Flood Impact Analysis

A preview of the ArcGIS Pro Solution Template

Gert van Maren

Floods are the most common natural disaster in the United States. Failing to evacuate flooded areas, entering flood waters, or remaining after a flood has passed can result in injury or death.

Source: U.S. Department of Homeland Security, Ready.gov

Issues in Flood Planning

Many communities don't have a systematic process to analyze the potential impact of flood events on critical assets

- Lack of predictive modeling capabilities to help create a flood response plan
- Ineffective methods of communicating flood impact severity to stakeholders
- Difficulty of getting useful flood depth data during the event causes information latency
- Lack of actionable information results in chaotic response
- Reactive approach costs lives and results in severe economic impact
- Difficulty in securing funding for flood mitigation projects due to inadequate flood impact analysis

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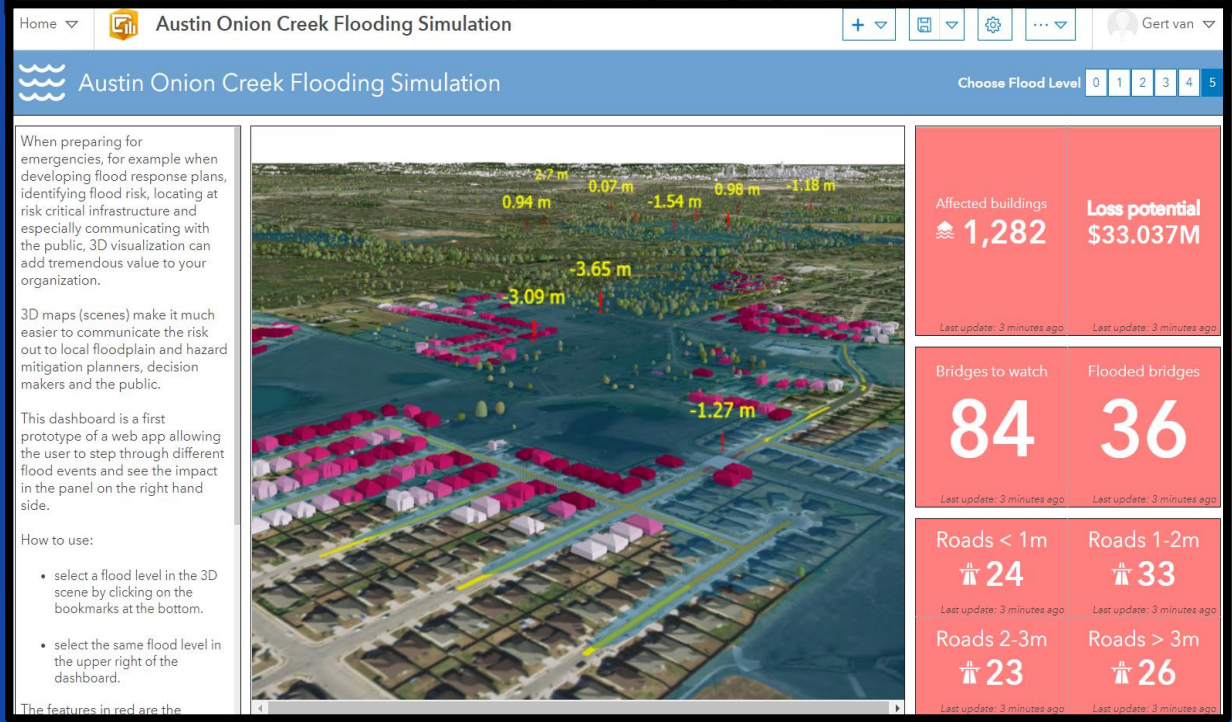
Flood Impact Analysis

ArcGIS Pro template for analyzing and visualizing flood impact

- Better understand flood impact
- Make it easier to communicate flood risk

"3D analysis of bridges, roads and low water crossings is a critical piece to our capacity to provide information that will save lives in the future."

