

Building and Maintaining a Highly Available ArcGIS Enterprise Environment

**Southwest Florida
GIS Symposium**

April 13, 2023

 Bonita Springs Utilities, Inc.

JonesEdmunds 

Project Background

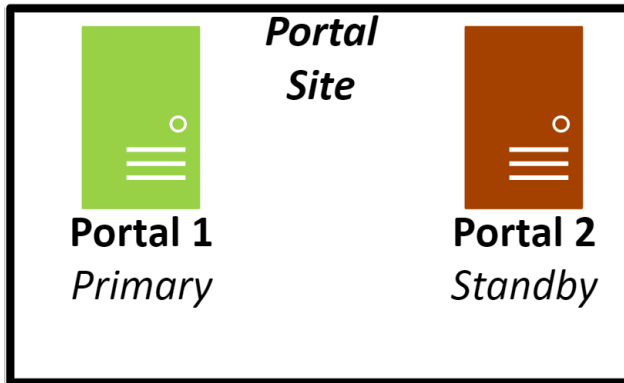
- Project goals
 - Improve Web GIS Performance
 - Make content available to office and field staff
 - Migrate ArcGIS Online content to Portal
 - High Performance and High Availability are critical!

- Project goals
 - Improve Web GIS Performance
 - Make content available to office and field staff
 - Migrate ArcGIS Online content to Portal
 - High Performance and High Availability are critical!

- Project Approach
 - Design deployment architecture
 - Develop an implementation plan
 - Closely coordinate with IT
 - Install and configure ArcGIS Enterprise
 - Migrate content
 - Go Live
 - Maintain deployment and upgrade when needed

What is High Availability (HA)?

Infrastructure



- Failover occurs when:
 - Primary machine stops working or is unavailable
 - Web app stops running or restarts

Practices

- 24x7 availability of key staff
- Eliminate single points of failure
- Develop a system maintenance plan
- Monitoring



Why Implement High Availability?

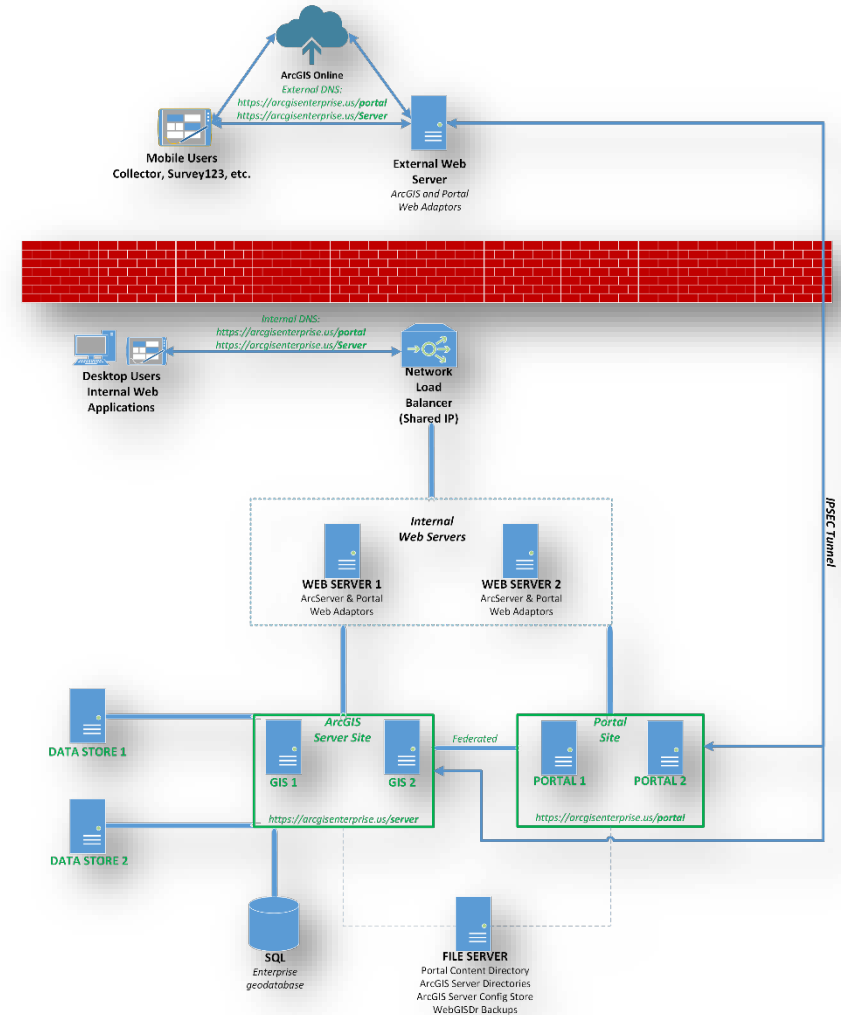
- Does your GIS support critical business functions?
- Do you have a contractual or service level mandate for HA?
- Do you have the resources to support HA?



