



Using ArcGIS Online to Manage Snow Operations



Tom Maggard
GIS Technician
City of Greenwood



Outline of Today's Presentation

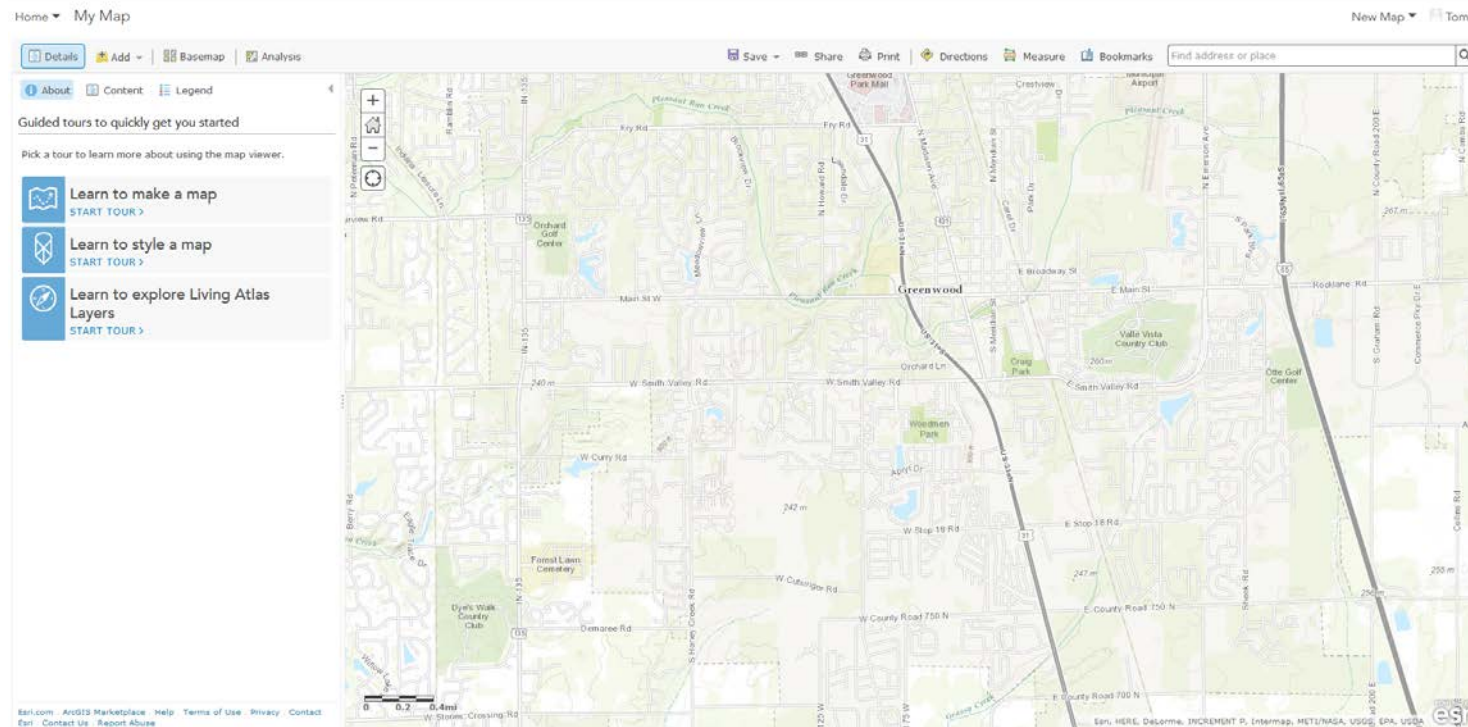


- Brief Overview of ArcGIS Online
 - How to store data and publish maps
 - Examples of snow management
- The Beginning of Our Snow Map
 - Last year had a lot of snow to keep track of
- Improvements to the Snow Map
 - Taking lessons learned from last year and implementing
- Live Demo of Snow Map
- Future Plans of the Snow Map