David Maidment
The University of Texas at Austin



Why Water Depth Matters

~1 Foot

Response focused on those who need additional assistance

~3 Feet

Near the limit to use High Profile Vehicles to perform high water rescues

~6 Feet

Boats and helicopters now required to perform high water rescues

~9 Feet

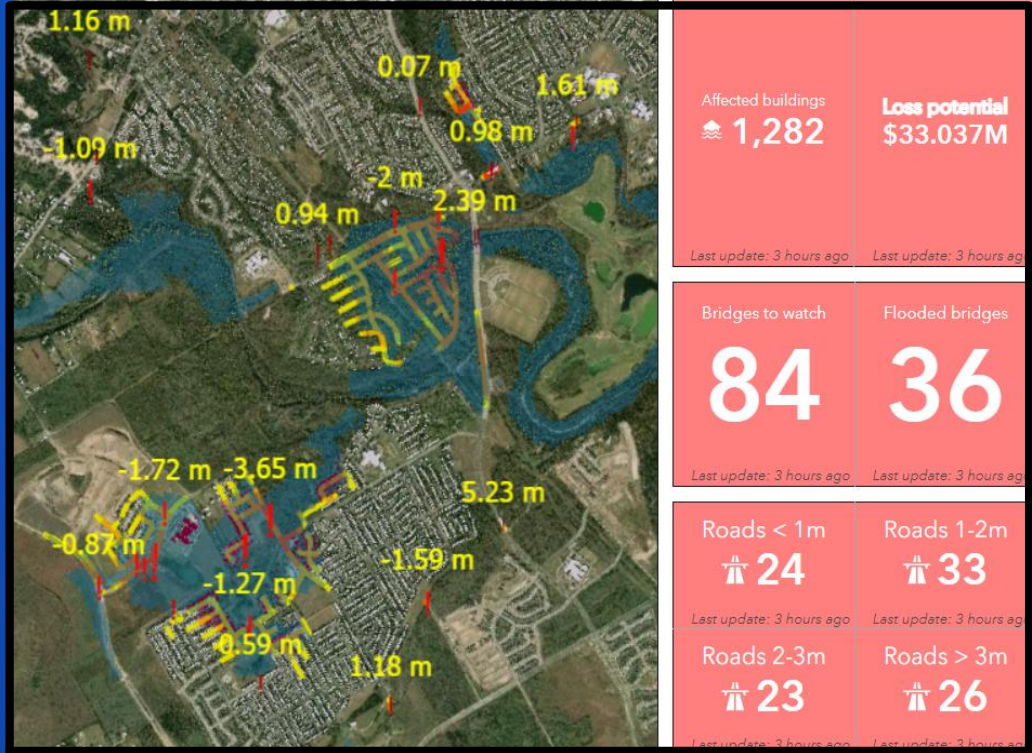
1st Floors completely inundated

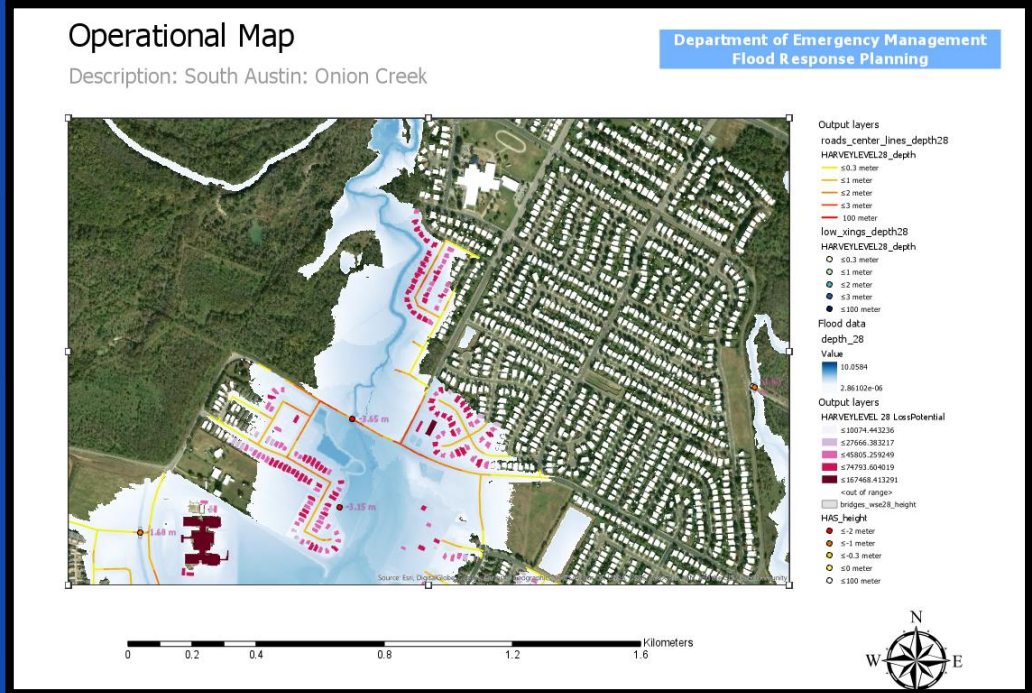
"How many helicopters, boats, and high profile vehicles and where to send them"
– Texas State Operations Center

National Weather Service's West Gulf River Forecast Center in Fort Worth Texas

How can it be used in Flood Planning?

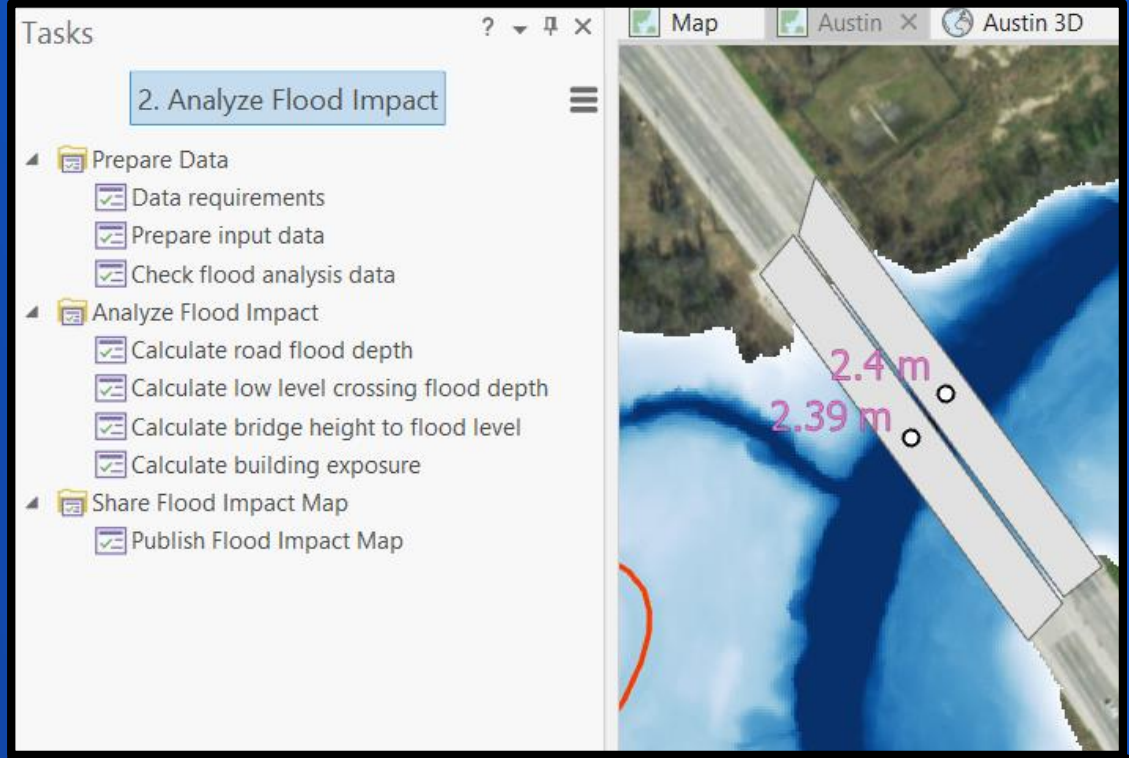
- Define flood impact areas at each flood stage
- Determine what assets will be impacted and by how much
- Communicate the results of the analysis to community stakeholders
- Prepare hard-copy operations maps for first-responders on scene