Server Architecture

■ Servers

- Leverage existing web servers, load balancer, and SQL server, and file Server.
- Add 6 machines:
 - 2 Portal
 - 2 Server
 - 2 Data Store
- Decommission existing ArcGIS Server machines



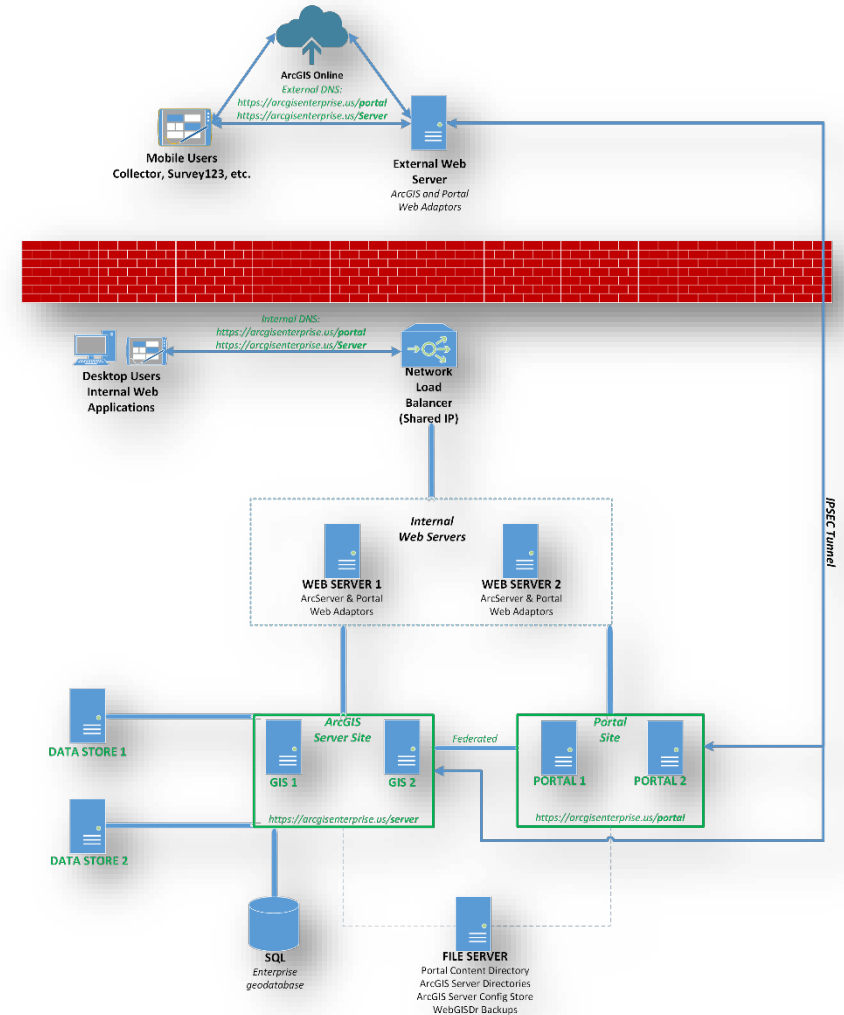
Server Architecture

■ Servers

- Leverage existing web servers, load balancer, and SQL server, and file Server.
- Add 6 machines:
 - 2 Portal
 - 2 Server
 - 2 Data Store
- Decommission existing ArcGIS Server machines

■ Networking

- Ports
- Set DNS rules for internal and external routing to resolve same URL to different web servers



Implementation Plan

- Implementation sequence with machines and responsible party for each step
- Plan was executed over remote working sessions to facilitate knowledge sharing
- The implementation process was captured in a configuration document

