Collecting Data in the Field for Search & Rescue and Debris Management

November 12th, 2019
Paul J Doherty and Jared Doke
napsgfoundation.org | @napsgfoundation
Today’s Objectives

• Understand how to use basic field data collection tools (Survey123 configured with the SAR and First Responder Survey template).

• Understand the relationship between Search & Rescue and Debris Management.

• Understand how to quickly analyze and report against live field data for situational awareness.

• Begin to develop your own geospatial game plan and access additional resources.
Why Use Geospatial Tools in the Field?

• Real-time situational awareness & collaboration
  “I can see where other search & rescue teams have already searched and what is needed in the field”

• Enhanced data collection and reporting capabilities
  “I can see where teams are (or have been), and what they observed – share data with agencies”

• Improved search strategy & tactics
  “I can see what areas have been covered and what remains to be searched”

• Geospatial Coordination
  “I can reach out to the SAR Geospatial Working Group to find access to the layers I need”
Today’s Agenda

• 1440 Introductions
• 1445 Pre-planning: USNG Trail Markers - Jennifer Lana, Cobb County
• 1455 Debris Management - Katie Picchione, FEMA
• 1505 Search and Rescue & First Responder Survey – Paul Doherty, NAPSG SAR Working Group
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• 1630 Adjourned
Pre-planning: USNG Trail Markers

Jennifer Lana, Cobb County
IMPROVING EMERGENCY RESPONSE ON TRAILS WITH GIS AND USNG

COBB COUNTY, GEORGIA

JENNIFER LANA, COUNTY GIS MANAGER

JENNIFER.LANA@COBBCOUNTY.ORG
COBB COUNTY TRAILS

• Existing Trails: 133 miles
• Programmed/Under Construction: 28 miles
• TOURISM is a leading industry in Cobb
• Kennesaw Mountain is most visited Civil War site in the entire US!
The Cobb Emergency Management Agency (EMA), Parks, DOT, GIS and Public Safety members have been working together on what started as a trail mapping system that has evolved into a nationally recognized trail marking and mapping system.
EMERGENCY RESPONSE ON TRAILS

COBB POLICE RANGERS
Primary Responders when initial E911 call comes in

EMERGENCY MANAGEMENT AGENCY
Missing Persons & Lost Children
Response & Recovery

SOUTHERN OFF-ROAD BICYCLE ASSOCIATION
Eyes & Ears on the trails
Do rescues themselves
Part of CERT

COBB FIRE STAFF
Medical Responders
Usually on scene before Ambulance

** Cobb Contracts with Private Vendors for Ambulance Services**
Familiar Challenges

• Trail Program growing each year
• New Police Rangers had to rely on other people (PARKS & SORBA) for detailed trail information.
• Responders could not view existing trails on their in-car MDC’s
• Trails and mile markers were not integrated into dispatch and E911
Increasingly Aware of a problem...

The Cobb Police Ranger Unit recognized the need to have a location specific system that relayed a way point on a trail or in a park that corresponded correctly to our police and fire CAD dispatch system.

So, in late 2016, SGT Ablashi asked EMA Director, Cassie Mazloom, for her opinion as a previous Cobb County Police Officer and Cobb Police Ranger.
E911 CALLS... MORE COMPLICATIONS

CASE #1807XXX
Silver Comet Trail @ East-West Conn.
- Bicyclist rode off trail bridge (2 levels)
- Police Officer Rangers on the trail headed Westbound on motorcycles.
- *It was not on a map, so Rangers had to escort ambulance personnel to area.*
- They had to manually redirect Fire and EMS to the Concord Rd. trailhead from Cooper Lake Rd.
- Limited Bridge Access for vehicles.

CASE #18-0005XXX
Silver Comet Trail @ Brookwood Dr.
- Bicyclist near end of ride had heart attack and went into arrest.
- Location was between two first responding units with limited access from the west.
- *Unknown restricted weight limit bridges*

CASE #18-0001XXX
Silver Comet Trail @ Concord Rd.
- Engines were not able to drive on the trail
- *Limited and unknown local access points to get to patient.*
- Restricted bridges and tunnels for the ambulances.
HOW TO OVERCOME RELUCTANCE...
GET PEOPLE TO SEE OUR CONCERNS: TRIP 1 FEB 17, 2017
Trip 2. May 2\textsuperscript{nd} 2017

Older Signs, Missing Mile Markers, Old Call Boxes
Addressing is hard enough on roads... what about Trails?
What colors?