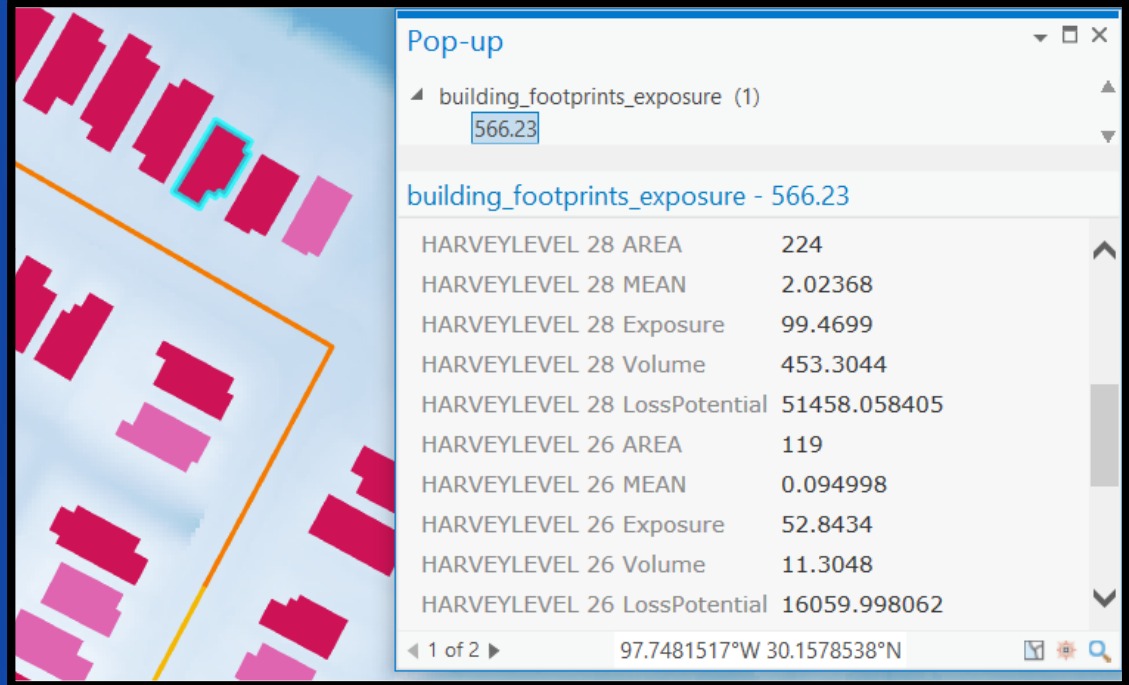


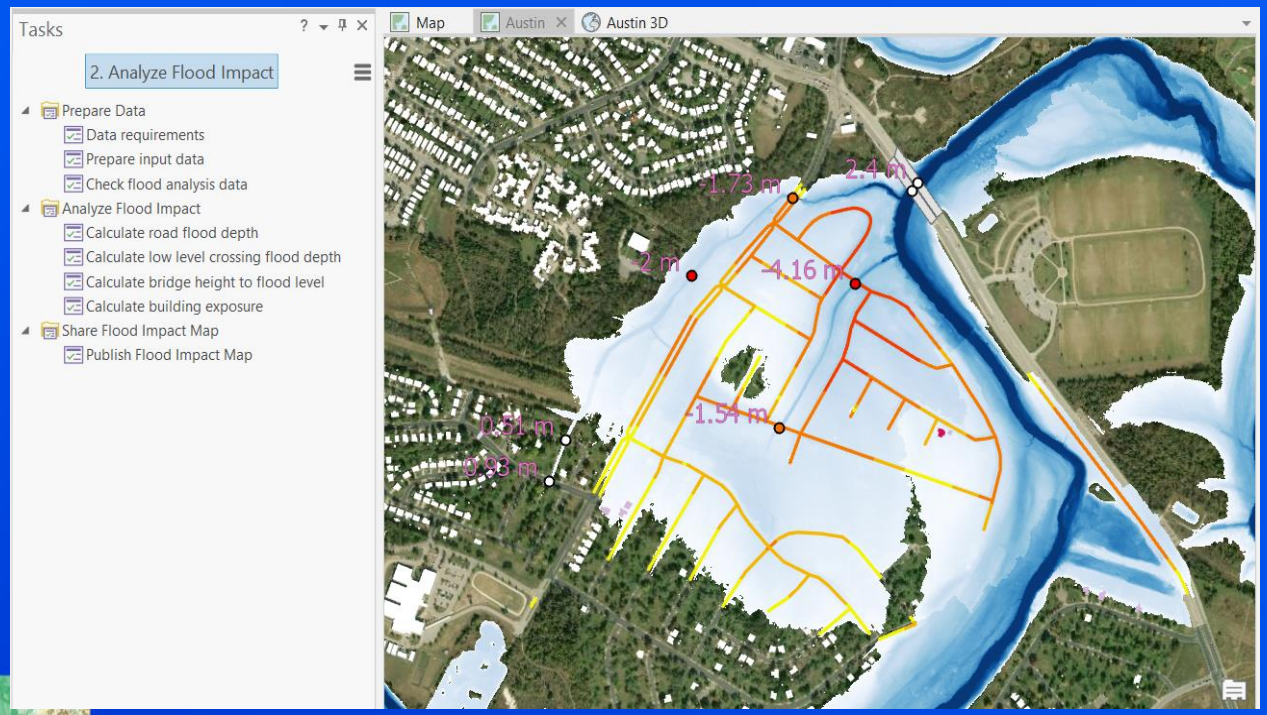


How does it work?

- ArcGIS Pro template project
  - Tasks, tools
- Input data
  - Flood depth rasters
  - DTM
  - Asset features
- Output
  - Asset features with flood depth attributes
  - Flood impact map
  - Flood impact scene
  - Flood impact dashboard configuration







