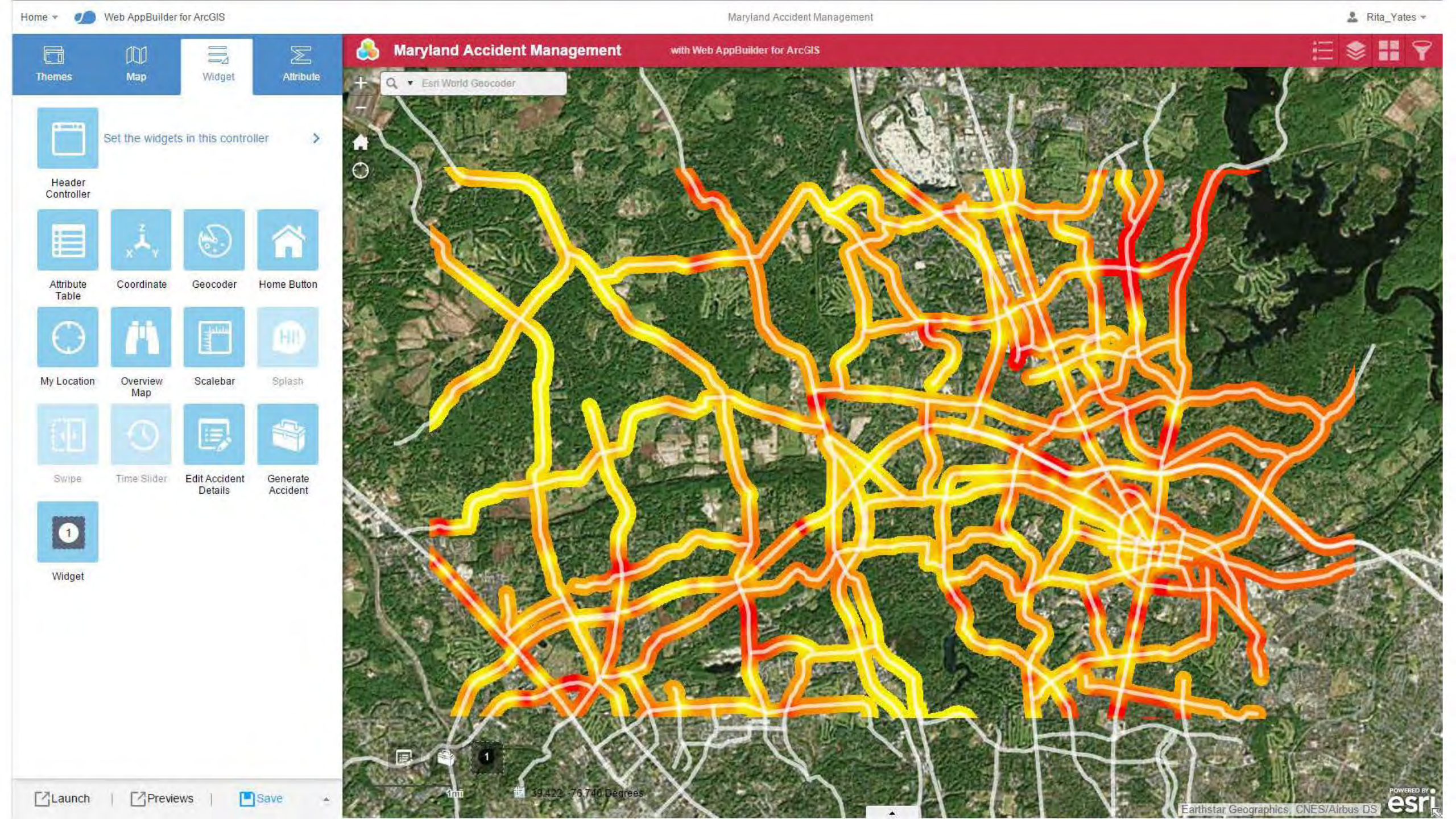
Help

Execute

200ft

DigitalGlobe, Microsoft

POWERED BY esri


Home
Web AppBuilder for ArcGIS
Maryland Accident Management
Rita_Yates
Themes
Map
Widget
Attribute
Set the widgets in this controller
Header Controller
Attribute Table
Coordinate
Geocoder
Home Button
My Location
Overview Map
Scalebar
Splash
Swipe
Time Slider
Edit Accident Details
Generate Accident
Widget
Launch
Previews
Save
Maryland Accident Management
with Web AppBuilder for ArcGIS
Esri World Geocoder
1mi
39.422 -76.740 Degrees
Earthstar Geographics, CNES/Airbus DS
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Themes | Map | Widget | Attribute

Branding

Add logo, title, or subtitle for your app.

