



ArcGIS Apps: Taking Your Maps Offline

Brent Pierce

Kevin Burke

2020 ESRI DEVELOPER SUMMIT | Undisclosed Secret Location

2019 ESRI DEVELOPER SUMMIT
Palm Springs, CA

What we will cover today

- Overview of Apps and their offline capabilities
- Three Options for Working Offline
 - Mobile Map Packages
 - Map Areas Defined in the Webmap
 - Map Areas Defined in the App
- Offline Basemaps
- Future plans for working offline



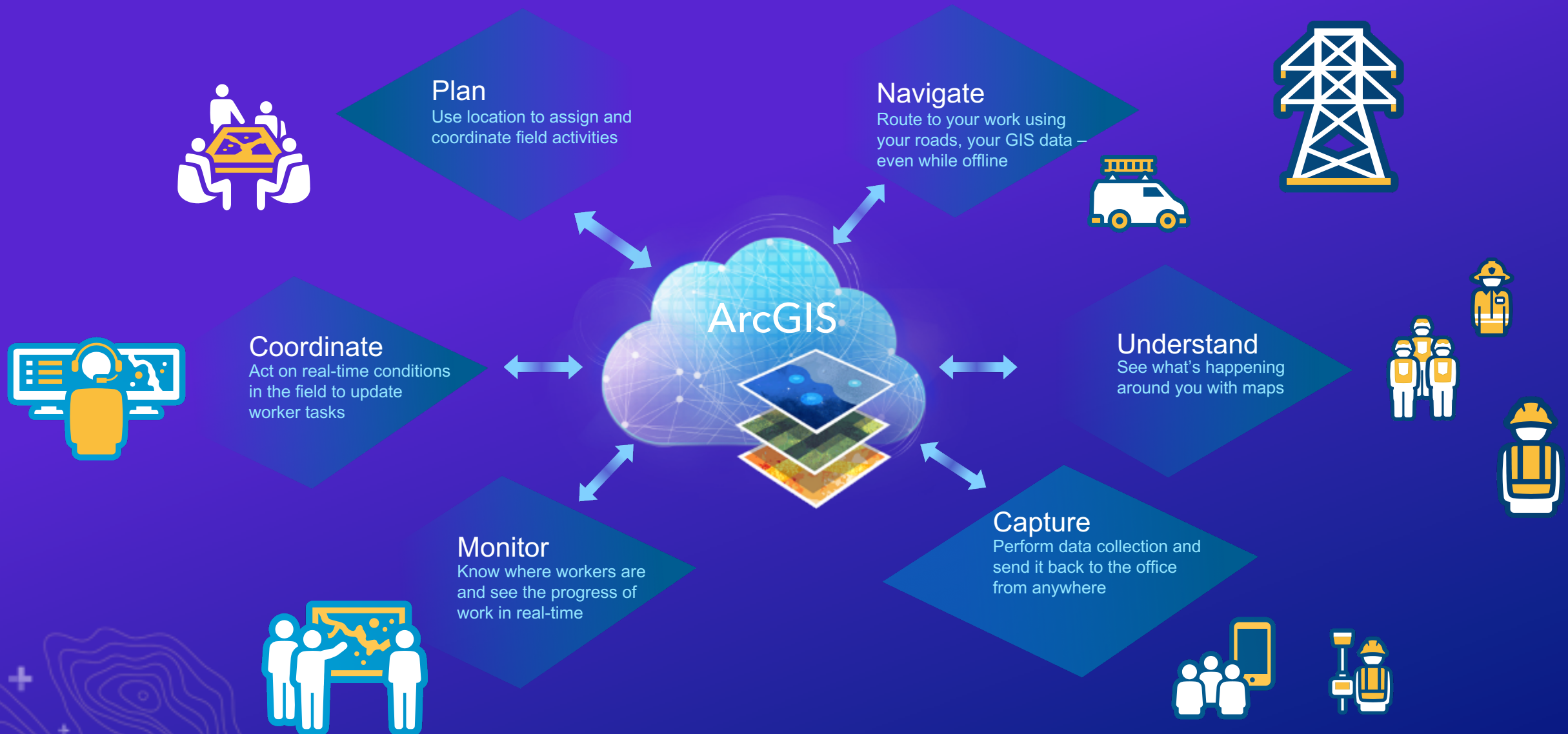
Field Operations

It starts with ArcGIS

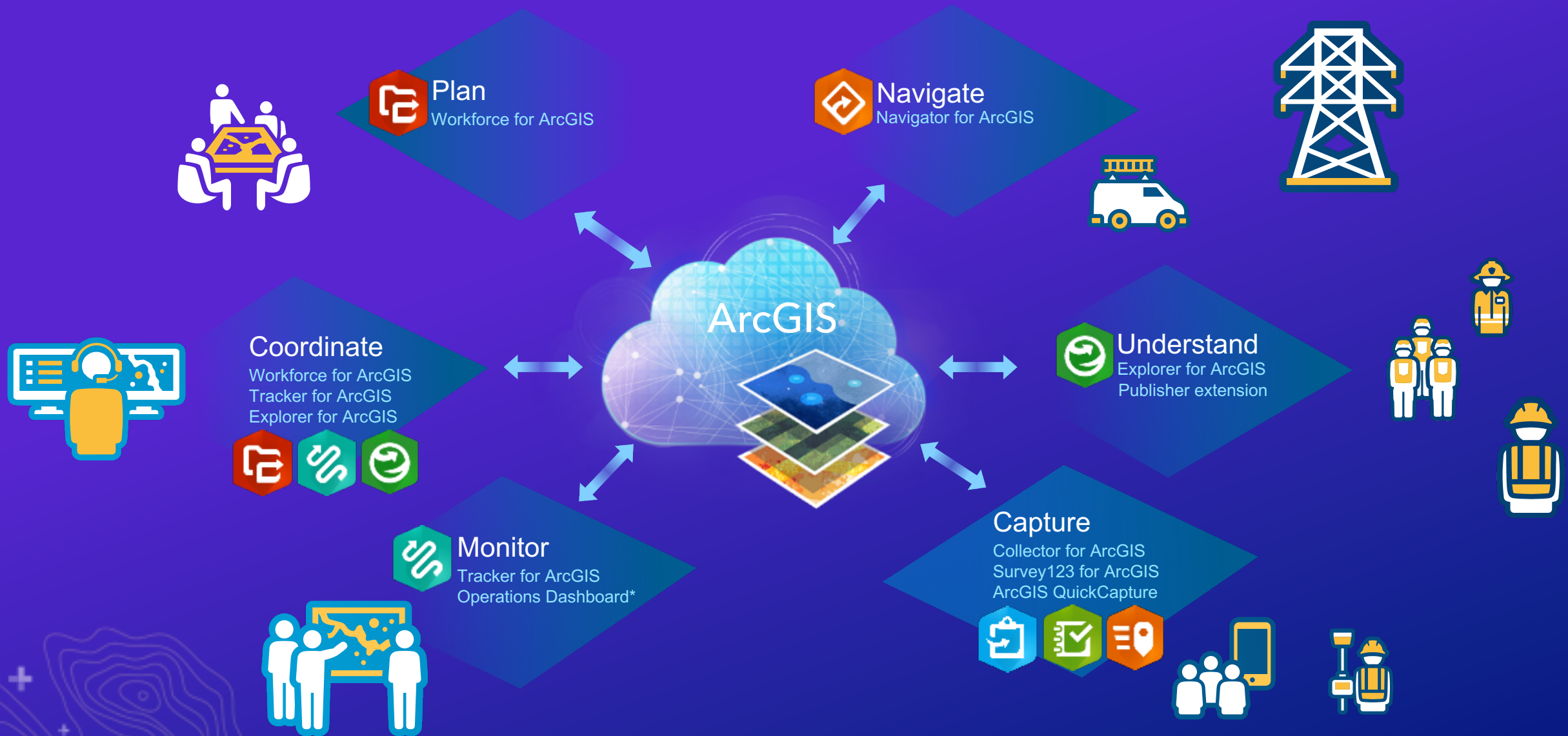


Field Operations

Location-enable all phases of field work



Field Operations | How we accomplish this today...









The Case For Offline

- Apps Are Not Always Connected
- Limited, slow, expensive or no network access
- Mapping and location functionality needs to work
 - Maps
 - Vector
 - Imagery
 - GPS Location
 - Feature Search
 - Routing
 - Popups
- Workers need to get their work done without internet access



Most field apps work offline

- Collector 
- Explorer 
- Navigator 
- Tracker 
- Survey 123 
- Quick Capture 

Three Methodologies for Taking Your Maps Offline

1. Mobile Map Packages (MMPK)
2. Map Areas Defined in the Webmap
3. Map Areas Defined in the App



ArcGIS Pro based

Webmap based

Methodology 1: Mobile Map Packages

Who uses them and why

Navigator – Private Roads, Drive to Assets (hydrants, trees, any location)