Flood Impact Analysis demo

Data requirements

3D analysis of assets

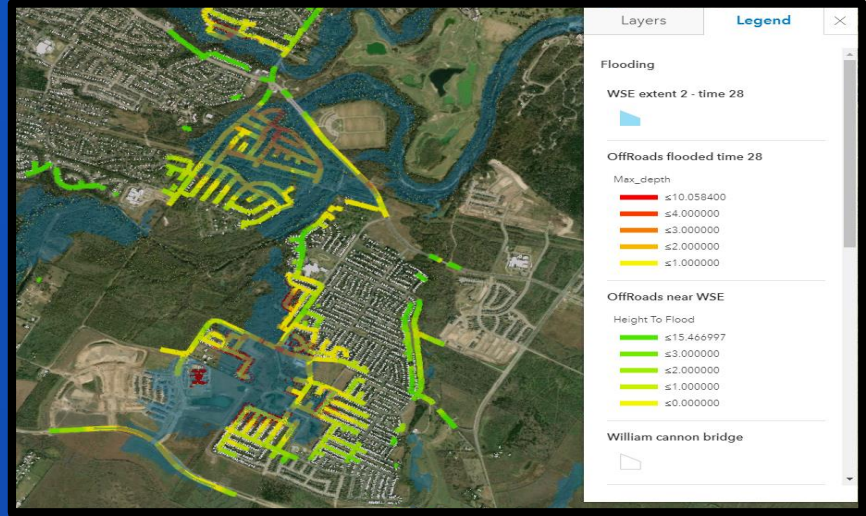
Input data

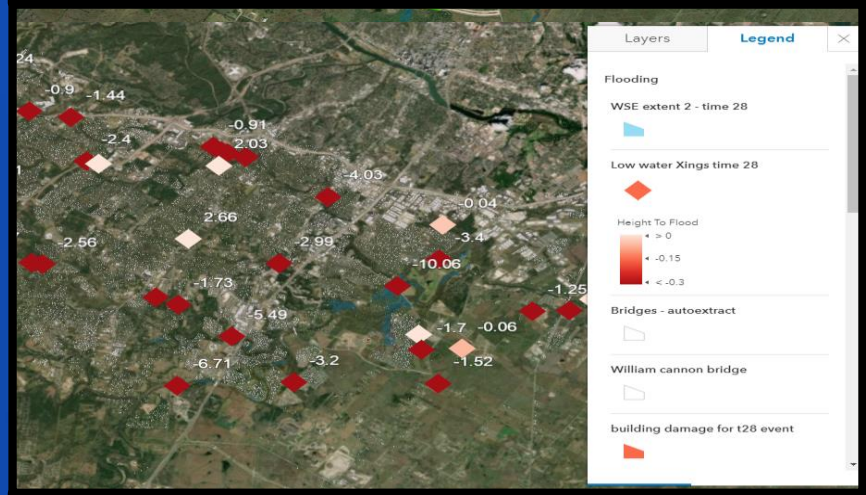
Assets

Depth raster

Output layers

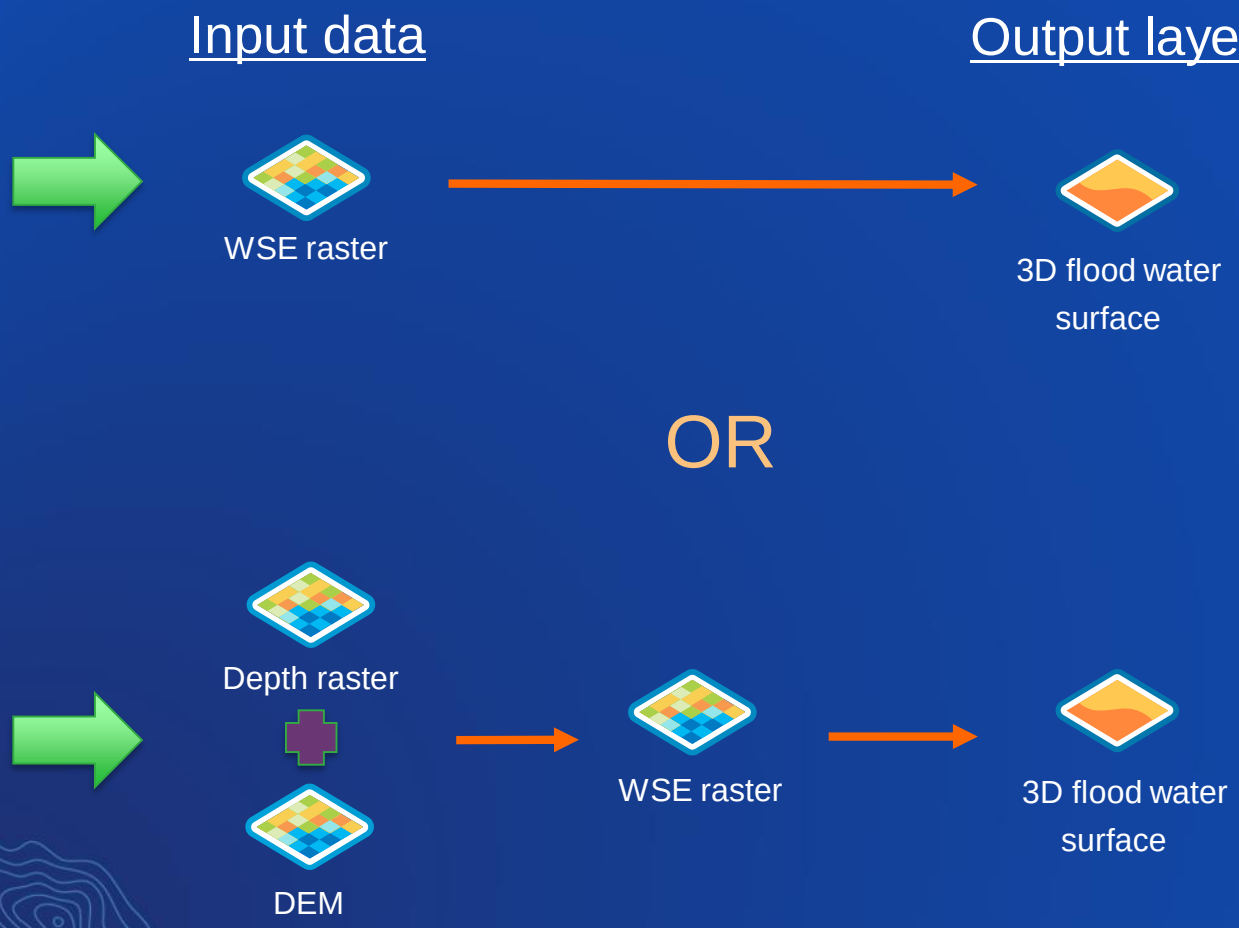
Assets with
Flood attributes

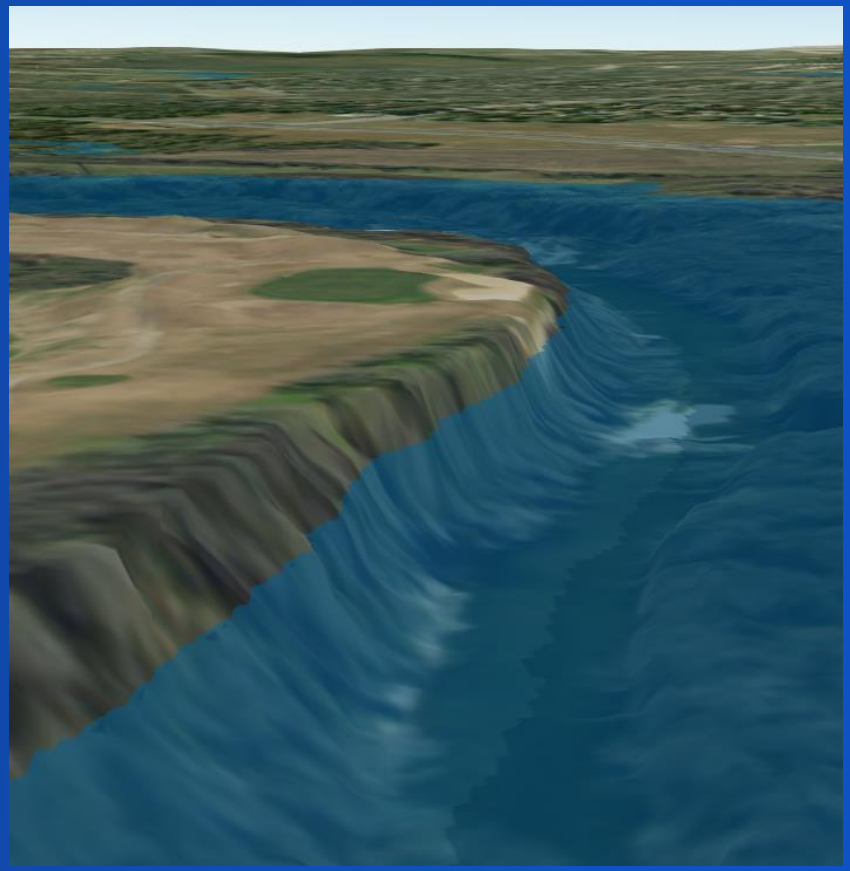




Data requirements

3D visualization of flood levels





3D flood water surface