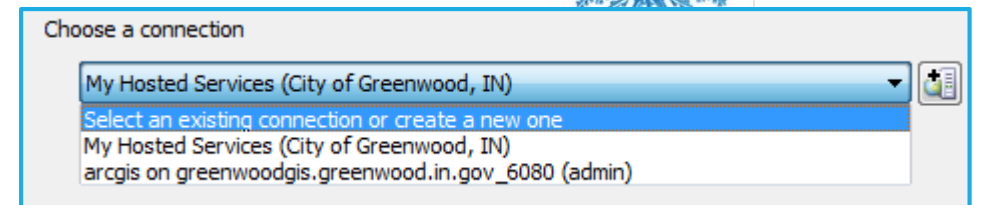
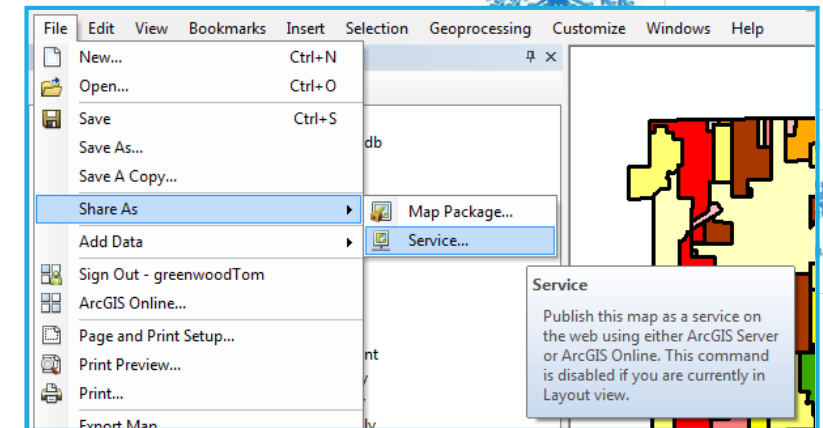
ArcGIS Online (AGOL) Overview

- Online uses a subscription account with that is included with your ArcGIS Desktop license
- Number of basemaps, such as imagery, street, and political boundary maps are available
- Online uses a multitude of data types, created from feature classes and shapefiles
- online maps are sharable, either by embedding into websites or creating url



Getting Data Online

- 2 main ways to publish and manage data into the AGOL world
 - 'My Hosted Services' site – ArcGIS Organizational Account
 - This is where I store Greenwood's online data
 - ArcGIS Server
- two difference
 - Online vs On Premises data storage
 - How get the data into the hands of workers/citizens



Greenwood AGOL Public Maps



Boundary Map



Building Permits – Active



Johnson County Historical Markers



Parks and Trails



Common Council



Legal Drains



Road Ownership



Trash Service



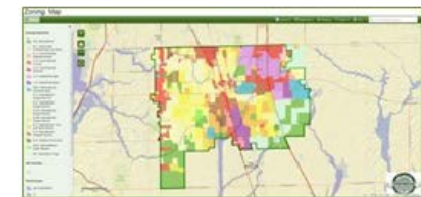
Letters of Map Amendment



Library Districts



Utility Coverage Map



Zoning Map




Esri Snow Management



Solutions for Smart Snow Fighting

SCROLL TO EXPLORE

I'm interested in Esri's Snow Solutions [Connect Now](#)




Weather Watch Bundle

Desktop
ArcGIS for Desktop Basic

ArcGIS Online
ArcGIS Online Level 1 Plan

AccuWeather
U.S. Severe Weather Premium Service Subscription

\$8,150



Storm Management Bundle


Desktop
ArcGIS for Desktop Standard

- Spatial Analyst
- Network Analyst

ArcGIS Online
ArcGIS Online Level 1 Plan

AccuWeather
U.S. Severe Weather Premium Service Subscription

\$17,550



Storm Operations Center

Desktop
ArcGIS for Desktop Standard

- Tracking Analyst
- Network Analyst
- Spatial Analyst

ArcGIS Online
ArcGIS Online Level 1 Plan

AccuWeather
U.S. Severe Weather Premium Service Subscription

Server

- Windows Database Server*
- ArcGIS for Server Enterprise Standard
- ArcGIS GeoEvent Extension for Server

SnowCOP Application
[More about SnowCOP](#)

***Contact for Pricing**

Solutions for Smart Snow Fighting

Esri Snow Management Case Studies

Boston tracks snowplows with GIS-based SnowCOP to keep roads clear



- “Over the course of a storm, we have 500 to 600 plows pinging once each minute for 18 hours or longer”
- “The system tracks almost 30,000 street segments in the city”
- “display the locations of Boston’s snow-fighting workers with real-time 311 information from residents”