Table 3 Steps to Install and Configure ArcGIS Enterprise Environment

Step	Needs	Responsible	Machines
Spin Up Six Servers	Spin up two GIS servers, two Portal servers, and two Data Store servers.	BSU	GIS Server 1, GIS Server 2, Portal Server 1, Portal Server 2, Data Store 1, Data Store 2
Esri Licensing	Obtain ArcGIS Enterprise License Files (ArcGIS Server, Portal).	BSU	
Install SSL Certificates	Obtain CA-Certified Wildcard SSL Certificate and install on servers.	BSU Jones Edmunds	
Open Ports	Configure ports on servers for ArcGIS Server, Portal, and Data Store.	BSU	
Portal	Install portal	Jones Edmunds	Portal Server 1, Portal Server 2
Web Adaptor – Portal Internal	Install web adaptor for Portal on internal web server boxes.	Jones Edmunds	
Server	Install ArcGIS Server on new servers.	Jones Edmunds	GIS Server 1, GIS Server 2
Web Adaptor-ArcServer Internal	Install web adaptor for ArcServer on internal web servers.	Jones Edmunds	
Federate Server with Portal	Federate ArcGIS Server site with Portal.	Jones Edmunds	
Data Store	Install and configure Data Store, add as hosting server on portal.	Jones Edmunds	Data Store 1, Data Store 2
User Store	Configure User Store on Portal (Integrated Windows Authentication [IWA] Active Directory for Single Sign-On [SSO] capabilities).	Jones Edmunds/ BSU	
Internet Protocol Security (IPSEC) Tunnel for Portal and ArcServer	Configure IPSEC tunnel for Portal and ArcServer.	BSU	GIS Server 1, GIS Server 2, Portal Server 1, Portal Server 2, External Web Server
Web Adaptors – External	Install web adaptors for Portal and ArcGIS Server on external web server.	Jones Edmunds	External Web Server

Implementation Process

- Configuration document:
 - Implementation plan
 - Installation and Configuration Screenshots
 - ArcGIS Enterprise Best Practice Resources
 - Troubleshooting documentation
 - AGE Backups documentation (WebGISDr)
 - Organizational Settings
 - Upgrade documentation (10.7.1 to 10.9.1)

TECHNICAL MEMORANDUM JonesEdmunds

ArcGIS Enterprise Implementation

TO: Kevin Hofmann, GISP
FROM: Tom Blush
DATE:
SUBJECT:

1 INTRODUCTION

Bonita Springs Utilities services supporting technical memorandum implementation plan the implementation maintained as future. As such, the following

Version	Author	Description	Date
1.0	Jones Edmunds		
1.1	Jones Edmunds		
1.2	Jones Edmunds		
1.3	Jones Edmunds		
1.4	Jones Edmunds		
1.5	Jones Edmunds		
1.6	Jones Edmunds		
1.7	Jones Edmunds		

02999-007-01
April 2021

Check for Updates
Run Enterprise Updater on each machine to check for patches.
It is recommended to install the Security Patches - review the others just in case functional patches are needed.

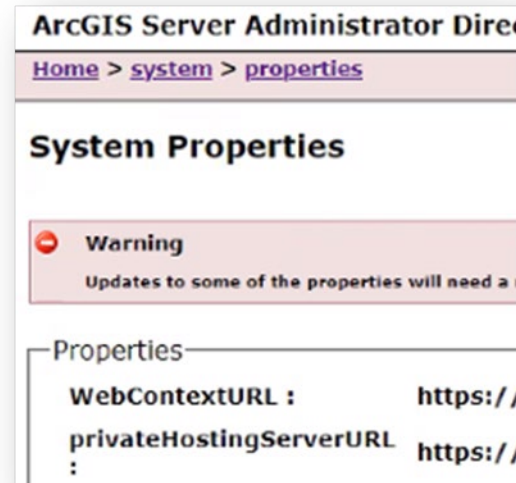
Update Name	Priority	Date	Progress	Status
KB4018986 Security Update for Windows 7	High	2/18/2016	100%	Installed
KB4018986 Security Update for Windows 7	High	2/18/2016	100%	Installed