WSE = Water Surface Elevation

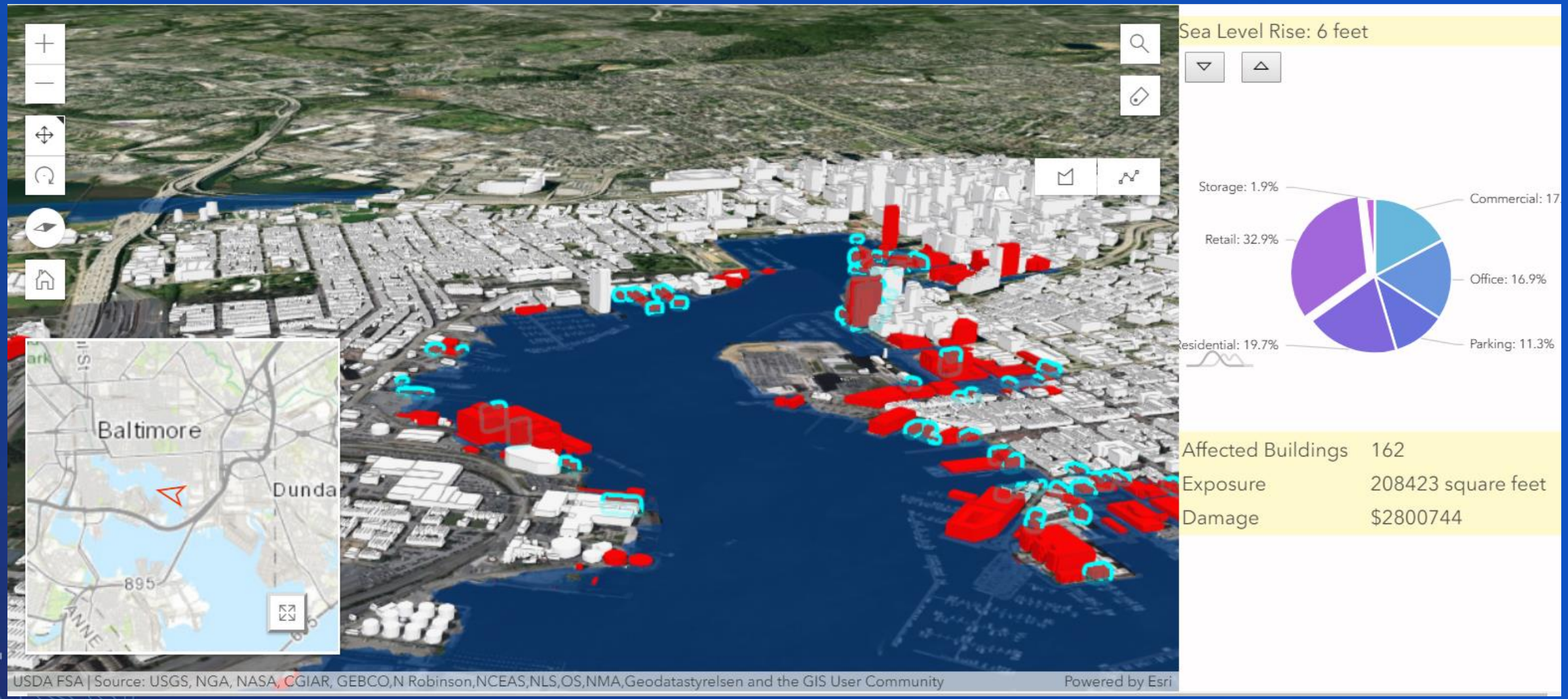
Examples

Baltimore sea level rise

http://arcg.is/0zGeLy

Examples

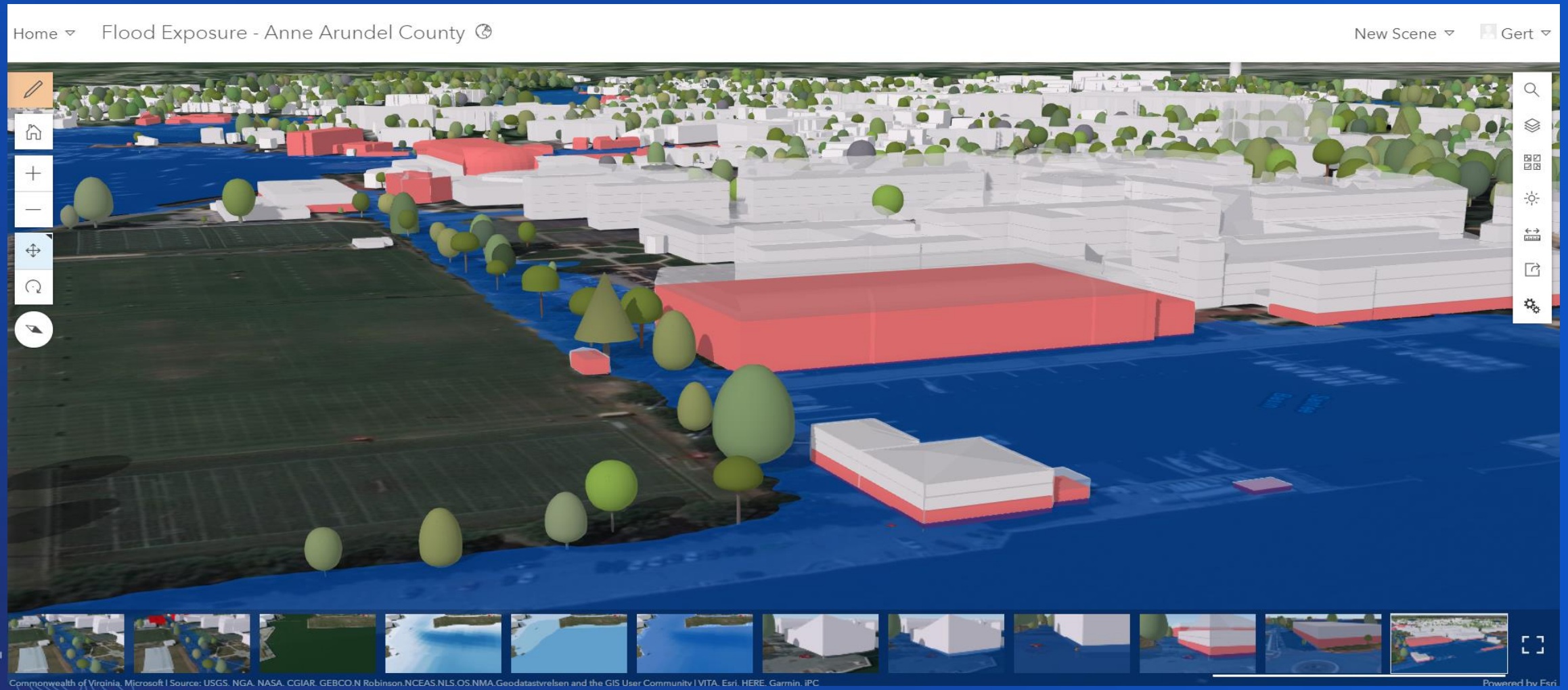
Baltimore sea level rise



https://gvanmaren.github.io/3D-Flood-Impact-App/

Examples

Annapolis storm surge

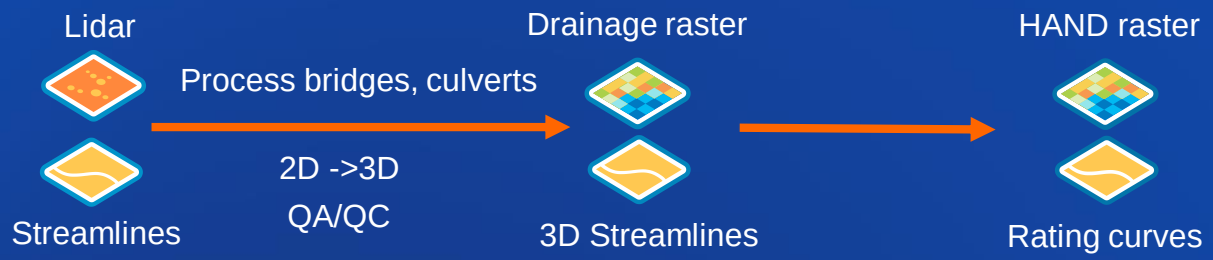


http://www.arcgis.com/home/webscene/viewer.html?webscene=ba2629676d7a4972839ad07da82ade45