Esri Snow Management Case Studies

Managing GIS Operations for Snow Removal for the City of Columbus OH



- “Displaying real-time vehicle location data provided by Network Fleet (15-second intervals)”
- “Allowing users to search historical vehicle activity by a location on the map or by information, such as brass tag, street centerline, or street maintenance zone”
- “Providing standard reports for route completion, customer service requests, and truck activity summary”

Esri's Severe Weather Public Information Map

Severe Weather Public Information Map

Find address or place

Legend

- Sign in to Twitter
- Flickr photos filtered by: rain OR tornado OR blizzard OR ice OR snow
- Twitter tweets filtered by: rain OR tornado OR storm OR ice OR blizzard OR wind
- YouTube videos filtered by: rain OR tornado OR storm OR ice OR blizzard OR wind
- NOAA_Storm_Reports
- Hail Storm Reports (24 hours)
- Tornado Reports (24 hours)
- Wind Storm Reports (24 hours)
- Weather Watches, Warnings, and Advisories
- Events Ordered by Size and Severity
 - 911 Telephone Outage
 - Administrative Message
 - Air Quality Alert

Map features include: State and province boundaries, major cities, geographical features like the Great Basin, Sierra Madre Occidental, and Appalachian Mountains, and various weather data overlays such as rain, snow, and wind patterns. Numerous red 'YouTube' icons are scattered across the map, indicating video content related to severe weather events. The map also includes navigation controls (zoom in, zoom out, home) and a search bar.

POWERED BY esri

The Beginning of Our Snow Map

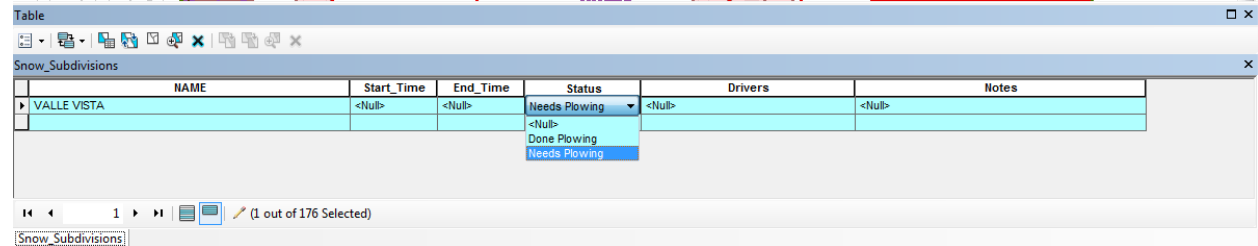


- Last year after a couple of snow events my boss approached me
- He was curious if there was a way to make a map to track snow plow activities
- This map would need to be able to show
 - Subdivisions plowed
 - Roads plowed
 - Which roads to plow/not plow
- I said that I could and got started working



The GIS of the Snow Map

- Started with Roads
 - Determined which were public/private/state
- Moved onto Subdivisions
 - Began by removing any 'Commercial' subdivision
 - Then removed subdivisions that didn't have roads or had only private roads
- I then created new GIS Feature Classes and added new fields to track snow data
 - Status – Needs Plowing, Done Plowing
 - Drivers – 254 character limit, plenty of room to enter names
 - Notes – 254 character limit
 - Start Time
 - End Time