02999-007-01
February 2021

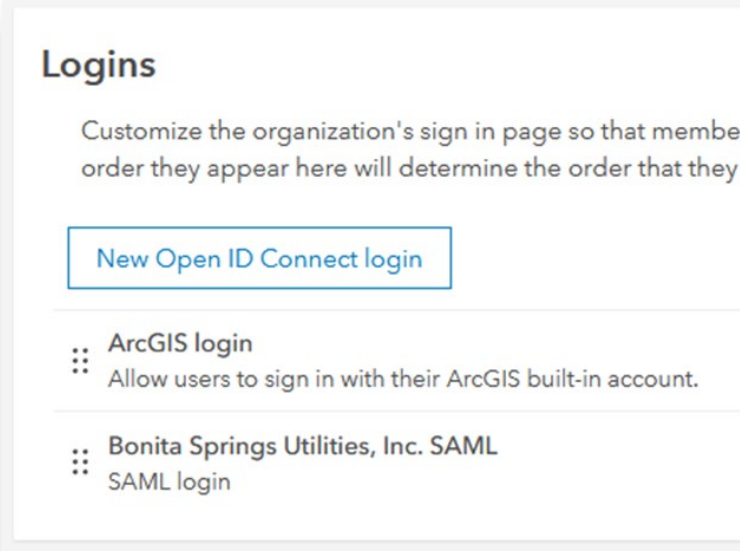
Appendix A: Installation and Configuration Screenshots

- Project Approach
 - Design deployment architecture
 - Develop an implementation plan
 - Closely coordinate with IT
 - Install and configure ArcGIS Enterprise
 - Migrate content
 - Go Live
 - Maintain deployment and upgrade when needed

- Respond to changes in the system architecture
 - Internal Web servers software issue
- ArcGIS Server & Portal system properties changes necessary
 - WebContextURL
 - PrivatePortalURL
 - Server Admin URL



- Switch to SAML authentication for portal
 - Configure Azure AD as identity provider
 - Esri recommended instead of mixed mode (IWA and built-ins)



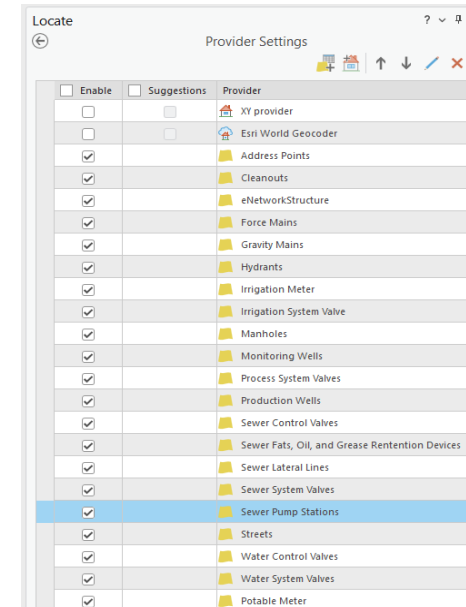
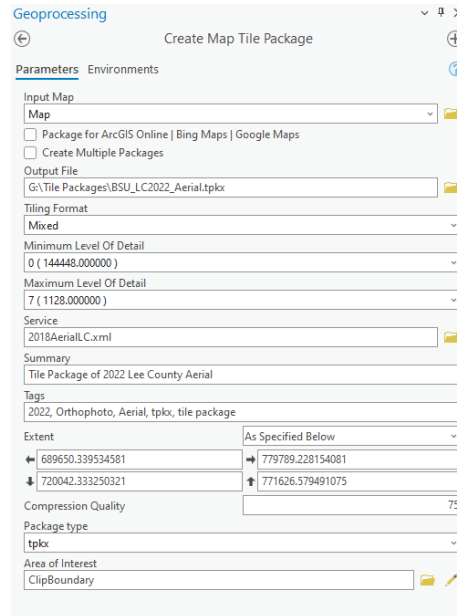
- Respond to changes in the system architecture
 - Internal network load balancer dropped
 - Web servers added to NLB cluster
 - Required changes to AGE system configuration
- ArcGIS Server & Portal system properties changes required
 - WebContextURL
 - PrivatePortalURL
 - Server Admin URL
- Switch to SAML authentication for portal
 - Configure Azure AD as identity provider
 - Esri recommended instead of mixed mode (IWA and built-ins)
- Upgrade!

