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**AppGeo**  
Central Street

Pennsylvania Emergency Management Agency (PEMA) Statewide 911 GIS Data Analysis Project  
**WestCORE NG911 Educational Session**

July 24, 2019



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Pennsylvania Emergency Management Agency (PEMA) Statewide 911 GIS Data Analysis Project  
**Northern Tier NG911 Educational Session**

July 25, 2019



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Pennsylvania Emergency Management Agency (PEMA) Statewide 911 GIS Data Analysis Project  
**South Central Mountain NG911 Educational Session**

July 26, 2019



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Pennsylvania Emergency Management Agency (PEMA) Statewide 911 GIS Data Analysis Project  
**NorthCentral/NorthCom NG911 Educational Session**

July 29, 2019



Pennsylvania Emergency Management Agency (PEMA) Statewide 911 GIS Data Analysis Project  
**South Central NG911 Educational Session**

July 30, 2019



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Pennsylvania Emergency Management Agency (PEMA) Statewide 911 GIS Data Analysis Project  
**SouthEast Region NG911 Educational Session**

July 31, 2019





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Pennsylvania Emergency Management Agency (PEMA) Statewide 911 GIS Data Analysis Project  
**NECORE NG911 Educational Session**

August 1, 2019

# Introductions

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Here with you today



**Carrie Tropasso**  
PEMA



**Jeff Boyle**  
PEMA



**Jessica Frye**  
GEOCOMM



**Brian Coolidge**  
AppGeo



**Cheryl Benjamin**  
AppGeo Consultant



# Today's Agenda

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- Introductions
- PEMA's Role in NG911
- GIS Data Use in NG911
- Pennsylvania NG911 GIS Data Model for Road Centerlines and Site/Structure Address Points
- Lunch
- Parsing Addresses into NENA Compliant Fields
- Best Practices
- Wrap-Up

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# PEMA's Role in NG911



# PEMA's Role in NG 911

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**911 is a vital part of public safety.**

**Quick facts:**

- Operates 24 x 7 x 365
- 2,200 dedicated, trained 911 personnel in PA
- 8.3 million requests for emergency service in 2018
- \$350 million = Annual cost for 911 in PA

**Challenges:**

- Consumer technology has outpaced the 911 system
- Old, soon-to-be obsolete 911 infrastructure

# PEMA's Role in NG 911

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## What is NG911?

- Necessary upgrade to how people communicate – mobile, digital data
- Transition from decades old infrastructure to IP based 911 system

## What are the benefits?

- Support all modes of communication connected to a network
- Transfer 911 calls and associated data where needed
- Interconnect with other public safety systems such as FirstNet
- Cost and operational efficiencies
- And more.....

# PEMA's Role in NG 911

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- **How will PA implement NG911?**
- **Statewide 911 Plan: PEMA procures service-based NG911 solution**
  - RFP released 2/27/2019
  - Dedicated network and services to deliver 911 calls from provider to PSAP
  - Phased, methodical (multi-year) implementation across PA
- **NG911 will rely heavily on locally developed GIS data!!!**
  - Validate the location of 911 callers
  - 911 Call Routing

# Pennsylvania 911 Funding - 83% Funds

- **911 surcharge of \$1.65 in effect as of 8/1/2015**
- **911 funds are distributed to PA counties via two methods:**
  - 83% - Formula based distributions (*Primary funding source*)
  - 15% - Dedicated to NG911; currently distributed by grant
- **83% formula-based distributions:**
  - A PSAP has discretion over how funds are spent; provided costs are eligible
- **Eligible costs for GIS include:**
  - Personnel
  - GIS Hardware/Software/Workstations
  - GIS data development, assessment, and maintenance
  - Professional services related to GIS & 911
  - **Important: Only the percentage of cost representing 911 use would be eligible**



# Pennsylvania 911 Funding - 15% Funds

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- 15% of 911 revenue collected quarterly must be used to establish, enhance, operate or maintain statewide interconnectivity of 911 systems
- Funds currently distributed to PSAPs through an annual grant process
- **2019 Grant Program Overview:**
  - **Amount available:** \$47 million (*estimated*)
  - **Who may apply:** PA PSAPs
  - **Where to submit your application:** PEMA 911 Webtool
  - **Application release date:** 10/1/2019
  - **Application due date:** 10/31/2019

# Pennsylvania 911 Funding - 15% Funds

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- **Anticipated Eligible GIS projects for 2019:**
  - NG911 GIS data development
  - Regional GIS data aggregation
- **NG911 GIS Data Development:**
  - Applications shall only be submitted for projects to develop GIS data that adheres to NG911 GIS requirements for the following layers:
    - Road centerlines
    - Site/structure address points
    - PSAP boundary
    - Emergency service boundary
    - Provisioning boundary
  - Project must have been identified as a deficiency during gap analysis to be eligible