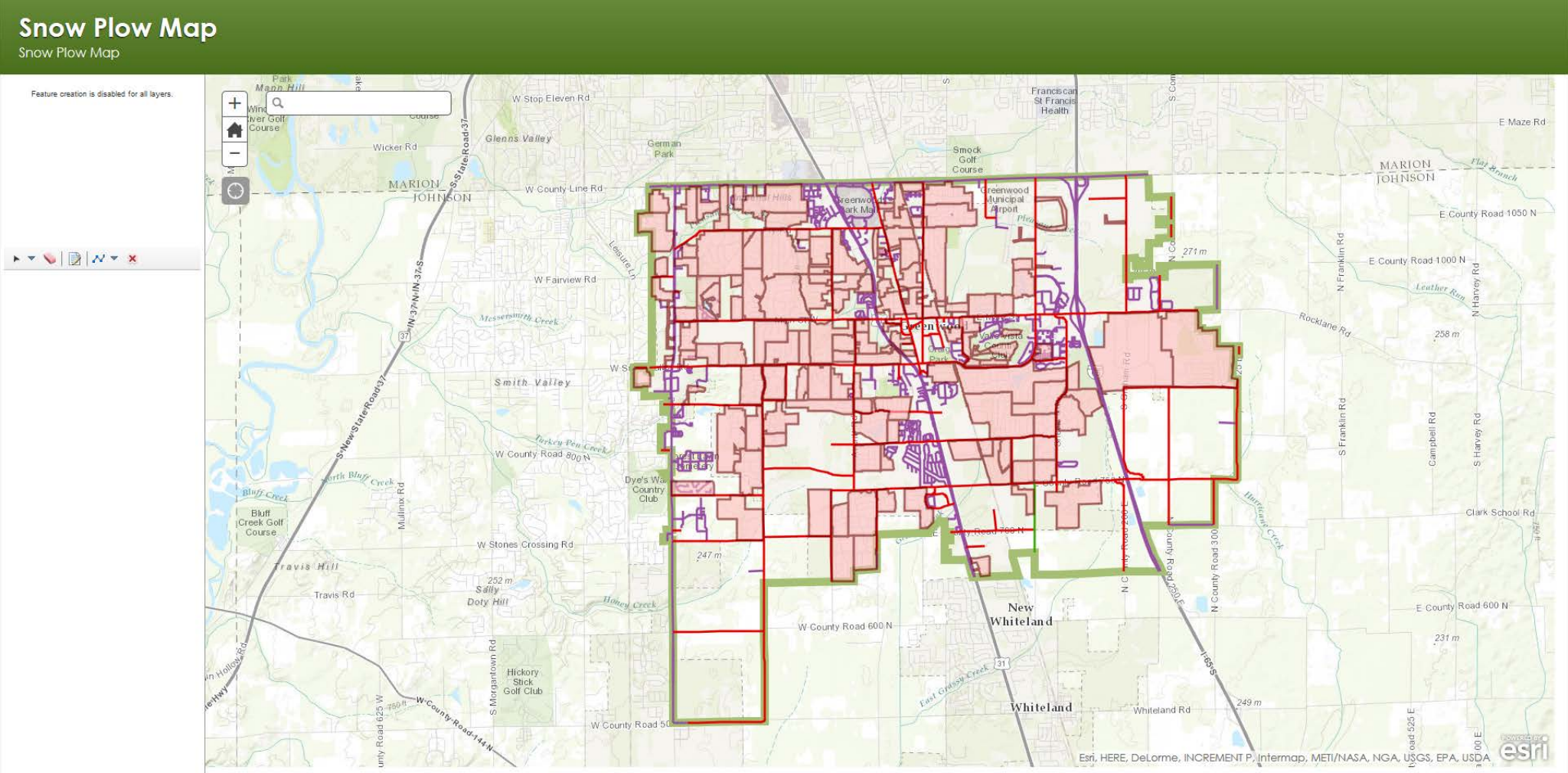


The screenshot shows a table window titled 'Table' with a sub-window for 'Snow_Subdivisions'. The table has the following columns: NAME, Start_Time, End_Time, Status, Drivers, and Notes. The first row is highlighted in cyan and contains the following data: NAME: VALLE VISTA, Start_Time: <Null>, End_Time: <Null>, Status: Needs Plowing (with a dropdown menu open showing options: <Null>, Done Plowing, Needs Plowing), Drivers: <Null>, Notes: <Null>. The status dropdown menu is currently open, showing 'Needs Plowing' as the selected option. The table footer indicates '(1 out of 176 Selected)'.

| NAME | Start_Time | End_Time | Status | Drivers | Notes |
|-------------|------------|----------|---------------|---------|--------|
| VALLE VISTA | <Null> | <Null> | Needs Plowing | <Null> | <Null> |