Explorer – Digital version of Paper map, Anonymous use

Developers – Runtime SDK, AppStudio

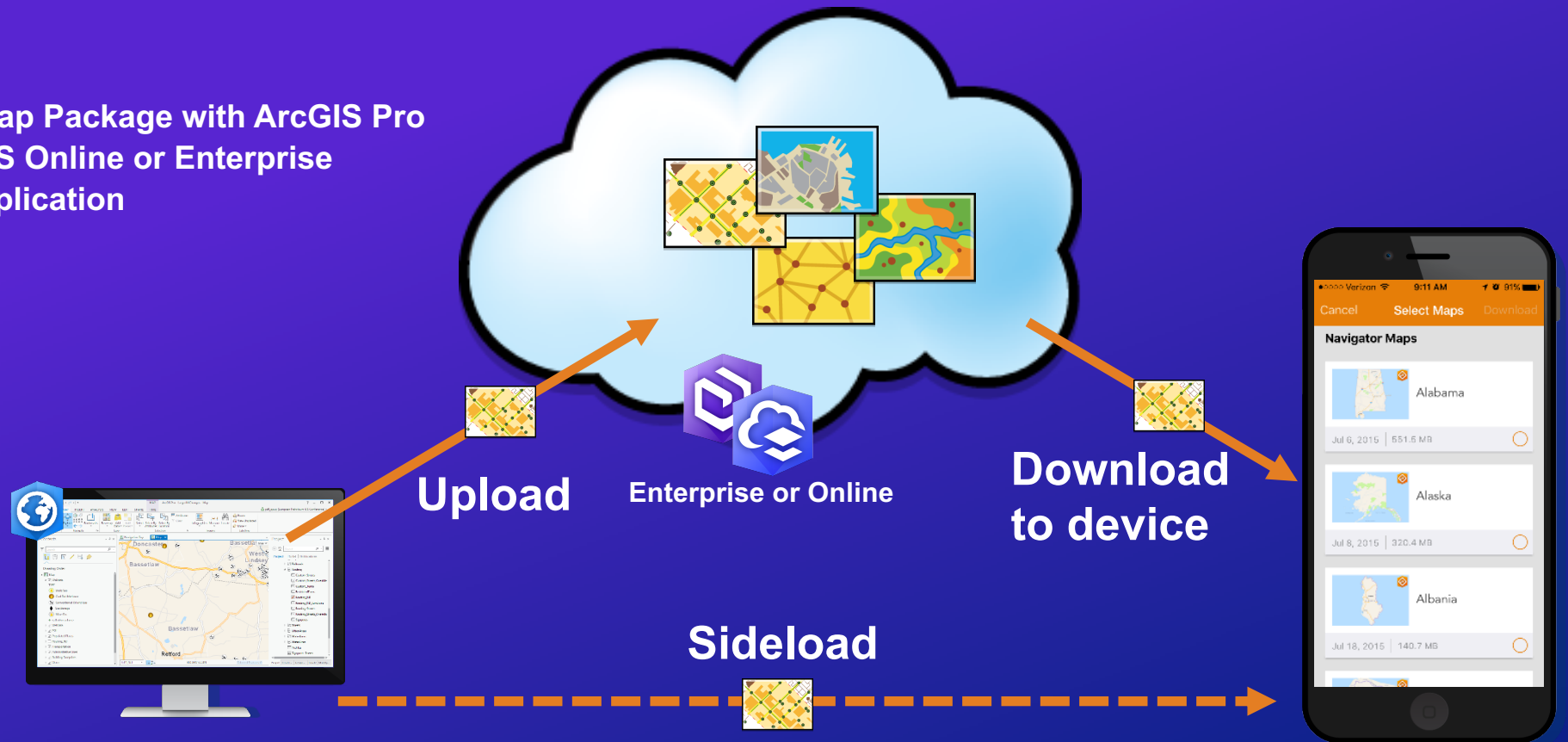
Created using ArcGIS Pro



Methodology 1: Mobile Map Packages

The creation and use of MMPKs

1. Create Mobile Map Package with ArcGIS Pro
2. Upload to ArcGIS Online or Enterprise
3. Download to Application



Note: Maps on device can check for updates

Methodology 1: Mobile Map Packages

Using ArcGIS Pro to Create MMPKS

- **Best Practices**

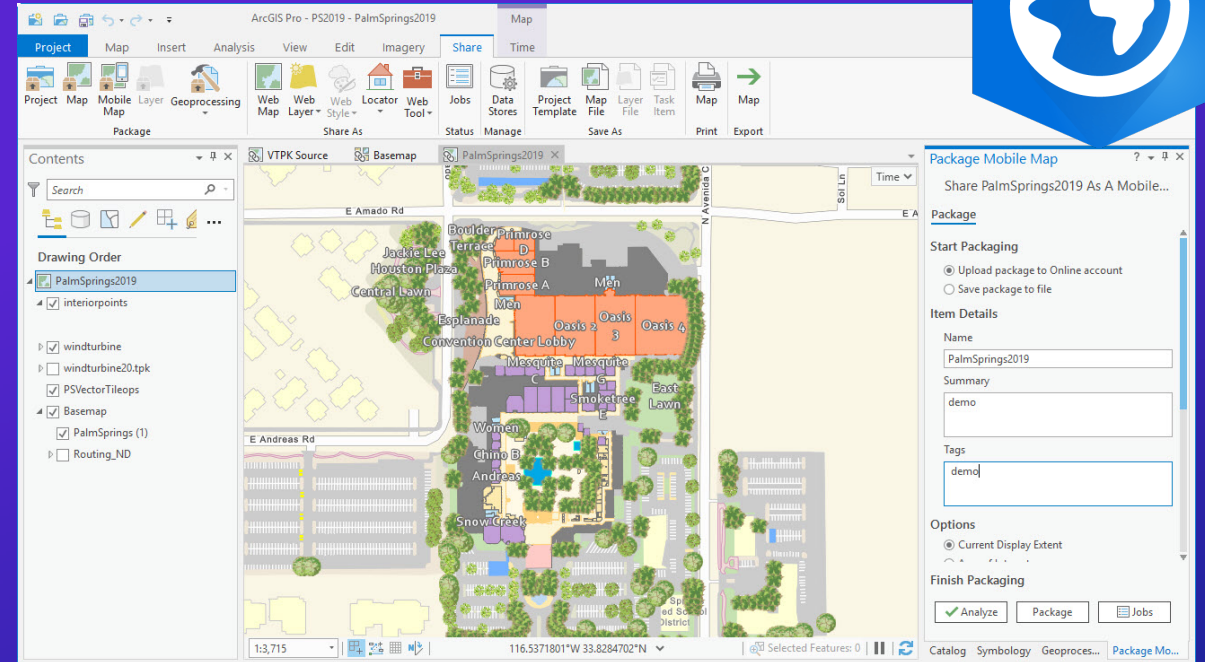
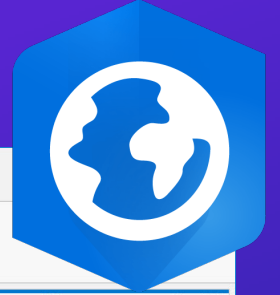
Basemap, Operational Layers

Use VTPK when possible

More Details

<https://community.esri.com/community/gis/applications/arcgis-pro/blog/2018/01/20/use-arcgis-pro-21-to-make-an-offline-map>

<https://community.esri.com/community/gis/applications/arcgis-pro/blog/2018/06/29/using-arcgis-pro-22-sharing-and-the-publisher-extension-to-make-a-public-offline-map-with-hillshading>