What Type of Sign?

What about existing signs?

How tall/short?

What about Reflectivity?

How many do we need?

Replace our Call Boxes?

Metal, Plastic or Wood?

How do we follow GDOT standards?
OR THESE??
NOPE
WHAT???
NOT EVEN SURE WHAT THESE ARE
DECISION: US NATIONAL GRID & ELM MARKER FORMAT

• Met our DOT and state requirements for signage, reflectivity and format

• Expandable program to other local counties that our trails connect with

• Nationwide standard grid system, used by federal agencies

• We use this grid system for our CERT (Citizen rescue teams)

• Although the FIRST county in Georgia, not the first in the US
ELM = Emergency Location Markers
USNG = US National Grid

HOW DOES IT WORK?

SIX DIGITS: 899 598 locates a point within a 100 m square (football field size).
EIGHT DIGITS: 8998 5988 locates a point within a 10 m square (within a standard home).
What do these numbers mean?
Emergency Location Markers

- Cobb County Logo
- Placed every ¼ mile on trails
- Metal Poles
- Co-located where possible
- 6x9 signs
Informational Signs placed at Trailheads, Parking lots, Call Boxes, Major intersections and various county Parks.

12x12 signs

IN CASE OF EMERGENCY

Using the Cobb County Emergency Location Marker (ELM) System

1. Dial 911, tell them your emergency, and then read the 8 large numbers (Fig. 1) to describe your location. These numbers are U.S. National Grid (USNG) coordinates, if requested by the dispatcher, also read the small numbers and letters at the top (Fig. 2).

Fig 1. Read numbers left to right, top row, then bottom row

Fig 2. Only read text at top if requested

2. Dispatchers can then quickly transmit your location to multiple agencies and responders in the region. Responders will use the coordinates with GPS units and USNG gridded maps to locate your position.

3. Be patient. It may take some time for responders to reach you. In many cases they will have to travel the same trails as you did to get to your location.
USED ARCGIS ONLINE GROUP TO MANAGE PROJECT
• For EVERY trail, our Parks, PD & Fire staff worked with our contractors for sign placement.

• Used ESRI Collector to gather ELM location and attribute data.
FIRST SIGN ORDER RECEIVED!
TEAM SPATIAL: ESRI DASHBOARD, FOR PROJECT STATUS

Cobb County ELM Dashboard

There will be a total of 926 signs at 713 locations. All locations will have 2 (bidirectional) ELM signs and 10 locations will have "information" signs as well.

![Dashboard with indicators and a map showing various locations marked with dots and lines.](image-url)
KEY ATTRIBUTES:
- TRAIL TYPE
- TRAIL WIDTH
- PREMISE HAZARD
  (NOTES FOR RESPONDERS)
- PICTURES
OUR TRAILS
115 MILES... WITH SIGNS TODAY
WHAT’S NEXT FOR COBB USNG PROJECT...

• Expand ELM’s to all trails and all future programmed trails
• Continued Outreach: schools & public
• Help other counties/cities with their projects
• Work with private groups/companies to ‘adopt’ trails and fund more outreach
• Add Cameras
• Add more call boxes
RESOURCES

• USNG ELM web-site: https://usngcenter.org/

• Cobb County ELM Story Map: www.CobbELM.com

• FGDC Executive Summary on USNG
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Debris Management

Katie Picchione, FEMA
Initial and Preliminary Damage Assessments (IDAs and PDAs) are used to determine if Federal assistance is needed.

**Initial Damage Assessment (IDA)**
Local gov. identifies damage.
State verifies damage and requests a joint PDA with FEMA.