Handling System Upgrades

- Upgrade from 10.8.1 to 10.9.1
 - Needed for additional capabilities and security considerations
- Specific considerations for highly available environments
 - Upgrade components in Esri's recommended order
- Troubleshoot issues not encountered during implementation
 - Folder permissions, especially for HA
 - Content directories/backup directories on shared file server

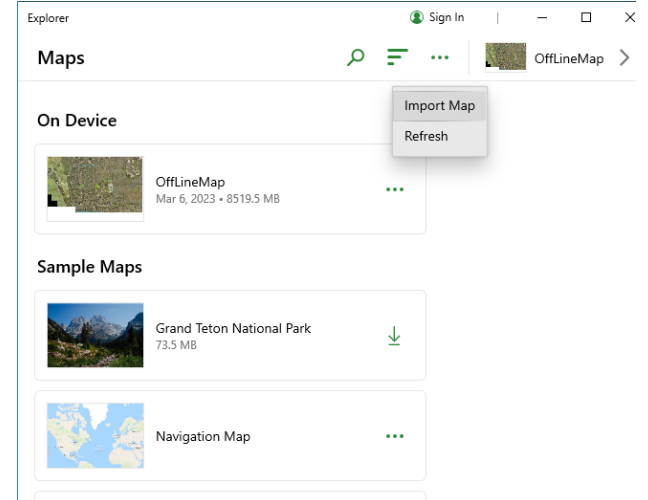
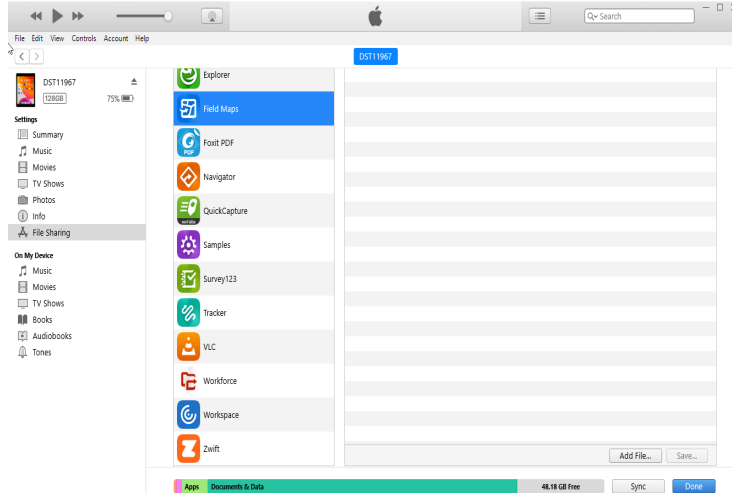
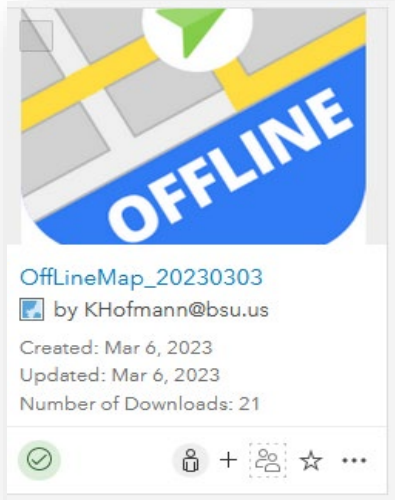
Mobile Map Packages (MMPK)

- During upgrade users required access to critical data
- BSU deployed a solution using ArcGIS Field Maps or ArcGIS Explorer
- Solution was centered around mobile map packages (MMPKs)
 - Tile Package from latest Orthophotos
 - Add Locate Providers