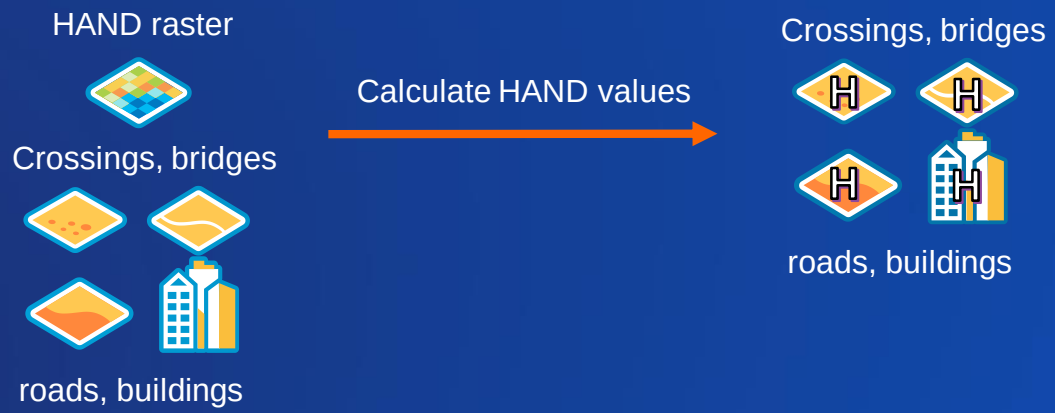
Flood Modeling and Mapping Analysis

Research by University of Texas, Esri

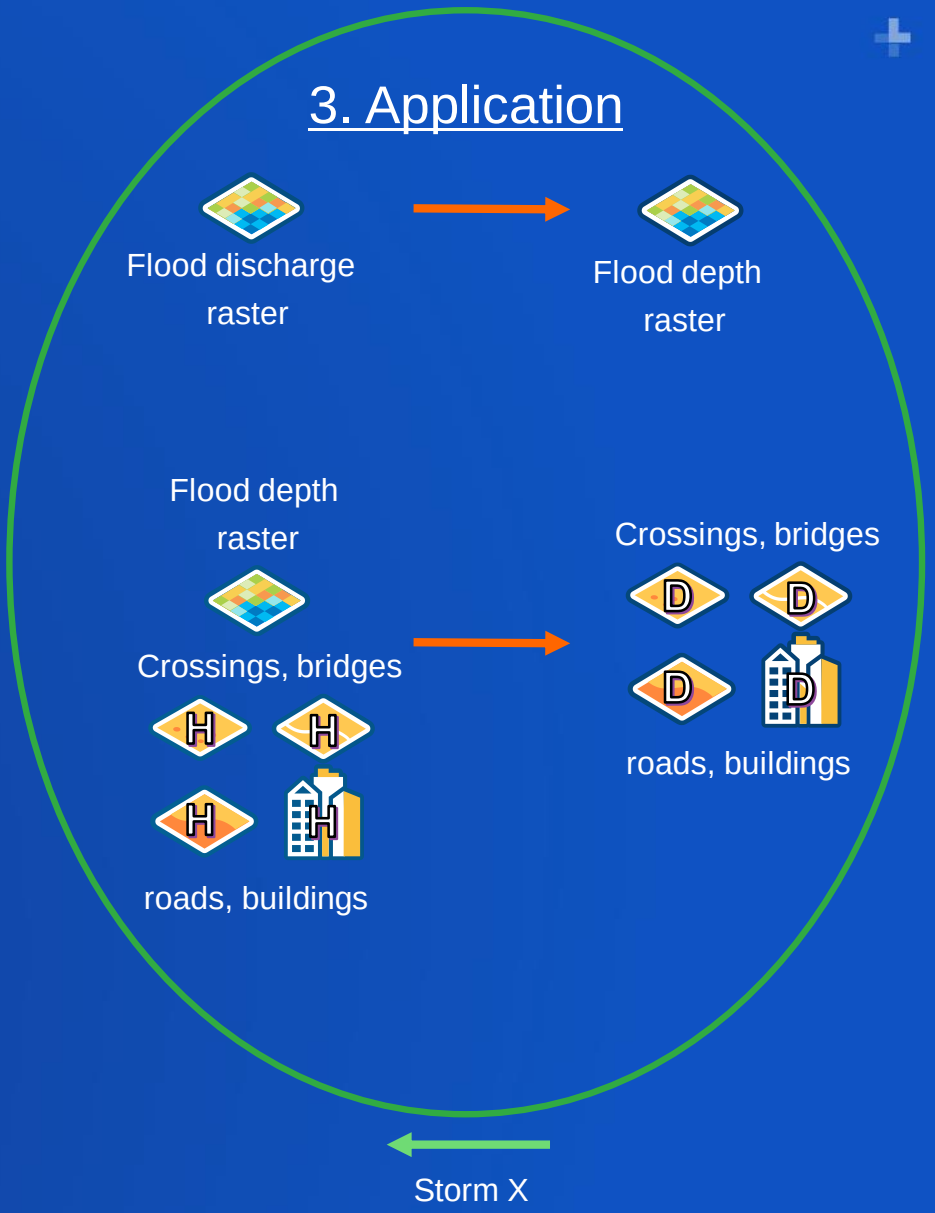
1. Data pre-processing



2. Flood map database

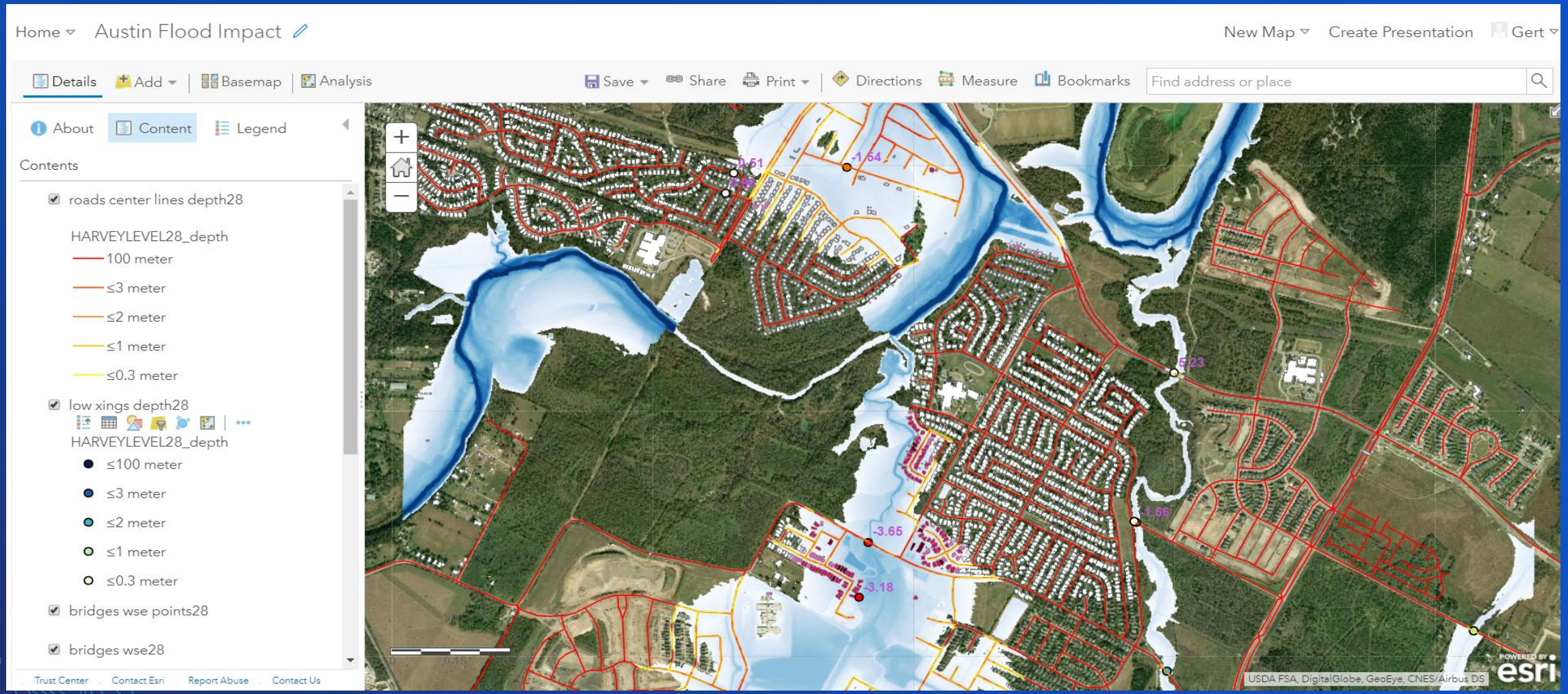


3. Application



Examples

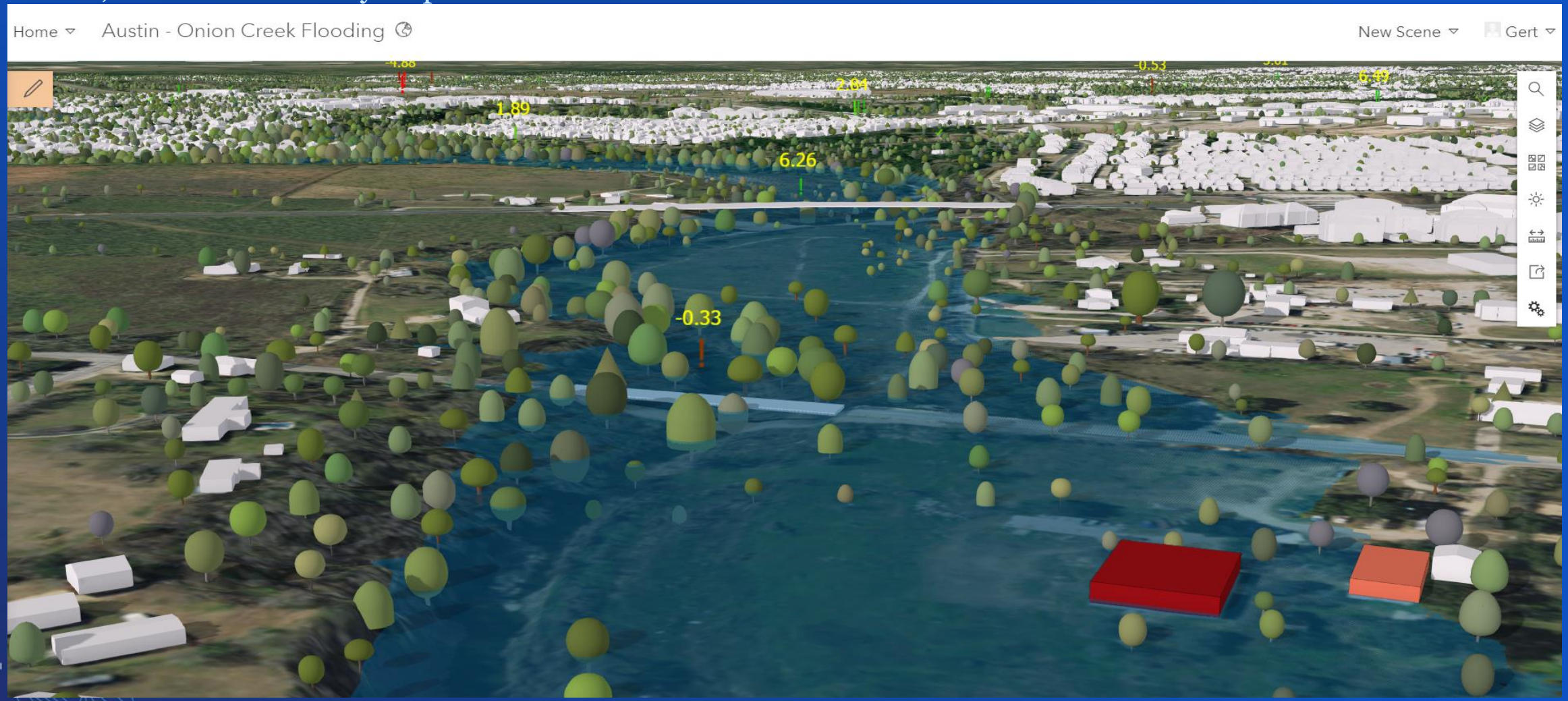
Austin, Hurricane Harvey impact map



http://www.arcgis.com/home/webmap/viewer.html?webmap=52e572eb197c4b468adba77742006f08