**Joint Preliminary Damage Assessment (PDA)**
FEMA and State, Tribe, or Territory collaborate to validate damage.

**Declaration**
PDA informs presidential Major Disaster declaration, which authorizes federal assistance.

**Recovery**
Recovery programs begin: PA, IA, HMGP
FEMA’s Public Assistance (PA) program provides federal funding for debris removal, emergency work, and infrastructure repairs.
Imagery collected during Search and Rescue operations could be used to:

**Identify location and type of debris**

- PC: Dewberry and FEMA GIS, Hurricane Michael debris assessment

**Prioritize recovery ops.**

- PC: Debris analysis by MIT Lincoln Laboratory

**Identify and quantify infrastructure damage**

- PC: LIDAR analysis by MIT Lincoln Laboratory
Summary: PDA Data Applications and Challenges

Data on damaged infrastructure captured during Search and Rescue can inform recovery

• Applications of PDA Data
  • Capture dimensions and descriptions to estimate repair costs
  • Monitor debris operations, electrification, repair progress
  • Record damage to substantiate claims

• Challenges
  • Interpretation of unfamiliar image types
  • Data processing and sharing (permissions, quantity)
  • Personally-identifiable information/privacy
  • Contracting and deploying assets
  • Using coarse resolution data to optimize allocation of high-resolution assets

FEMA PDA Templates
IA Express: http://fema.maps.arcgis.com/home/item.html?id=9f59e65d42344a4d935146d536b62053
IA: http://fema.maps.arcgis.com/home/item.html?id=5cd25aa3d91344dd89cdf653d1130b73
PA: http://fema.maps.arcgis.com/home/item.html?id=7c0312f38def45928586cbf941439dd3
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SAR & First Responders Geospatial Toolkit
Preparedness Technology Talk: June 26th

PREPAREDNESS TECHNOLOGY TALK: GEO-ENABLE SEARCH & RESCUE IN DISASTERS

On June 26th, 2019, NAPSG Foundation launched the new Virtual Seminar Series called Preparedness Technology Talks — PrepTech Talks.

The first seminar in the PrepTech Talk series, “Geo-Enable Search & Rescue in Disasters”, provided participants the opportunity to train and gain access to a standardized suite of tools and common framework for geo-enabling Search and Rescue (SAR) missions for disaster response.

TRAINING OBJECTIVES:
- Learn who to contact in order to gain access to the existing field apps hosted by FEMA: Urban Search & Rescue (USAR) and the International Association of Fire Chiefs (IAFC).
- Understand how to use basic field data collection tools (Survey123 configured with the SAR and First Responder Survey template).
- Understand how to quickly analyze and report against live field data for situational awareness.
- Begin to develop your own geospatial game-plan and access additional resources.

Provided below is a link to the materials used in the training and a recording of the full training seminar.

- SAR & First Responder Toolkit - This is the website shown during the PrepTech Talk. It includes resources and access to the “SAR Sandbox” for training with Survey123 and additional apps that will be used in the 2019 Hurricane Season.
- Link to Recording
SAR & First Responders Geospatial Toolkit

Story Map Website with:

1. Resources by capability
2. Links to training videos
3. Points of contact
   • FEMA Urban Search and Rescue
   • International Association of Fire Chiefs
   • NSARC Geospatial Working Group*
4. Sandbox for testing geospatial tools – NOT FOR REAL-WORLD RESPONSE