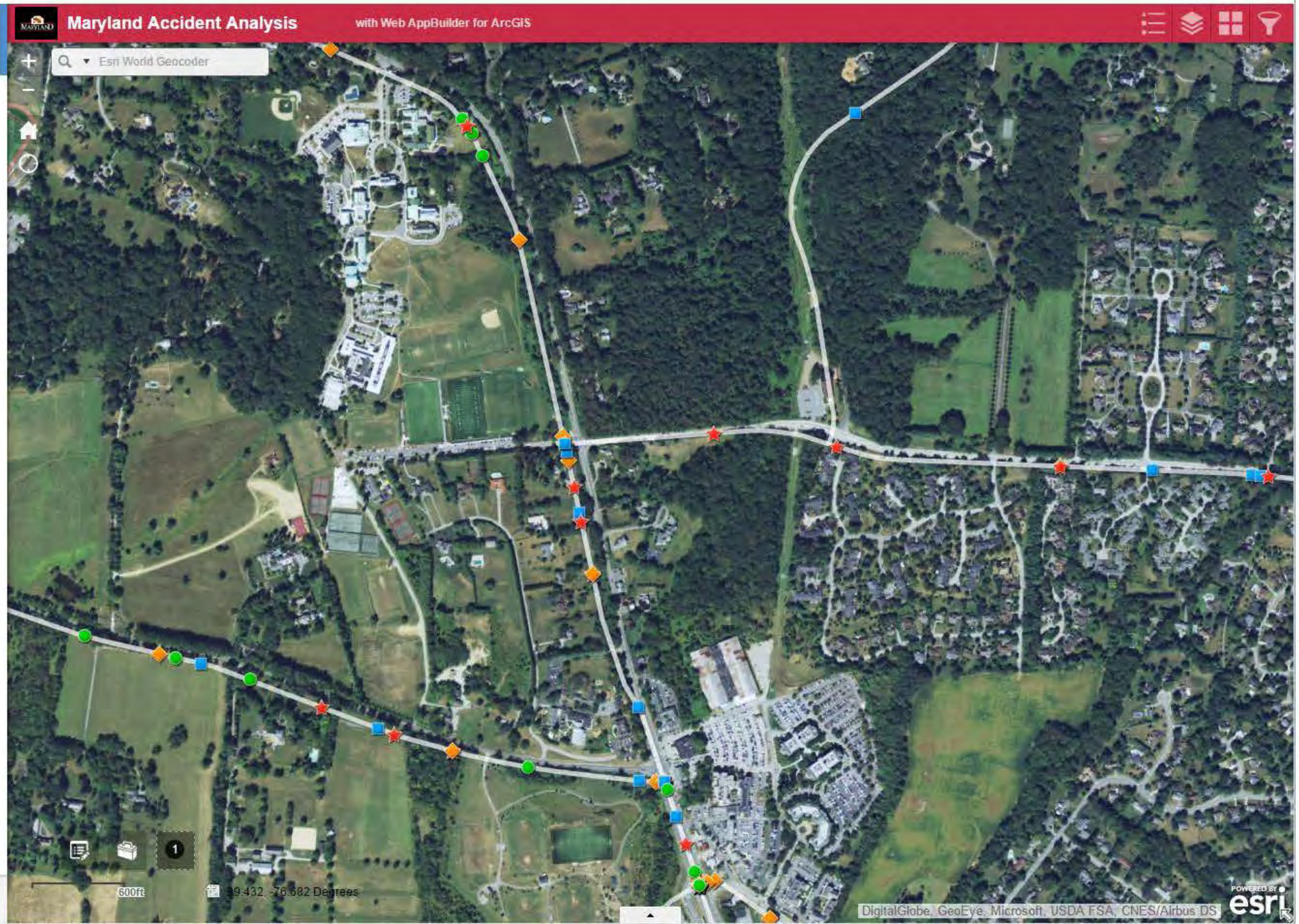
Maryland Accident Analysis

with Web AppBuilder for ArcGIS

Links

Add New Link | Edit | Delete

Launch | Previews | Save