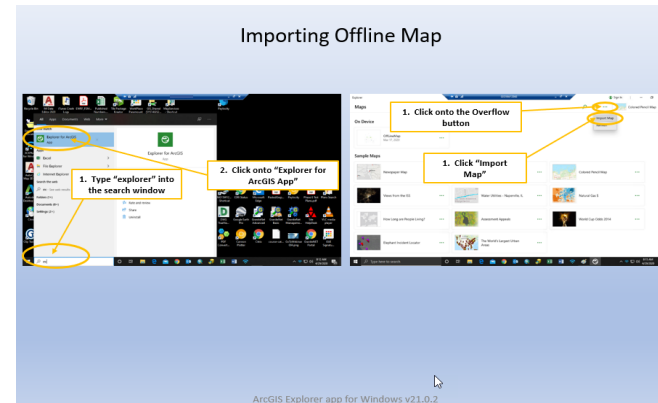
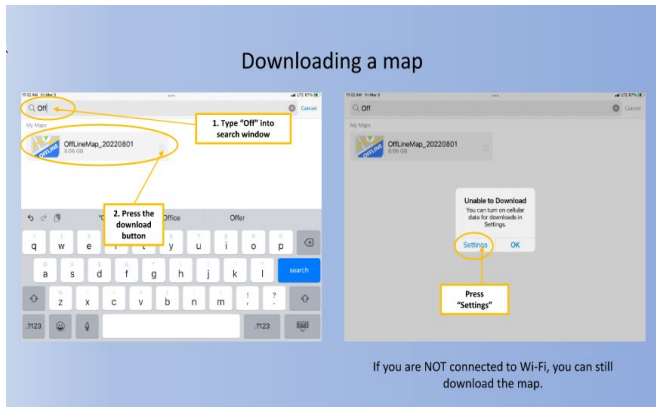
Mobile Map Packages (MMPK)

- Utilized by mobile (Field Maps) and desktop (Explorer) users
 - Downloaded or Sideloaded on to mobile devices
 - Imported on to Desktop machines



Mobile Map Packages (MMPK)

- User Guides for mobile downloading and desktop importing



Content Migration Plan

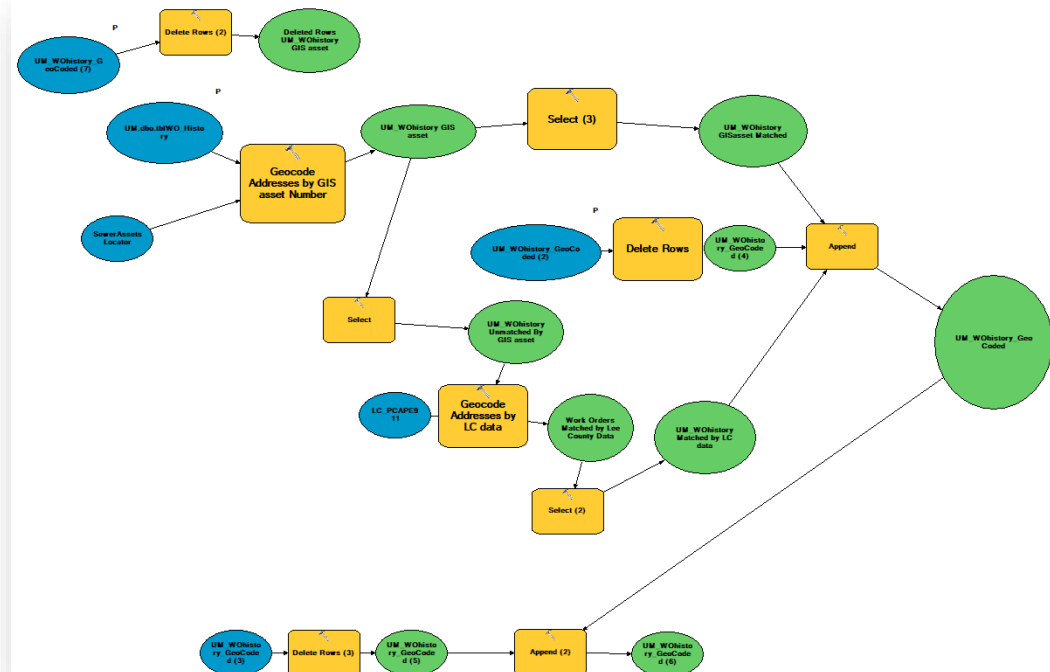
- Made a list of business-critical maps and apps
- Made lists of data within critical maps and apps by data types and source