Examples

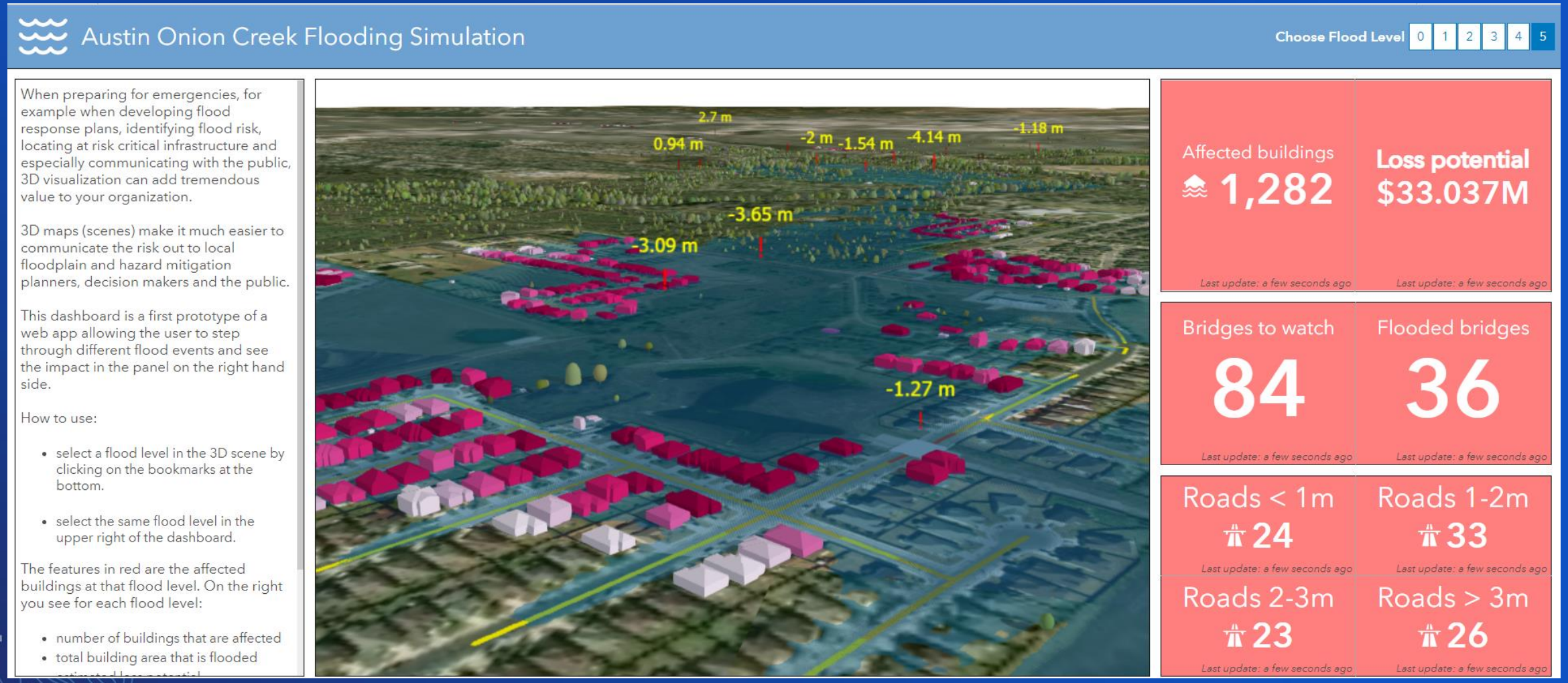
Austin, Hurricane Harvey impact scene



http://www.arcgis.com/home/webscene/viewer.html?webscene=3455af9be32141569da41f42d880d022

Examples

Austin, Hurricane Harvey impact dashboard



http://arcg.is/0rKy5b

Flood Planning Solutions

Planning Phase

Months/Weeks in advance

Flood Impact Analysis *
(understand flood risk)
(communicate flood risk)