The AGOL of the Snow Map

➤ Uploaded the GIS data to AGOL and created a map like this



The AGOL of the Snow Map



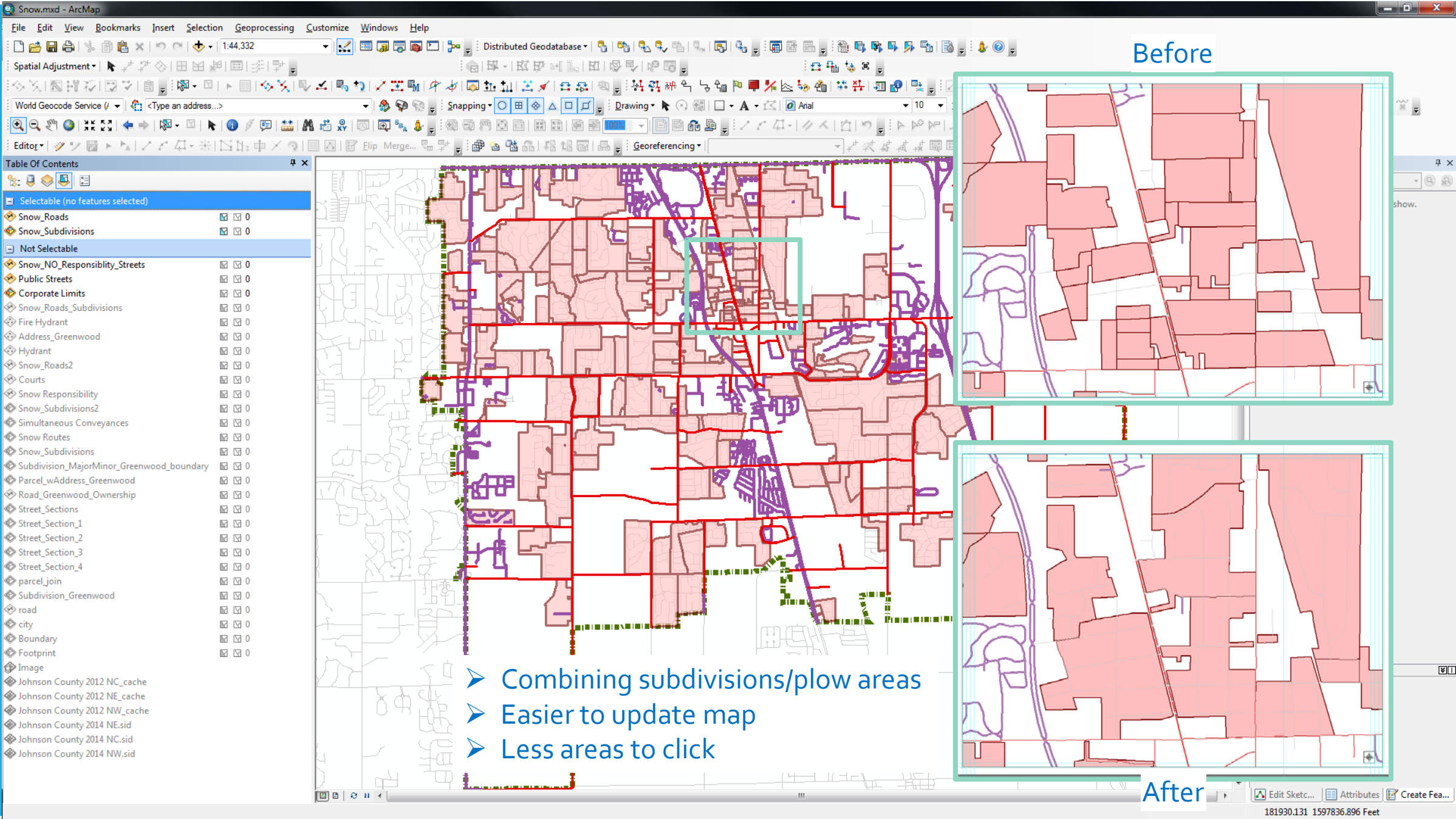
- After each snow event I asked for input from whomever was updating/using map
 - What did you like/dislike
 - What do we need to do to make it easier/more user friendly
- Hardest part of all this was that no one had iPads yet
- Only able to update on desktop (even though map was mobile friendly)
- Meant coming up with system of phone calls to get the map updated
 - Crew calls crew leader who calls person updating map
 - Not ideal but effective for the initial stages
- Able to use the map for the rest of that season with the plan to update it for the next year



Snow Map Updates

- Getting ready for the current snow season we started talking about how to improve the map
- One advantage was that more people had iPads
 - Allowed for easier and more timely updates
- Some improvements to the map
 - Combining of Subdivisions/Plow Areas
 - Consulted with Street Dept. Supervisors to determine best way to do this
 - Some subdivisions are tiny
 - Mainly in our downtown area
 - Others have large areas that drivers plow, encompassing multiple subdivisions
 - Major roads were split into appropriate areas of coverage
 - Main St (EW road thru town) was split at Madison Ave
 - Fine tuned drop down options
 - Removed some options (Partial) deemed not needed