Demo 1

Introduction to Mobile Map Packages



Methodology 2: Map Areas Defined in the Webmap

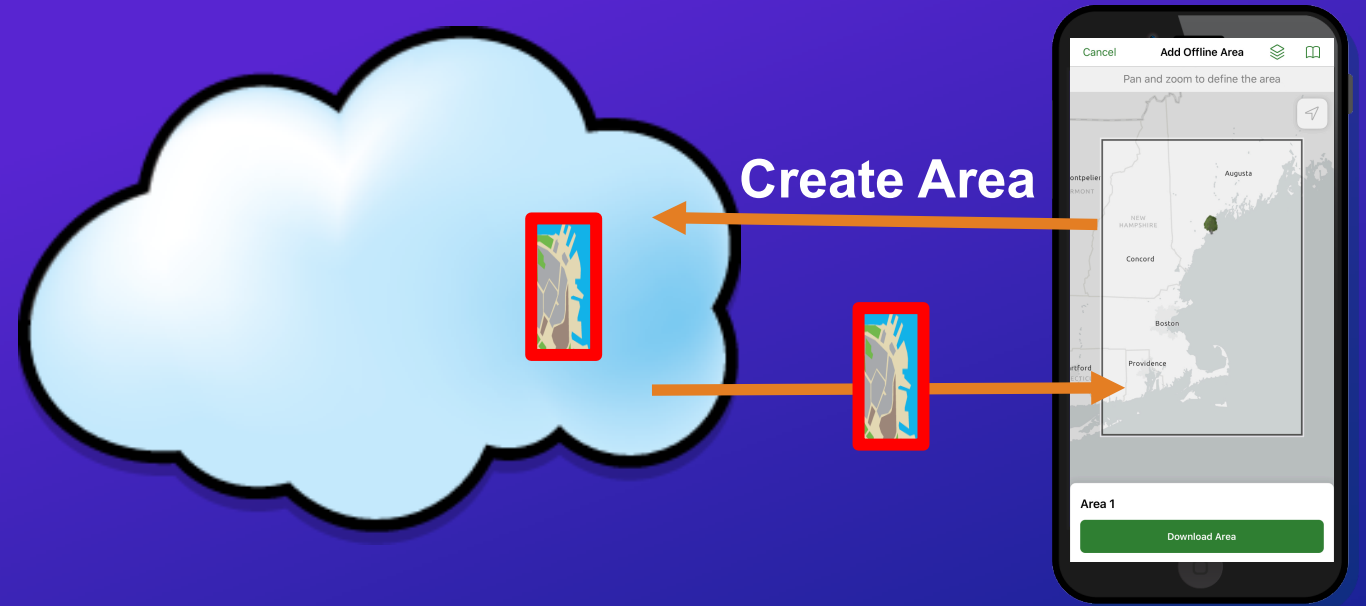
1. Define areas in the webmap
2. Initiate map area creation in the cloud
3. Download area in field app



Note: Maps on device can check for updates

Methodology 3: Offline Areas Defined in the App

1. Define areas in the application
2. Download Area




Note: Maps on device can check for updates


Creating Map Areas from the Web Map


[Home](#) [Gallery](#) [Map](#) [Scene](#) [Groups](#) [Content](#) [Organization](#)

Kevin Burke
kburke_apps

3


Gas Utility Network Map 




 Edit Thumbnail


☆ Add to Favorites

Add a brief summary about the item.

 Web Map by kburke_apps

Created: Mar 4, 2020 Updated: Mar 4, 2020 View Count: 3

 Edit


 Edit

Overview


Usage

Settings

Open in Map Viewer


Open in ArcGIS Desktop 

Create Presentation

Create Web App 


Share

Item Information

 Learn more

Low

High




 Top Improvement: [Add a summary](#)

Details


Size: 39 KB


Shared with: **The item is not shared.**

★★★★★


  

Owner

 kburke_apps

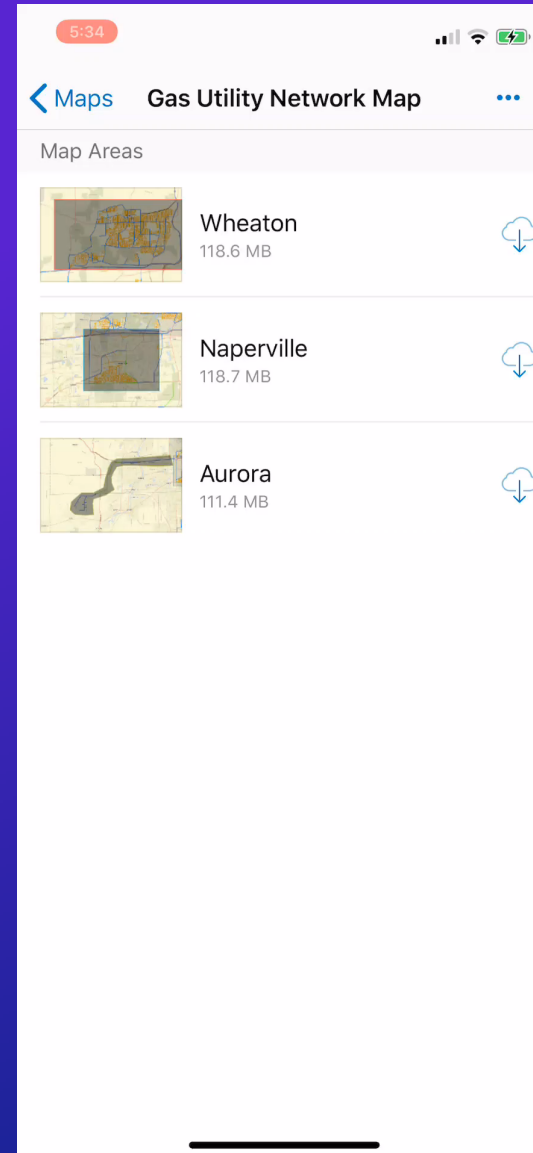
 Change Owner

Folder

 Move

DevSummit2020

Using Map Areas in the App



General Information

- Available through ArcGIS Online and ArcGIS Enterprise 10.7+ via the web map settings in the Offline section under **Manage Areas**:

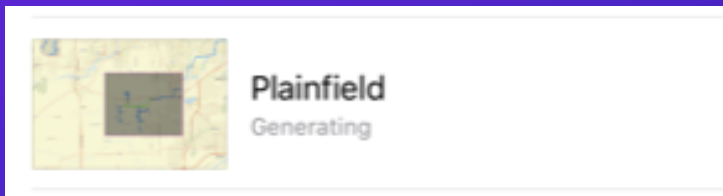
Map Areas



While not required, it is recommended that you create map areas ahead of time to package data for specific areas you expect to be used offline. Using map areas makes taking maps offline easier and faster.