Emergency Assistance
(plan assistance requests)

Evacuation Zones
(plan evacuation)

Shelter Locator
(plan shelter capacity)

My Hazard Information
(increase public preparedness)

Response Phase

During flood event

Situation Awareness
(monitor flood event)

Operations Response
(execute flood response plan)

EM Maps
(produce maps for response)

Evacuation Zones
(communicate evac zones)

Road Closure
(communicate closures)

Shelter Locator
(find shelter)

Recovery Phase

Immediately after flood

Damage Assessment
(get damage estimates)

Debris Reporting
(understand debris effort)

Public Safety Reports
(Collect and manage issues)

Community Impact Reporter
(monitor service outages)

Mitigation Phase

After flood and before Next Flood

Flood Impact Analysis *
(understand flood risk)
(communicate flood risk)

Hazard Assessment
(gather and analyze hazards)

Community Resilience
(monitor asset resilience)

Data Flow

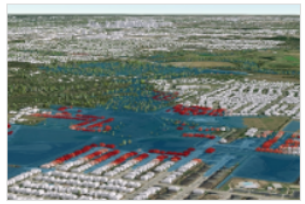
* **New Solution can be used in either planning or mitigation phases**

Download Flood Impact Analysis Preview 2

ArcGIS Pricing Map Scene Help Sign In

Flood Impact Analysis - Preview 2

Overview



The Flood Impact Analysis solution template can be used to visualize and assess the impact of flooding events on the existing landscape.

Desktop Application Template by awesome3D

Created: Jul 3, 2019 Updated: Jul 3, 2019 Number of Downloads: 1

Download

Description

The Flood Impact Analysis solution template can be used to develop flooding scenarios and visualize the impact on the existing landscape. It leverages flood depth data to analyze the impact of flood events on critical assets such as buildings, bridges, low water crossings and roads. It also can be used to create compelling 3D visualizations that make it easier to understand and communicate the real impact of flooding events.

Any type of flooding is supported including, sea level rise, riverine, storm surge and lake flooding. Below are some examples of the solution template output:

Riverine flooding Onion Creek, Texas dashboard,
Sea level rise, Baltimore dashboard
Lake Flooding, Queenstown, NZ

The solution template consists of several tasks that allow you to:

- prepare the flood input data,

Details

Size: 122 MB

Owner

awesome3D

Tags

flood planning, Emergency Management, local government, 3D, flooding

Credits (Attribution)

No acknowledgements.

http://www.arcgis.com/home/item.html?id=9500337ef006437aa83cb2bfedcd3b57

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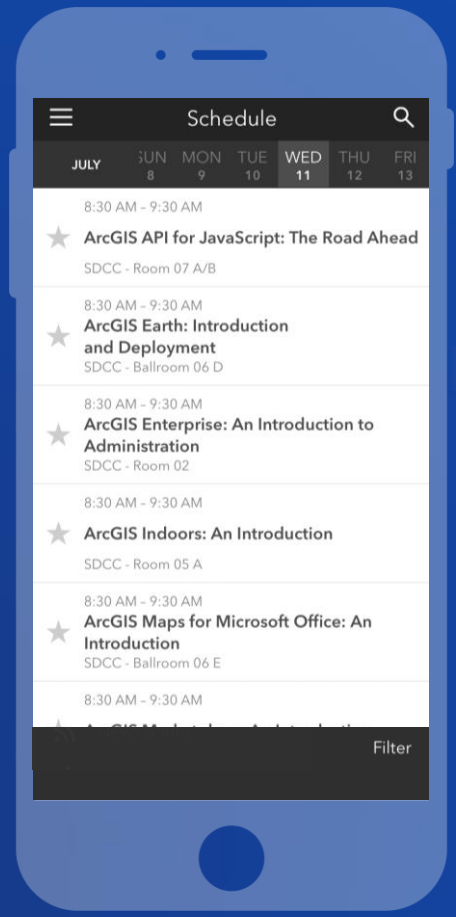
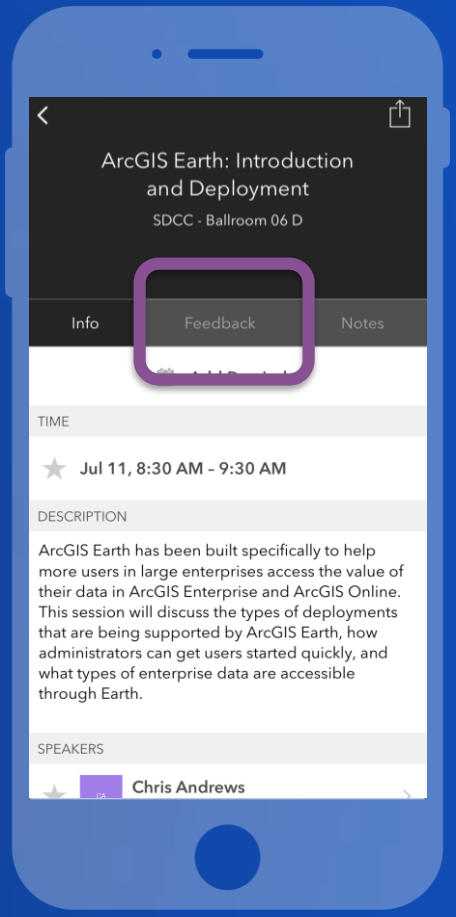
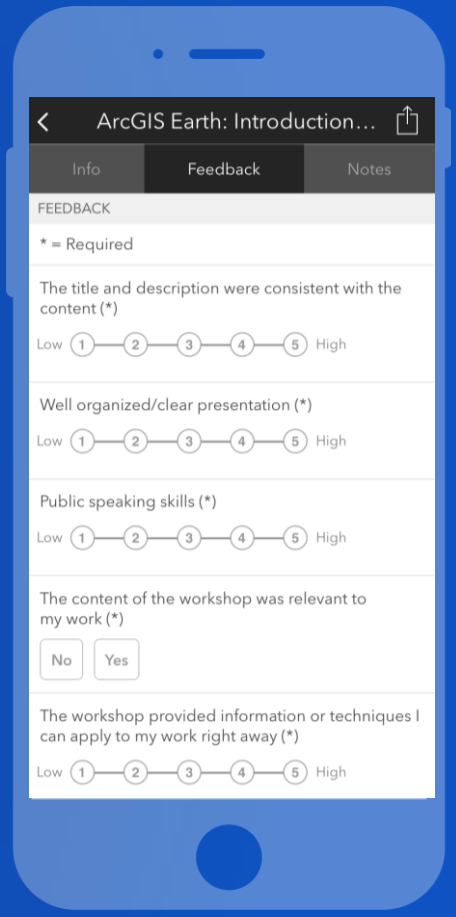
Select the session you attended



Scroll down to find the feedback section



Complete answers and select “Submit”



Follow up with…

WORKSHOP	LOCATION	TIME FRAME
• Creating Your 3D City Basemap	• Demo Theater 03	• ~~10:00 am Tuesday~~
• ArcGIS 3D Solutions: An Overview	• Room 33C	• ~~08:30 am Wednesday~~ • 08.30 am Thursday
• ArcGIS 3D Solutions	• Demo Theater 03	• ~~11:15 am Wednesday~~ • 12.15 pm Thursday
• 3D Flood Impact Planning	• Demo Theater 16	• ~~2.30 pm Wednesday~~

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