https://arcg.is/00L58f
SAR Terminology

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Name</th>
<th>Description (based on MOTF-1 guide)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>Assisted</td>
<td>Material assistance provided to residents</td>
</tr>
<tr>
<td>F</td>
<td>Evacuated</td>
<td>Survivors transported to collection point</td>
</tr>
<tr>
<td>A</td>
<td>Rescued</td>
<td>Technical rescue that required physical intervention</td>
</tr>
<tr>
<td>V</td>
<td>Victim Detected</td>
<td>Potential victim detected (including canine alert or intelligence)</td>
</tr>
<tr>
<td>V</td>
<td>Confirmed Victim</td>
<td>Confirmed live survivor (visual, audible, physical confirmation)</td>
</tr>
<tr>
<td>V</td>
<td>Human Remains</td>
<td>Confirmed victim determined to be deceased</td>
</tr>
<tr>
<td>V</td>
<td>Human Remains Removed</td>
<td>Human remains removed from specific location</td>
</tr>
<tr>
<td>V</td>
<td>Shelter In Place</td>
<td>Survivors have chosen to remain at location</td>
</tr>
<tr>
<td>H</td>
<td>Fire Incident</td>
<td>General fire occurrence</td>
</tr>
<tr>
<td>H</td>
<td>Hazardous Material Incident</td>
<td>Nuclear, biological, or chemical incident</td>
</tr>
<tr>
<td>L</td>
<td>Flood/Water Level</td>
<td>Predetermined site for documentation of water line</td>
</tr>
<tr>
<td>L</td>
<td>Route Blocked</td>
<td>Inaccessible route by land or water</td>
</tr>
<tr>
<td>L</td>
<td>Structure No Damage</td>
<td>Low Risk, low probability of further collapse</td>
</tr>
<tr>
<td>L</td>
<td>Structure Damaged</td>
<td>Medium Risk, structure is moderately damaged</td>
</tr>
<tr>
<td>L</td>
<td>Structure Failed</td>
<td>High Risk, may be subject to sudden collapse</td>
</tr>
<tr>
<td>L</td>
<td>Structure Destroyed</td>
<td>Complete destruction of structure</td>
</tr>
<tr>
<td>L</td>
<td>Targeted Search</td>
<td>Specific location or condition requiring increased search effort</td>
</tr>
<tr>
<td>L</td>
<td>Helicopter Landing Site</td>
<td>Appropriate site for landing zone</td>
</tr>
<tr>
<td>L</td>
<td>Animal Issue</td>
<td>Issue including aggression, location, assistance needed, etc.</td>
</tr>
<tr>
<td>F</td>
<td>Follow-Up Form</td>
<td>Additional information required not adequately described by symbol set</td>
</tr>
<tr>
<td>L</td>
<td>Extra 21</td>
<td>Mission specific placeholder to be determined (e.g. abandoned vehicle, commercial structure, evidence)</td>
</tr>
<tr>
<td>L</td>
<td>Extra 22</td>
<td>Mission specific placeholder to be determined</td>
</tr>
<tr>
<td>L</td>
<td>Extra 23</td>
<td>Mission specific placeholder to be determined</td>
</tr>
<tr>
<td>L</td>
<td>Extra 24</td>
<td>Mission specific placeholder to be determined</td>
</tr>
</tbody>
</table>
• General Memo 2019-050
• GovDelivery List
• Geospatial Game Plan
  • Who to contact? lance.gilmore@fema.dhs.gov
  • How to access?
    1. Read memo,
    2. Sign-in with your team username (1 for TIS and 1 for Ops)
State & Local SAR Teams

- **Scenario A** – you have ArcGIS Online usernames and want to deploy the SAR and First Responder Survey into your own environment for local response, you can use the Deployment Kit to host it yourself.

- **Scenario B** – you have ArcGIS Online usernames, but you want to be interoperable with other teams for a common operational picture for large disasters (e.g. earthquakes, hurricane).
  - Inquire with your state ESF 4/9 Lead and/or State Emergency Management and the to see if they will be hosting the standard templates and capability for teams within your state.
  - Request access and support from IAFC by granting access to their ArcGIS Online Group to use SAR Survey and general Dashboard.

- **Scenario C** – you don’t have ArcGIS Online or your GIS staff don’t have usernames or time to support you? You can purchase ArcGIS Online usernames and request access to the IAFC ArcGIS Online organization.

- **ALL Scenarios** – Ensure you are using the data collected only for it’s intended use – operational coordination. Be sure you are sharing the data in interoperable formats and with appropriate data sharing agreements in-place.
Deployment Kit

Deployment Kits - SAR and First Responder Field Data Collection Form

Add to Favorites

description

Summary

This item links to a zip file that you can download and use as a template to deploy a Survey123 survey for recording the location of human interactions, hazards, damage assessments, and operational support for Urban Search and Rescue incidents. This item was uploaded on June 26th, 2019.

Important Note: If you represent a FEMA Type 1 USAR Team, a similar survey has already been published in the FEMA ArcGIS Online Organization. Please contact Lance Gilmore at Lance.Gilmore@fema.dhs.gov to gain access to the survey.

If you represent a state USAR team, you may be eligible to use a similar survey published and administered by the International Association of Fire Chiefs. Please contact Jeff Duin at J Duin@iafc.org.

Contents: The zip file contains a read me text file with folder content descriptions, an xml form that can be used as a template for publishing a Survey123 survey in Survey123 connect, a pdf with deployment instructions, a pdf with waypoint descriptions, associated media files for use in Survey123 Connect, a thumbnail that you may choose to use if you do not have a designated thumbnail.