You have no map areas yet, click Manage Areas to get started.

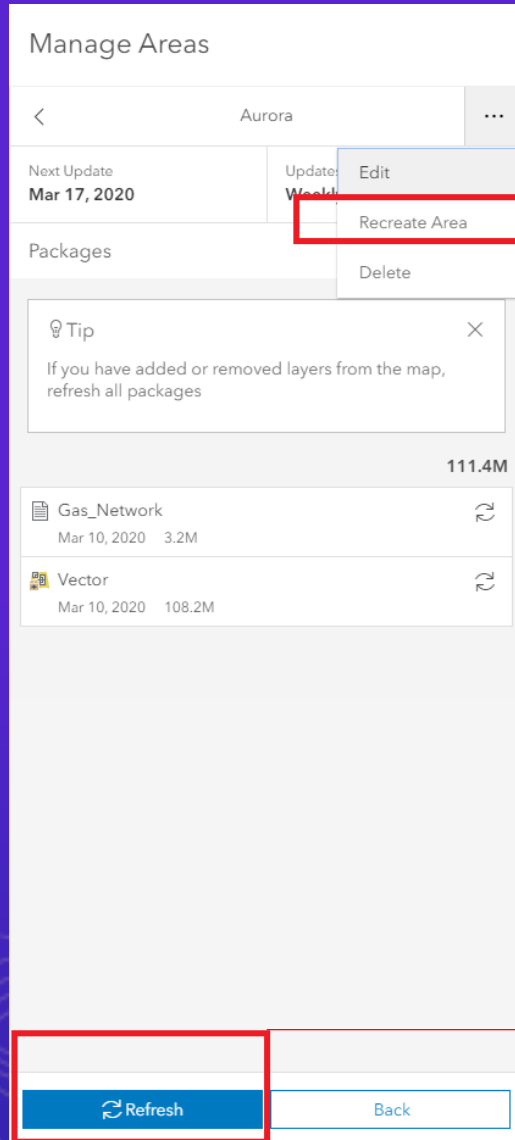
[Manage Areas](#)

- Create up to 16 areas per web map
- Construct each area as a rectangle or as an irregularly shaped polygon
- During the construction of new areas, Collector displays '**Generating**' next to that area until it's ready to be downloaded once all file components for that area have been constructed such as:



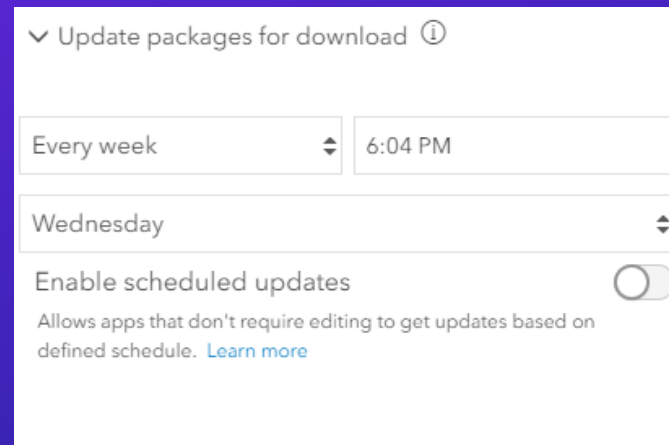
 Gas_Network	72
Mar 4, 2020 3.2M	
 Vector	72
Mar 4, 2020 107.6M	

Updating Existing Map Areas



Use when:

- Fields have been added or removed from a layer
- Domains or feature templates have been modified
- **NOTE:** All existing packages will be deleted and new packages will be created. Users will need to redownload the new packages.



Use when:

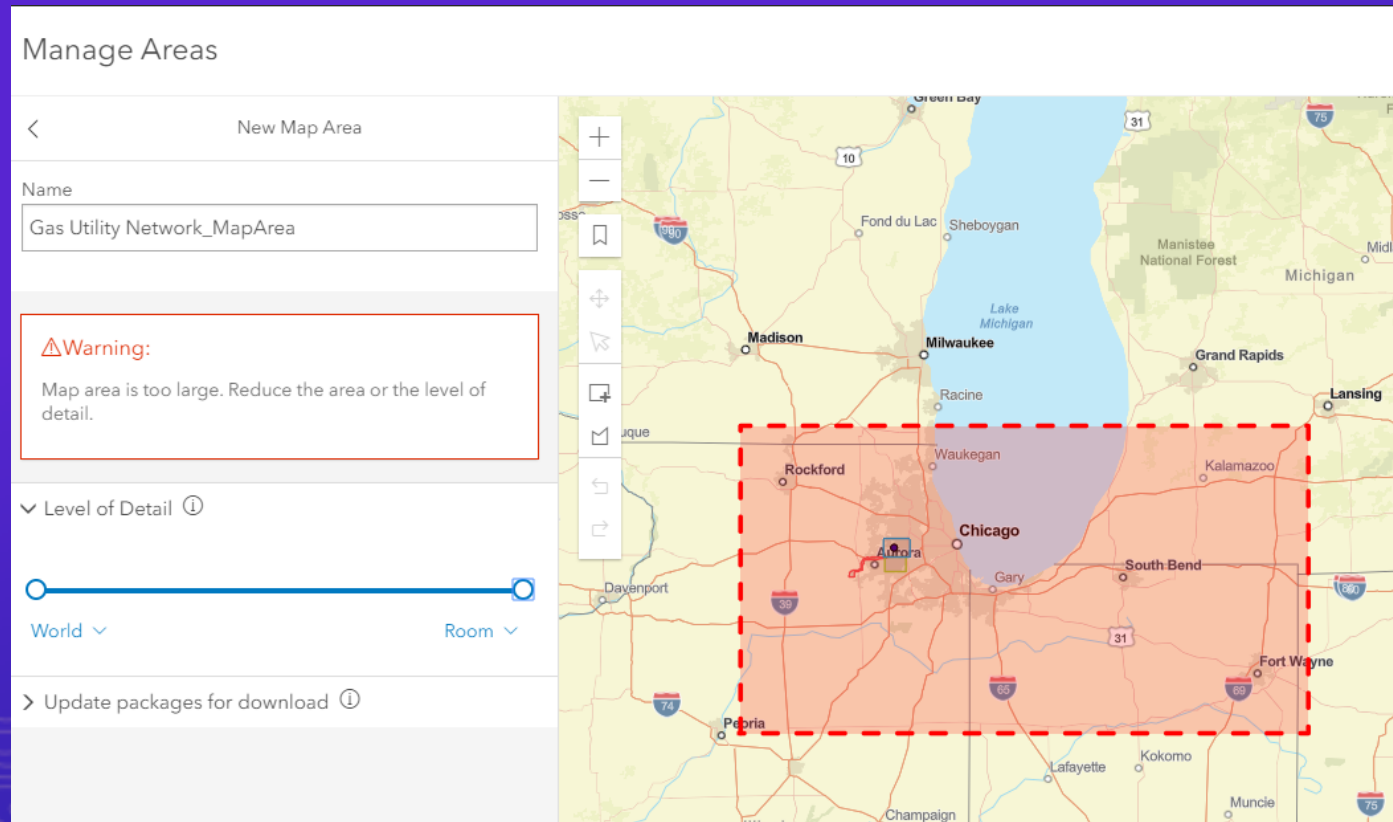
- Field users require regularly updated read-only content
- This is not supported with editing workflows. i.e. one-way update
- Supported with Explorer.
- Not supported with Collector.