Width 1024 Px Height 768 Px

iPhone6 | iPhone6 plus | iPhone5/5C/5S | iPhone4/4S

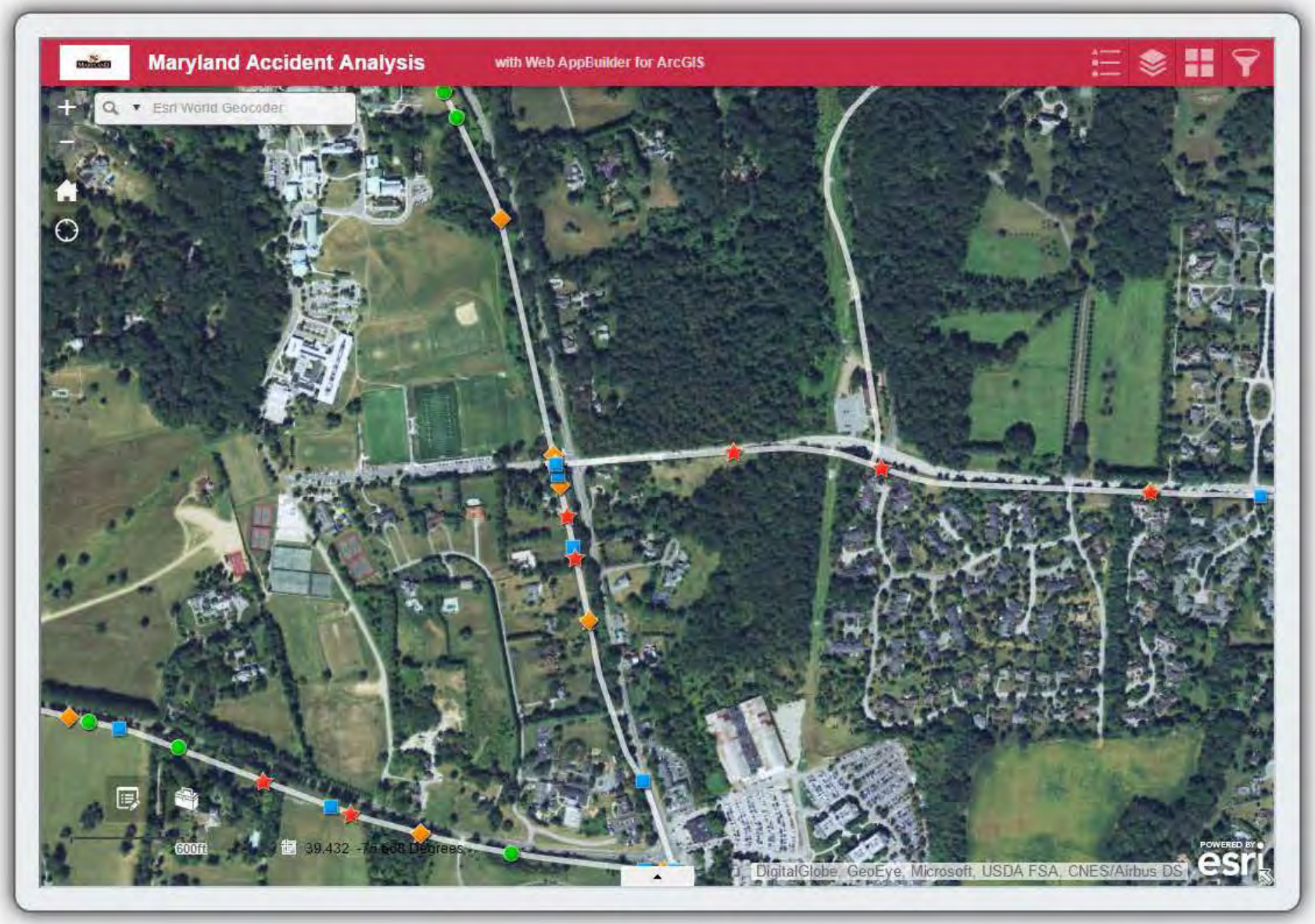
iPad Air | iPad with Retina Display | The New iPad | iPad Mini