Most Viewed	Application Name	Type	Author	Comments	Date Completed
1	Water	Map	Kevin	ALL/DIST	12/30/2020
2	BSU GIS	Web Mapping Application	Kevin	ALL	12/30/2020
3	Capital Improvement Projects	AGOL Story Map	Kevin	AGOL	
4	GPS data Collection	Map for Collector	Kevin	Inspectors/GIS	1/20/2021
5	Project Status AGOL	AGOL used in story map	Kevin	AGOL	
6	Utility Maintenance	Map	Kevin	UM	12/30/2020
7	Meter Verification	Map for Collector	Kevin	CS	12/31/2020
8	Hydrant Maintenance	Map for Collector	Kevin	DIST	12/29/2020
9	Meter Install	Map for Collector	Kevin	DIST	12/28/2020
10	Inspector Pictures	Map for Collector	Kevin	Inspectors/GIS	12/18/2020
11	GPS QC Map	Map	Adam	GIS	
12	Meter Install for ODB	Map for Dashboard	Kevin	DIST	1/6/2021
13	Auto Flushing	Map for Collector	Kevin	DIST	12/30/2020
14	ARV Maintenance	Map for Collector	Kevin	DIST	12/28/2020
15	New Meter Install Dashboard	Dashboard	Kevin	DIST	1/6/2021
16	Valve Maintenance	Map for Collector	Kevin	DIST	12/29/2020
17	Construction Meter Reads	Map	Adam	Eng	
18	Construction Meter Reads	Dashboard	Adam	Eng	
19	Meter Locations	Map	Kevin	CS	12/30/2020
20	GPS Inspector Map	Map	Adam	Inspectors	1/28/2021
21	Engineering Water Use	Map for Collector	Kevin	Inspectors	12/31/2020
22	Flushing	Map for Collector	Kevin	DIST	12/29/2020

DATA TYPE	Layer(s)	MIGRATION FROM	MIGRATION TO	COMPLETED	SCRIPTED	DATE COMPLETED	COMMENTS
WATER MAP							
geocoded fc	CS Open Service Orders	fgdb	sql	Y	Y	10/29/2020	
fc	CS Closed Service Orders	fgdb					CS ClosedServiceOrders related to Meter locations
Table	CS Open Service Orders	fgdb	sql	Y	Y		
Table	CS Closed Service Orders	fgdb	sql	Y	Y		
geocoded fc	Linko Active Violations	fgdb	sql	Y	Y	10/30/2020	Script completed need to place in Task Sch
Table	LinkoExtractors	fgdb	sql	Y	Y		
Table	LinkoViolations	fgdb	sql	Y	Y		
Table	LinkoLocations	fgdb	sql	Y	Y		
FC	PhotosAll	fgdb	data store	Y	NA	11/23/2020	merged all FCs into one
FC	Billing Cycles						Custinfo table join to meters then symbol by routeid
FC	Sequencing						Irr & Pot meters join to CS_Meter_Info then label with routeid & seq #
Table	CS Meter Information	fgdb	sql	Y	Y	10/22/2020	
geocoded FC	Reservation Accounts	fgdb	sql	Y	Y	10/30/2020	used for sequencing fc
Table	CS Reservation Accounts	fgdb	sql	Y	Y	10/22/2020	
geocoded FC	UnMetered Sewer Conn	fgdb	sql	Y	Y	10/30/2020	
Table	LocsWithSewerConns	fgdb	sql	Y	Y		
FCs	Project CAD files	fgdb	sql	Y	NA	10/22/2020	
Table	GeneratorsWPhotos	fgdb	sql	Y	N	10/23/2020	Access database - not scripted b/c of location and name changes
Table	SinglePhaseLGSensizerceptacle	fgdb	sql	Y	N	10/23/2020	Access database - not scripted b/c of location and name changes
Table	Notes Generators Equip	fgdb	sql	Y	N	10/23/2020	Access database - not scripted b/c of location and name changes
geocoded fc	UM Work Order History	fgdb	sql	Y	Y	10/30/2020	

Performance Improvements

- Migrated all dynamic data from replicated FGDB to SQL using python
- Moved static data into data store
- Minimized complex map symbology and labeling
- Cached tile service rather than dynamic service for imagery
- Consolidated services from over 150 to under 30



Project Accomplishments

- ArcGIS Enterprise 10.8.1 was deployed in production
- New hardware to support growing needs
- Optimized content for performance improvements
- ArcGIS Enterprise was upgraded to 10.9.1
- Deployment adapted to changes in environment
- New AGE capabilities leveraged with applications
- Ready to migrate to ArcGIS Pro!



Questions?

Building and Maintaining a Highly Available ArcGIS Enterprise Deployment

April 13, 2023

 Bonita Springs Utilities, Inc.

JonesEdmunds 