Use when:

- Layers have been added or removed from the map
- The data for one or more feature layers have changed significantly since it was last packaged
- When using scheduled updates

Basemap Tile Export Limits

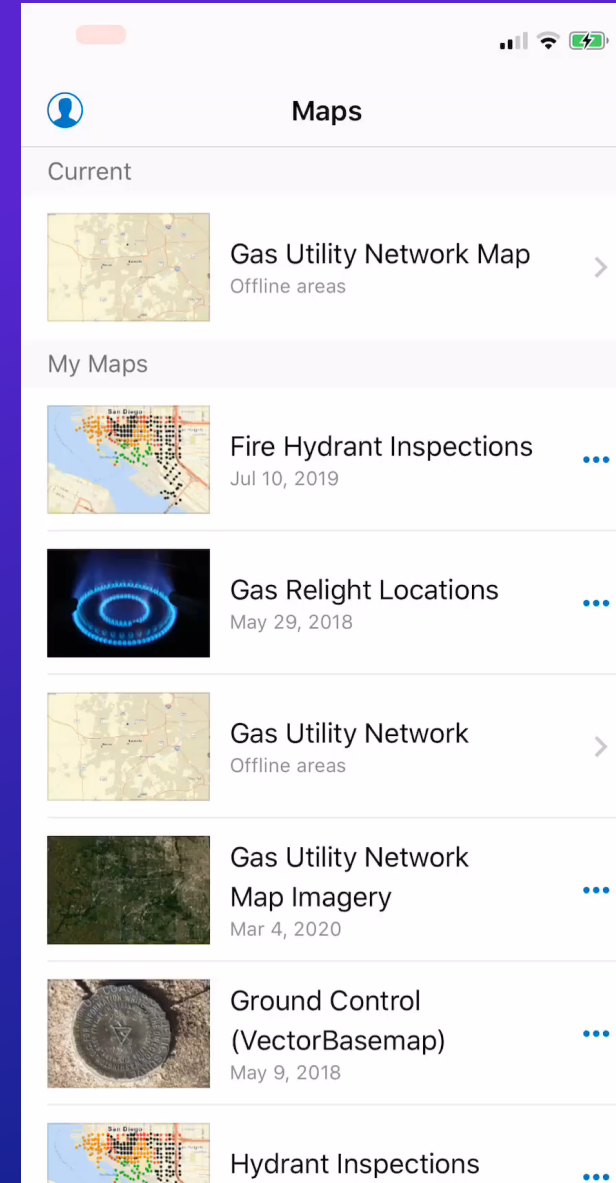
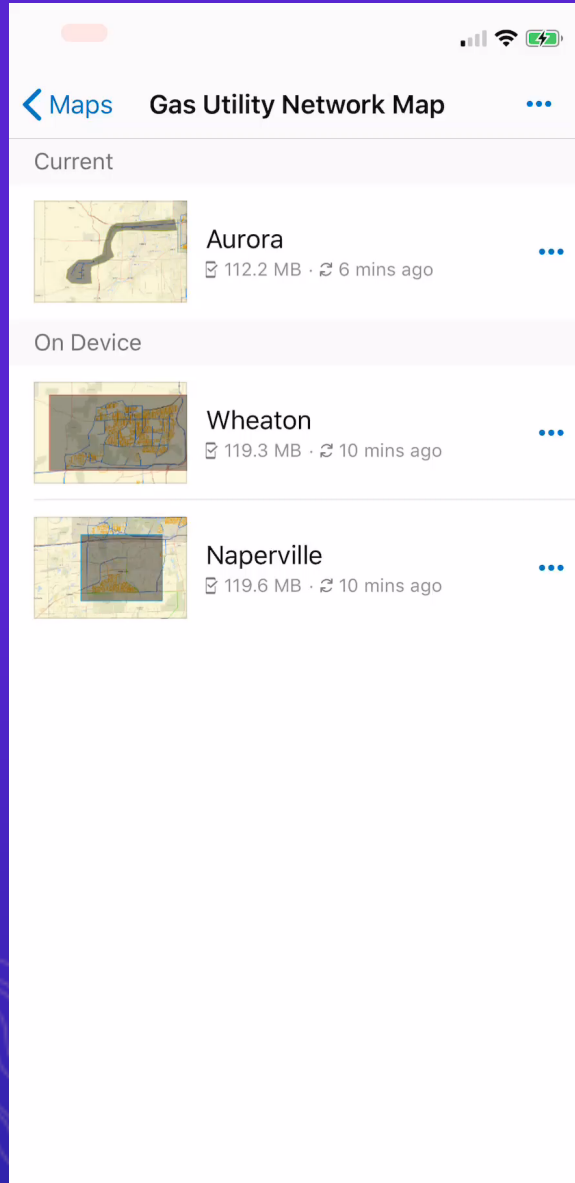
- Esri raster tiled basemaps = **limited to 150,000 tiles**
- Esri vector tiled basemaps = **limited to 10,000 tiles**
- When the maximum tile limit has been exceeded, the following error will be presented:



Working with Map Areas Defined in the App



Creating Map Areas in the App



Advanced Offline Options

- Utilize Advanced Offline Options in the web map settings to control the downloading of feature geometry and/or attachments with offline areas.
- Different options are available for both editable and read-only layers in the web map:

Editable features

- ☒ Device will download and get updates to features and attachments.
- ☐ Device will download and get updates for features only.
- ☐ Device will never download or get updates for features.

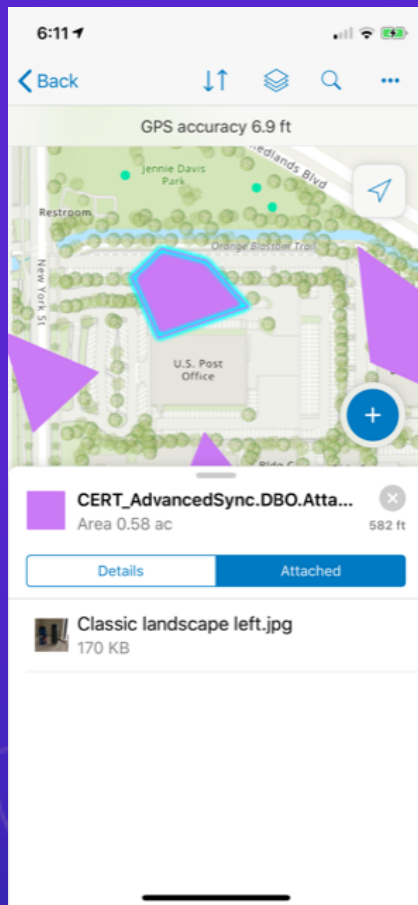
Read-only features

- ☒ Device will download and get updates to features and attachments.
- ☐ Device will download and get updates for features only.

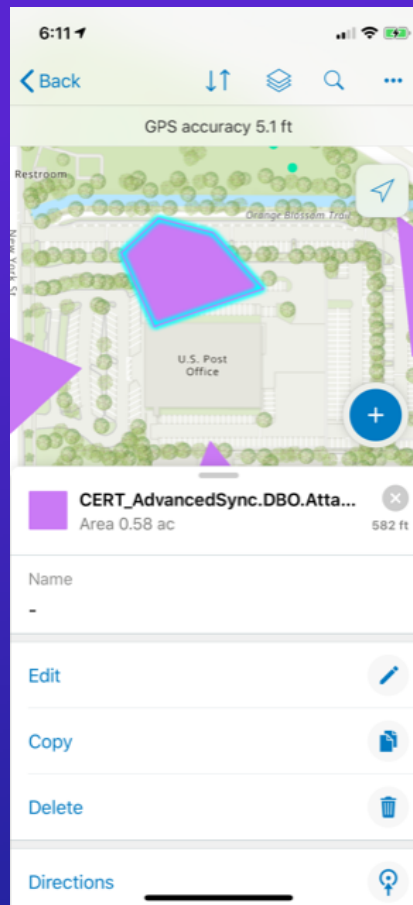
Using Advanced Offline Options with Editable Features

- Examples of each Advanced Offline Option for editable features:

Features + Attachments



Features Only



Schema Only



Working with Local Basemaps



Working with Local Basemaps

- Often referred to as ‘Sideloaded’ basemaps
- Includes file types such as TPK, TPKX, and VTPK
- Two ways to utilizing sideloaded basemaps:
 - Switching between different basemaps using the Basemap tool from an opened map (online or offline area)
 - Applying a sideloaded basemap as the default basemap to a new offline map area (Basemap by Reference)
- The main reason for wanting to utilize a sideloaded basemap as oppose to publishing it as a tiled service and downloading it with the offline map area, is often due to the size and complexity of the basemaps.
- Multiple methods for sideloading basemaps onto devices:
 - Manually over a USB connection between the device and PC/MAC (iOS)
 - Using a third party sharing app such as Google Drive, iCloud drive (iOS), etc.
- Switching between sideload basemap in offline areas requires:
 - The SR of the default basemap in the web map must match the SR of the local basemap.
 - The offline map extent must intersect with the extent of the local basemap.
- Basemap by Reference workflow requires:
 - Specifying the file name for the sideloaded basemap within the Advanced Offline Options:

Use a tile package for the offline basemap. ⓘ

Define what mobile devices use for a basemap.

☐ Device will use the basemap defined by the web map.