Samsung Galaxy S4 | Samsung Note 3 | Nexus 5 | Nexus 4

Nexus 7 | HTC One | Xiaomi 3 | LG G2

Scan QR code to view application on your mobile device

Launch | Configure | Save



Width 375 Px Height 667 Px

iPhone6 | iPhone6 plus | iPhone5/5C/5S | iPhone4/4S

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iPhone6 375 x 667

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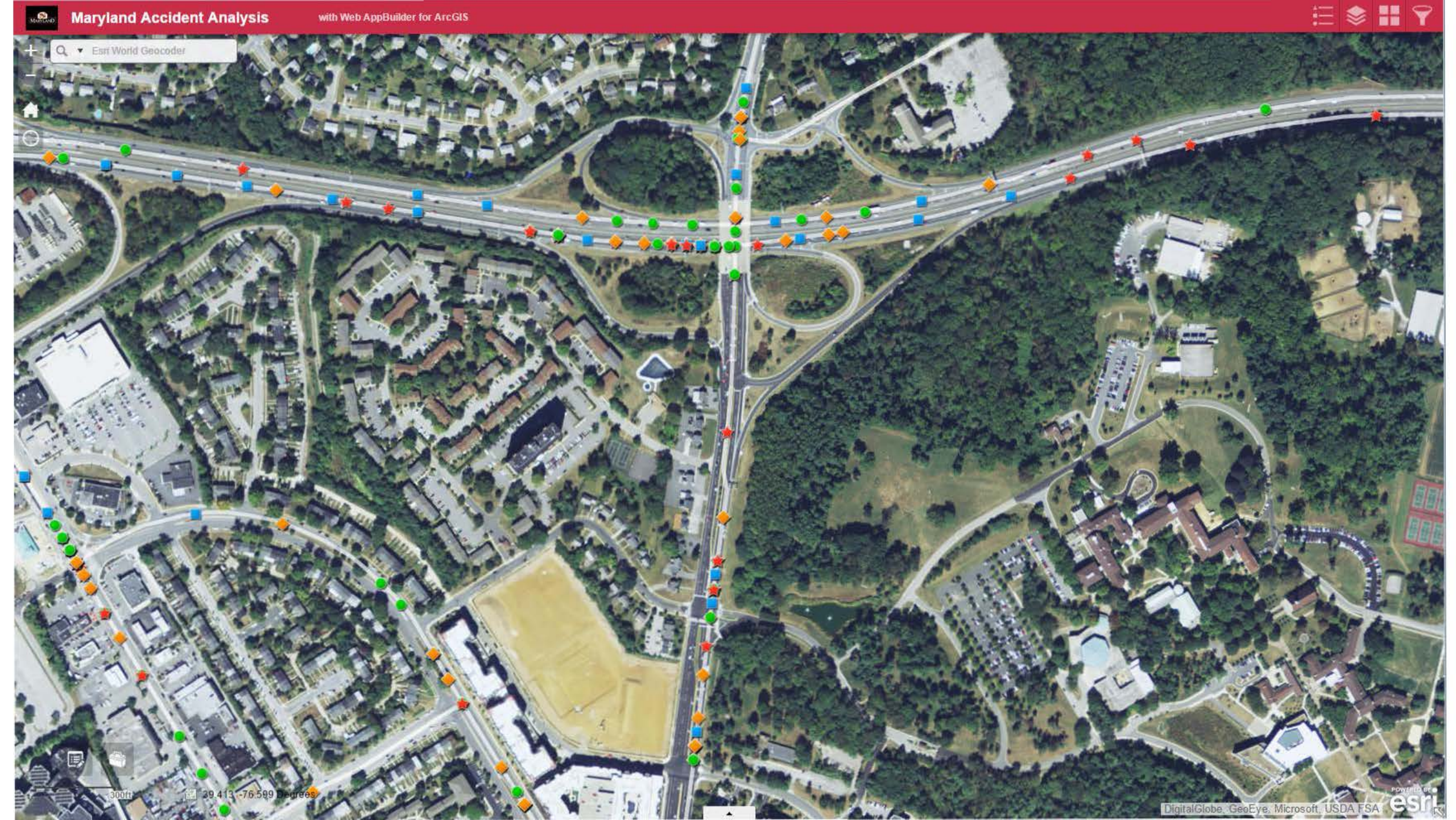
Maryland Accident Analysis
with Web AppBuilder for ArcGIS
Esri World Geocoder
300ft
29.413 -76.599 Degrees
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