Audience: This item is designed to assist a GIS Specialist, Tech Info Specialist, or other person trained in the use and deployment of Survey123. For training materials that you can provide to test teams see this website and YouTube playlist.
Interagency Coordination – One Team, One Fight
Inspections/Assessments after a Disaster

Assessments are an essential part of the response and recovery process and are critical for assessing the size, scope, and severity of an event.

**THE CHALLENGE**

When a home is damaged as a result of a natural or man-made disaster, numerous damage assessments are performed to assess the safety of the structure, quantify the damage, and determine financial aid from the government and/or insurance company. While each assessment is conducted for a specific purpose, this puts a significant burden on the survivors and community and often times delays recovery efforts.

**THE SOLUTION**

Consistent standards and data sharing mechanisms are needed so various programs and agencies (e.g., state and local authorities, federal agencies, statutory authorities, non-profit organizations) can leverage the same data collected during the preliminary damage assessment. This will help avoid duplication of effort, conflicting information, and delays in bringing relief to the homeowner.
R&D: NZUSAR / INSARAG Workflow

Collection systems

Survey 123
Explorer
Workforce

Key Learnings
1. Use integrated data where ever possible. Only collect data once
2. Prepopulate as much as possible
3. Use of Explorer and Workforce to assign and task teams
4. Links to Survey123 from Explorer and Workforce
5. Clever system, easy UI
6. Tested on wide range of field users
7. Possible to integrate data from other systems, but requires effort.
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Hands-on Exercise
1 Open Camera

2 *Point At Code →

3 Open in Explorer for ArcGIS
   (or install the app)

*some phones require a QR app or to hold down the home button while scanning with camera
1 Open Camera

2 *Point At Code →

3 Open in Survey123 (or install the app)

*some phones require a QR app or to hold down the home button while scanning with camera
Survey instructions, tips, and sharable QR code. Click arrow to left to open.

Event Details:
- Open to complete event details and "set as favorite answers" using instructions allowed to pre-populate future forms. Be sure to reset favorite answers at the beginning of each search operation.

Location
- Select the map to improve location accuracy or enter an address/place/USNG for damage surveys. Be sure to "drag" the point to the building footprint where applicable.

USNG
- 115 MT 8119.6723

napsgfoundation.org  |  @napsgfoundation
1 Open Camera

2 *Point At Code →

3 Open in Survey123 (or install the app)

*some phones require a QR app or to hold down the home button while scanning with camera
Great Galveston Hurricane

• EXERCISE ONLY: A Category 2 Hurricane has just swept through the Galveston area.
• SAR Teams are being tasked with conducting Primary Searches of the Texas A&M University at Galveston Campus.
• Use the SAR and First Responder Field Data Collection Form to document field observations and note areas in need of Debris Management.
• Debris Teams will follow up on areas identified by SAR Teams.
Concept of Operations

• First 10 Teams of “First Responders” deploy using the Search and Rescue Survey
  • 5 Targets per assignment area. Use Explorer for ArcGIS to navigate to the “targets” in your identified Search Segment.
  • 2 targets will contain debris related information. Flag this as Public Infrastructure > Debris Removal
  • SAR Teams, please remove the SAR Target Card (Blue Border) and take it with you to return to us. Please leave any targets with a green boarder in place.

SAR/First Responder Target

Structural Assessment Icon (Structure Destroyed)
Rescued x3, Live Victim Detected x1

***Exercise Target – Please Do Not Remove***
After 20 minutes, 10 “Debris Teams” use the Preliminary Damage Assessment – Public Assistance Survey to document debris locations

• 2 Debris targets per assignment area.
• These teams will locate the “debris targets” using Explore for ArcGIS
• Debris Teams, please remove the Debris Target Card (Green Border) and take it with you to return to us.
All Teams Return By 16:15!

For Quick After-Action Review

Turn off your Wi-Fi to reduce issues when you leave the building.
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Exercise Dashboard
Survey123 Backend
Debris Management Dashboard

https://arcg.is/0mSGSr
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After Action
Not So Well? Technology

Bugs (Need to fix)          Enhancements (Need to add / change)

Enter new issues here on GitHub
Enter new issues here on GitHub
What’s Next?