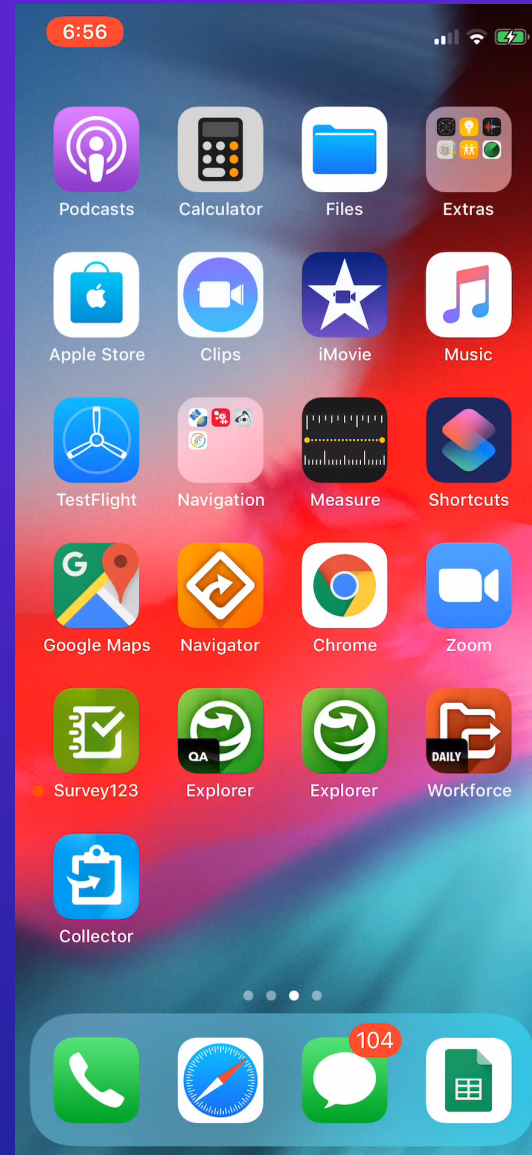
☒ Device will use a tile package it already has.

Package filename

RedlandsTiles.tpk

Enter the filename of the package on your device.

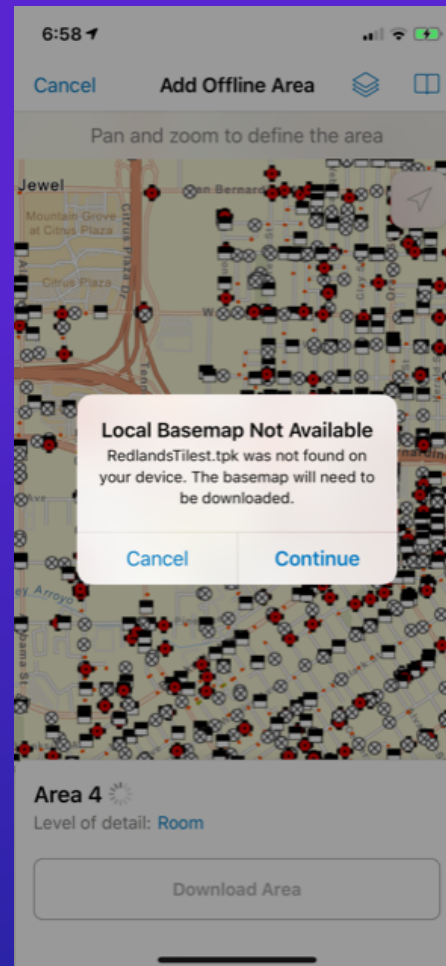
Basemap by Reference Workflow



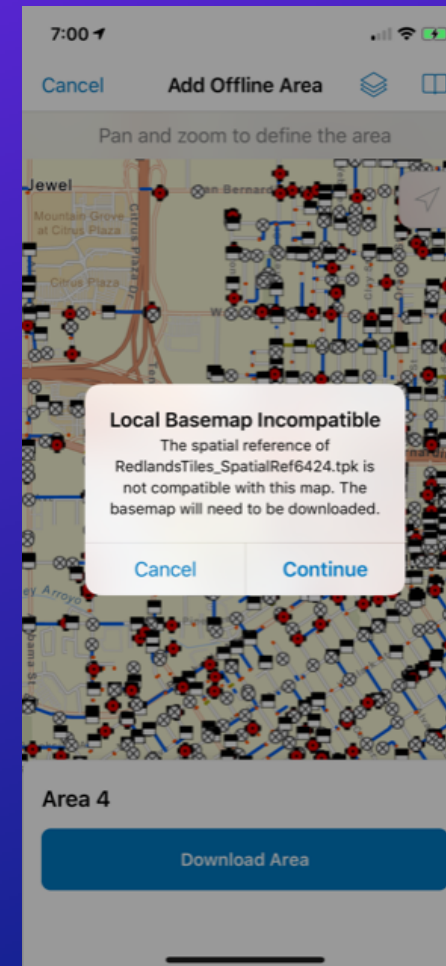
Basemap by Reference Workflow – Additional Information

- A few key points to highlight:
- In these cases, choosing 'Continue' proceeds with the download but uses the default basemap defined in the web map.

TPK not found on local device



TPK SR doesn't match SR of web map



Offline Workflows – Pros and Cons

- **Mobile Map Packages**

- Pro - Can be side loaded
- Pro - Can have routable network
- Con - Static, updates are a full replacement

- **Map Areas Via Defined in App**

- Pro - Field worker flexibility
- Pro - Take only what you need
- Con - Increased load on the server

- **Map Areas Defined in Webmap**

- Con - Areas must be anticipated
- Pro - Very simple
- Pro - Optimizations
 - Scheduled Updates (Delta Workflow)

The Road Ahead for Field Apps Offline

Offline Capabilities Coming to Workforce

- New projects will have offline capabilities
 - Projects are downloaded before you open them
 - You are always working on device
 - Remove projects from your device when finished
 - Optimize the download process by creating an offline map area for your project
- Improving Web Tool for configuring offline experiences
- Sharing content between our apps

Resources

Offline Implementation Guide

- <https://www.esri.com/content/dam/esrisites/en-us/media/pdf/implementation-guides/take-your-web-maps-offline.pdf>



esri

THE
SCIENCE
OF
WHERE