City of New Braunfels Leverages Esri's Flood Basemap to Improve Flood Response

Greg Brown, GISP, CPM GIS & Applications Manager



The Problems

- Flash Flood Alley
- Four water channels prone to flooding
- Communication chain
- Legacy map application
 - Duplicate mapping efforts
 - No data redundancy for map features
 - No tracking mechanism
 - No archiving after the event
- No public input (Crowdsourcing)
- No predictability (Flood Inundation)
- No Common Operating Picture (COP)
- Response plan without GIS support



Communication Problems

- Failures resulted in road closures not being mapped
- Information chain of when the barricade went up in the field to when GIS was notified failed repeatedly
- City Administration and City Council frustration



Legacy App Problems

- ► Not device agnostic
- Unstable application structure
- Redundant mapping effort
- No redundancy for map updates
- No method for archiving



The Solution

- ArcGIS Platform
- Application and workflow redesign
- Proactive approach
- Reduce communication chain
- New road closure web map application
- Redundancy for data entry
- Dashboard integration
- Report generation
- Collaboration with NBU



Application Design

City of New Braunfels

Road Closure Application



Flood Inundation Model

- Developed by Esri
- Enhance all phases
 - ► Mitigation
 - Preparedness
 - ► Response
 - ► Recovery
- Depth Grid
- Response Plans



Flood Forecasting

- National Weather Service Forecasting
- Esri Flood Model
- Proximity Analysis
- Response Plans



Observed and Forecast Stages for (NBCT2)

Observed Data:			Forecast Data (Issued 0	4-09-2018 08:58:00 CDT):	
Date(CDT)	Stage	Flow-	Date(CDT)	Stage	Flow-
04/09 12:45	4.17ft	279.00cfs	04/09 14:00	4.20ft	290.00cfs
04/09 12:30	4.19ft	286.00cfs	04/09 15:00	4.20ft	290.00cfs
04/09 12:15	4.19ft	286.00cfs	04/09 16:00	4.20ft	290.00cfs
04/09 12:01	4.18ft	283.00cfs	04/09 17:00	4.20ft	290.00cfs
04/09 12:00	4.18ft	283.00cfs	04/09 18:00	4.20ft	290.00cfs
04/09 11:45	4.17ft	279.00cfs	04/09 19:00	4.20ft	290.00cfs
04/09 11:30	4.19ft	286.00cfs	04/09 20:00	4.20ft	290.00cfs
04/09 11:15	4.19ft	286.00cfs	04/09 21:00	4.20ft	290.00cfs
04/09 11:00	4.19ft	286.00cfs	04/09 22:00	4.20ft	290.00cfs
04/09 10:45	4.20ft	290.00cfs	04/09 23:00	4.20ft	290.00cfs
04/09 10:30	4.19ft	286.00cfs	04/10 00:00	4.20ft	290.00cfs
04/09 10:15	4.19ft	286.00cfs	04/10 01:00	4.20ft	290.00cfs
04/09 10:00	4.14ft	269.00cfs	04/10 02:00	4.20ft	290.00cfs
04/09 09:45	4.18ft	283.00cfs	04/10 03:00	4.20ft	290.00cfs
04/09 09:30	4.19ft	286.00cfs	04/10 04:00	4.20ft	290.00cfs
04/09 09:15	4.19ft	286.00cfs	04/10 05:00	4.20ft	290.00cfs
04/09 09:00	4.19ft	286.00cfs	04/10 06:00	4.20ft	290.00cfs
04/09 08:45	4.18ft	283.00cfs	04/10 07:00	4.20ft	290.00cfs
04/09 08:30	4.19ft	286.00cfs	04/10 08:00	4.20ft	290.00cfs
04/09 08:15	4.16ft	276.00cfs	04/10 09:00	4.20ft	290.00cfs
04/09 08:00	4.18ft	283.00cfs	04/10 10:00	4.20ft	290.00cfs
04/09 07:45	4.19ft	286.00cfs	04/10 11:00	4.20ft	290.00cfs
04/09 07:30	4.16ft	276.00cfs	04/10 12:00	4.20ft	290.00cfs
04/09 07:15	4.19ft	286.00cfs	04/10 13:00	4.20ft	290.00cfs
04/09 07:00	4.18ft	283.00cfs	04/10 14:00	4.20ft	290.00cfs
04/09 06:45	4.17ft	279.00cfs	04/10 15:00	4.20ft	290.00cfs
04/09 06:30	4.16ft	276.00cfs	04/10 16:00	4.20ft	290.00cfs
04/09 06:15	4.19ft	286.00cfs	04/10 17:00	4.20ft	290.00cfs

Flood Inundation Response Plans

- Identifies critical infrastructure for response and recovery operations
- Estimates damage assessment costs
- Guide for information pertinent to all phases the OEM



Map Known Closures

- "Necessity is the mother of invention"
- Legacy workflow mapped flooding locations for every event
- New workflow to expedite mapping deliverables
- During the event, only change the status of pre-mapped locations



Web App Builder for Updates



Workforce for Road Closures (Dispatcher)



Workforce for Road Closures (Mobile Worker)

- Task assignments are received via iPhone app
- Changes to the assignment are seen immediately by Dispatcher