• Re-Convene the SAR Working Group
• Data Dictionary between SAR Damage and Preliminary Damage Assessment
• Survey123 Improvements for v7 in 2020
  • Remove Repeats and related table (#16)
  • Status / Action Field (#19)
  • Reverse Geocode (#26)
• Adoption of QuickCapture for tracks and rapid point collection
• Adoption of “triggers” for priority action (see Survey123 – Zapier – Slack integration)
R&D: QuickCapture

Auto-send or manual

Tap to start / tap to stop recording tracks

https://community.esri.com/community/arcgis-quickcapture/blog/2019/06/arcgis-quickcapture-version-10-released
SAR and First Responder Geospatial Toolkit

1. Introduction

What is the SAR and First Responders Geospatial Toolkit?

Use this story map template to adopt a common geospatial framework and train for disaster response search and rescue (SAR) missions. Incorporability between SAR teams is critical to response and recovery.

Next Steps

Each section below provides core geospatial capabilities that your team will need to prepare in advance. The left-hand side panel of each section will have a list of resources for the geospatial lead on your team, and the main stage on the right will have an opportunity to 'try it live'.

This story map is produced & maintained by the NAPSG Foundation based on work done by the LEAF FIELD DATA WORKING GROUP. This is a group of search and rescue professionals that convened in 2016 with the purpose of preparing for hurricanes and developing a common data schema for field data collectors.

2. Common Location Language

3. Readiness
**PREPAREDNESS TECHNOLOGY TALK: GEO-ENABLE SEARCH & RESCUE IN DISASTERS**

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Deployment Kits - SAR and First Responder Field Data Collection Form

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Whether the natural disaster is flooding, fire, earthquake, landslide, hurricane or tornado, there will be people in need and infrastructure to repair. A key question to be answered before any serious recovery efforts start is the magnitude and impact of the event; quantifying the damage. In times like these, collaboration, coordination and well-established procedures are critical.

The US Federal Emergency Management Agency (FEMA) Damage Assessment Operations Manual defines Standard Operating Procedures for assessing damage and outlines information considered when evaluating requests for a Major Disaster Declaration. This 60-page manual is intended for emergency management practitioners as well as private sector and non-governmental stakeholders who have a role in assessing damage or requesting disaster assistance.

FEMA has condensed the inputs that it requires by creating Preliminary Damage Assessment templates in Survey 123 for ArcGIS. These templates reflect the necessary assessment details contained in the manual and are designed to quickly operationalize this information.

The purpose of this blog post is to introduce these FEMA Preliminary Damage Assessment templates (“FEMA Templates”) and describe how they can be configured and optimized using Survey 123 to support damage assessment efforts.
Debris Management Solution

Debris Reporting Dashboard

Debris Reporting dashboard can be used for emergency response and recovery personnel to monitor reports of debris and understand responser needs for cleanup.

Adjust filters to refine the results.

Type of Debris
- All

Disposal Status
- All

Assignment
- All

Submission Date
- All

Debris Reports

- 19

- Appliances (Appliances)
  - 2/15/2021 1:55 AM
  - 19

- Sediment (Sol. Mud Sand)
  - 2/10/2021 2:12 AM
  - Basalt repositioned & mulched

- Electronic
  - 2/19/2021 8:00 AM
  - Transportation infrastructure is affected

- Construction and Demolition
  - 2/10/2021 2:12 AM
  - Construction materials not yet disposed of

- Sediment (Sol. Mud Sand)
  - 2/18/2021 1:14 AM
  - Street impassable due to sediment

- Personal Property
  - 2/18/2021 2:41 AM
  - Contents of household:

- Construction and Demolition
  - 2/14/2021 2:14 AM
  - Searches have not been completed

- Vegetation
  - 2/14/2021 1:55 AM
  - Vegetation on street

- Sediment (Sol. Mud Sand)
  - 2/14/2021 2:14 AM
  - Basalt repositioned & mulched

- Appliances (Appliances)
  - 2/12/2021 2:41 AM
  - Basalt repositioned

- InSpire
  - 2/12/2021 2:41 AM
  - street debris needs to be removed

Vehicle

Estimated Volume

1,013 cubic yards

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Thank you!
Interested in Geospatial Coordination for SAR?

Scan the QR code to open the survey on your device. Click to download

https://arcg.is/1m88Tj
Thank you!

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