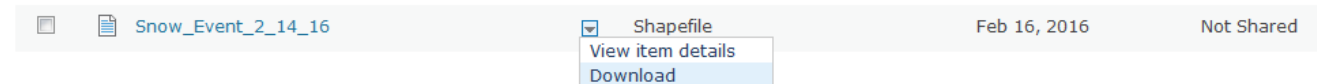
Before

After

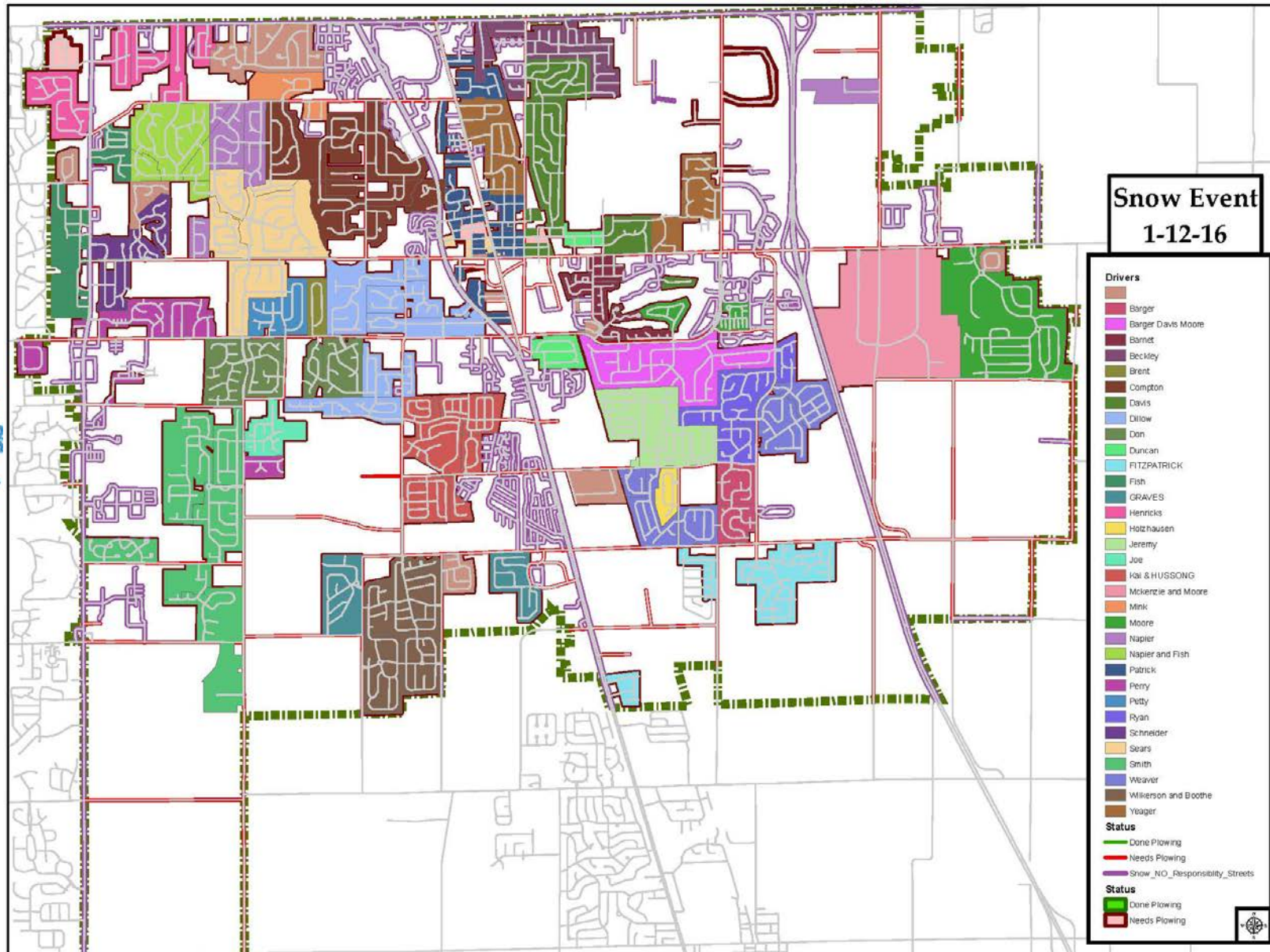
AGOL Snow Event data



- Updating the map during an event
 - Street Dept. Supervisors utilize iPads and desktop computers
 - Receive phone calls/texts from crews when they finish an area
 - Since the supervisors are also plowing while updating they generally wait until they receive 3-4 updates before adding that to the map
 - Go over map after event on desktop
 - Double check and add any final changes
- Once an event is done
 - I create a shapefile, that is dated per the event, and download it to my desktop
- I then can track each event
- Able to make maps showing who plowed where

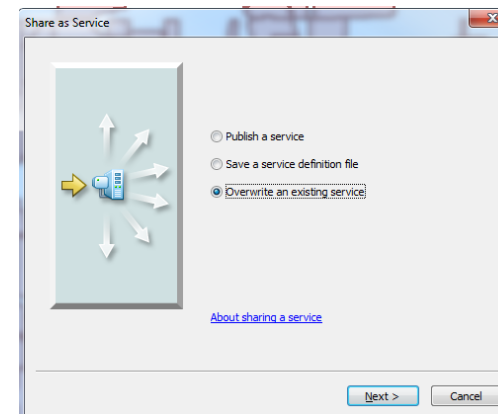
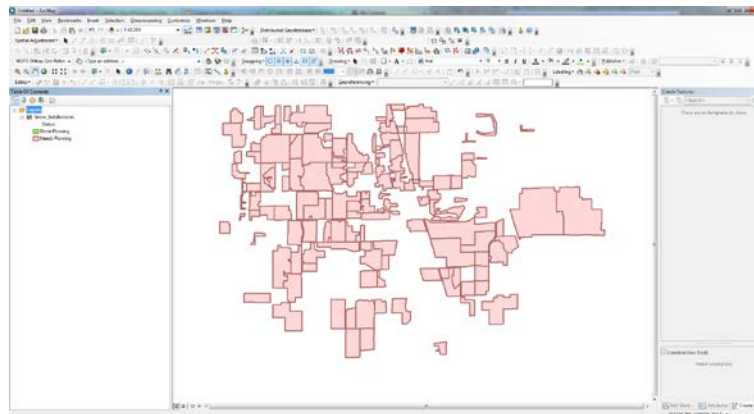


Snow Map produced from AGOL data



Updating online snow subdivision feature class

- Once an event is over and I've downloaded the data it's time to overwrite the map and make it ready for the next event
 - I go to my desktop GIS and open my snow map
 - I take the 'clean' snow subdivision feature class (empty schema) and overwrite the online feature class
 - This 'resets' the map back to the beginning
 - All subdivisions/plow areas are red (Needs Plowing)



- Now the online map is ready for the next Snow Event
- Lets have a quick Live Demo of the Snow Map



Future of the Snow Map



- Continue working with all departments to ensure the map is working effectively
- Hope to have iPads in all Snow Plow trucks by next winter
 - Will allow for easier updating and more information
 - Drivers to easier identify when they are starting/stopping to plow an area
 - Currently not worrying about time
 - Too much information for supervisors to add to the map during a snow event
 - Even quicker turn around for supervisors to determine areas in need or already completed
- Would ultimately even allow for a 'live' snow map which could be made public



Future of the Snow Map



- By next year we are hopeful to have Cityworks up and running for the street department
 - Cityworks is an asset management/work order software
- Snow Events will be handled through Cityworks
 - Drivers will be assigned work order for their route
 - Will update their progress and completion in Cityworks
- Superintendent and supervisors will go to Cityworks dashboard to gain insight on a snow event
 - Different manner of assessing drivers/areas during event with the same results
 - Historical snow data
 - Usage statistics
 - Salt, gas, overtime, truck mileage, etc.



Benefits of the Snow Map



- The success and usefulness of this map has been noticed by the Street Dept Superintendent
- He recently asked for more online maps that will allow them to track
 - Street Sweeping
 - Potholes
- This has also been a useful tool in getting people ready for Cityworks
- Will have different style map and data entry points
- Helps users prepare for moving from paper to digital



QUESTIONS??

Email – maggardt@greenwood.in.gov



[Tom Maggard](#)



[@TomMaggard](#)