Collector for ArcGIS

- Workforce launches Collector
 Damage Assessment App
- Quick method for changing the status of closures
- Requires no searching for locations
- Eliminates crews reporting to Dispatch
- Valuable in cases where street signs have washed away and/or user is not local
- Utilized by Streets, Police, Parks



Non-Map App for Updates

- Rapid, intuitive way to search and change status of pre-existing closures
- Device agnostic
- Immediate updates to the map
- Easy for non-mapping staff

You can use	Road Closure Status this form to update the road closure status for selecte road blocks in New Braunfels, TX.
Search for a	road closure
Alves Ln - A	lves Ln @ Tripp Ln
Select a road	closure to update the status
Closure State	ıs
Open	
Select	

ArcGIS Pro for Updates



Road Closure Report List

- Generates a report from ArcMap on demand to service Admin requests for updates
- References the feature class that serves out the REST service of the web application



This is a current list of road closures in New Braunfels,	Т)	X	(l	
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Co	nstruction
1.	ALBERT ST - 900 BLK ALBERT ST
2.	COUNTY LINE RD - BETWEEN WALNUT/1044
3.	EASTMAN AVE - 2000 BLOCK OF EASTMAN AVE
4.	FULL CLOSURE BTWN RR TRACKS AND FM 1102 - 1000 BLK CONRADS LN
5.	LAKEVIEW BLVD - BETWEEN CALIFORNIA & OAKWOOD
6.	S HACKBERRY - S HACKBERRY BTWN JACKSON & BUSINESS 35
7.	S WATER LN - 200 BLOCK OF S WATER LN @ IH 35
8.	S WATER LN - 200 BLOCK OF S WATER LN BETWEEN LODGEPOLE & IH 35

Crowdsourcing Road Closures

- Device agnostic web application for public consumption
- Public can crowdsource to inform the OEM staff of:
 - Debris blocking the road
 - Add road barricades
 - Remove road barricades



Road Closures

This application is for submitting information to the Emergency Operation Center (EOC) of New Braunfels, TX, during an event. Complete the form below and submit your entry in order for city staff to evaluate the situation.

1. Enter Information

S Seguin Ave @ Market Plaza	
Comments (Required)	
Add Barricades: Street Flooded	~
Add images (Jpeg or .png only)	
Select File	

2. Select Location

Specify the location for this entry by clicking/tapping the map or by using one of the following options.





Submit En

Road Closure Public Viewer



Road Closure Dashboard

🖙 City of New Bruanfels OEM Situational Awareness Dashboard



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Collector for Public Assistance

- Used by CERT members, Street crews and Park crews
- Collects information for the Public Assistance (PA) form of the Disaster Summary Outline (DSO)





Archiving Post Event

5 records 0 selected

Workforce for Damage Assessment (Dispatcher)

- Create tasks based on inundation model and reporting
- Improves communication with office and mobile workers
- Tasks guide assessment teams
- Improve work load balancing
- Improves tracking of the efforts



Workforce for Damage Assessment (Mobile Worker)

- Mobile workers receive assignments in the field
- New assignments or changes communicate through app to the Dispatcher
- All work can be tracked and reported



Damage Assessment Collector

- Feature layers configured to mimic TDEM damage assessment forms
- Workforce project for damage assessment is configured to launch Collector for mobile workers
- Data is synchronized with database instantaneously. No more paper forms.

●●○○○ Verizon 🗢	3:45 PM	≁ ◎ ∦ ■ +
Cancel		Done
D	amage Category	
	Q Filter	
<no value=""></no>		
Affected		
Destroyed		
Major		
Minor		~
No Damage		
No Visual Damaç	je	

Preliminary Damage Assessment

Crowdsourcing for public consumption

- Public can notify OEM of house(s) that require official damage assessment visit
- Feeds into Workforce for Task generation

Address (Required)				_	
555 N Main St					
Municipality					
New Braunfels					
County					
Comal County					
Flood Insurance (Required)					
Yes					
Owner Name					
John Doe					
Phone Number (Required)					
830-555-5555					
Type Structure					
Single Family					
Damage Category					
Minor					
Nater Level (Inches)					
3 to 6 Inches					
itructure Occupied					
Yes					
Residence					
Primarv					
Anticipated Insurance					
7376					
@ Attachment					
Select File					
Select Location					
cify the location for this entry by cl	cking/tapping t	the map or by us	ing one of the follow	ing options.	
Search Lat/Lon					

Damage Assessment Dashboard

🥗 Damage Assessment Dashboard



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Asset Management Integration

- Cartegraph (Existing)
 - Pavement
 - Supports & Signs
 - ► Stormwater Drainage
- ► Cartegraph (Future)
 - ► Facilities
 - Parks
 - ► Fleet



Outcomes

- Improved communication with more access and greater confidence
- Reduced information delay
- Enhanced situational awareness
- Workforce management
- Elimination of paper forms and data entry
- Public crowdsourcing
- Leveraged all components of the ArcGIS Platform
- Replaced legacy web application
- ► GIS staff in support/management role

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- ► Greg Brown, GISP, CPM
 - ► GIS & Application Manager City of New Braunfels, TX
 - ► GBrown@nbtexas.org
 - ▶ 830/221-4337

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