# Pennsylvania 911 Funding - 15% Funds

- **Regional GIS Data Aggregation:**
  - Applications shall only be submitted for regional projects that accomplish:
    - Aggregation of data into a regional dataset that meets NG911 requirements
    - Provisioning of GIS data updates to the regional datasets
    - Quality checks for conformity with NG911 requirements
    - Workflows for handling QA/QC errors
    - Production of seamless regional layers that meet NG911 requirements and can be shared with PEMA
- Grant rules being finalized by PEMA working with 911 Advisory Board
  - Eligible projects
  - Eligible costs
  - Required outcomes

# GIS Work Group Members

A Special Thanks to our GIS Work Group Members

Name	Agency	Name	Agency
Jeff Boyle	PEMA Deputy Director for 9-1-1	Craig Hollis-Nicholson	Somerset County
Carrie Tropasso	PEMA GIS Administrator	David Long	Montgomery County
Mary Fulton	PA Office of Administration	Jeff Garner	Lancaster County
Ken Juengling	PA Turnpike	Laura Simonetti	Mifflin County
Sandeep Chaudhary	PA Turnpike	Mark Leitzell	PA Dept of Transportation
Justin Smith	Cumberland County	Michael Vest	Montgomery County
Adam Repsher	PA State Police	Robin Wallace	PA State Police
Barry Hutchins	Lycoming County	Sara Mattio	Philadelphia County
Bill Shertzer	PEMA 911 Program Manager	Steve Kocsis	Cambria County
Brad Shirey	Berks County	Amy Marshall	Montgomery County

# About Today's Training

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- Being made into a series of small recorded webinars
- Will be posted and made available as a resource
- Great for:
  - Reviewing material discussed today
  - Bringing others up to speed who were not able to attend today
  - New staff and others responsible for GIS data maintenance

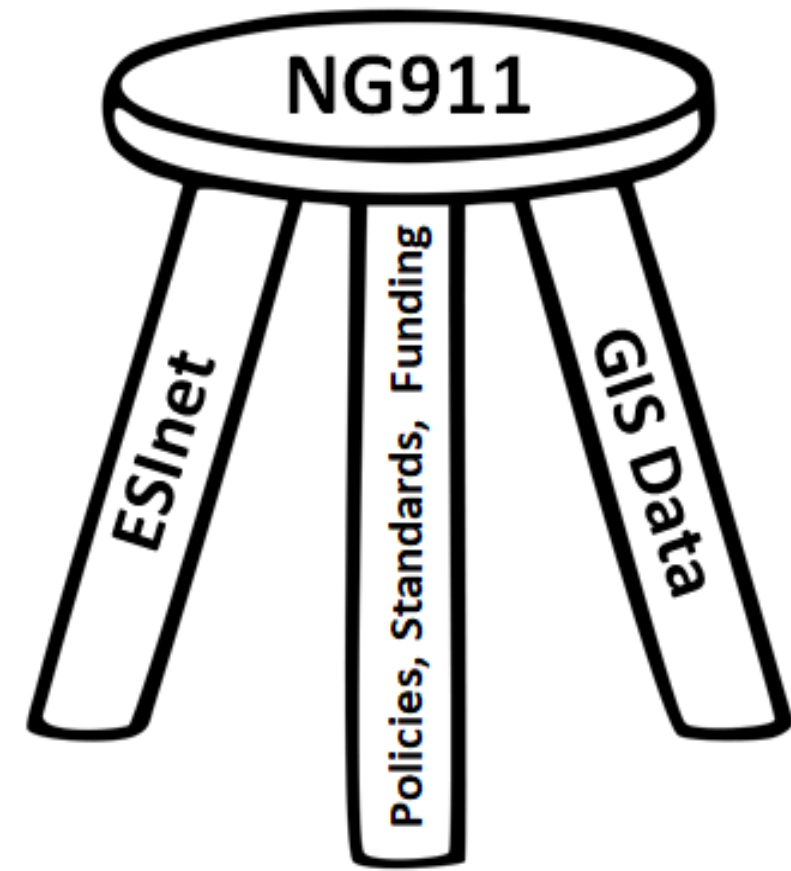
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# GIS Data Use in NG911



# What is Next Generation 911 (NG911)?

- Upgrade to an Internet Protocol (IP) based system
- Process all types of emergency calls including voice, photos, videos, and text messages
- Interoperable across local, regional, state and federal geographic levels
- Greater location accuracy of wireless callers
- Reliance on GIS data for call routing and handling



# NG911 Acronyms

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**BCF:** Border Control Function

**ECRF:** Emergency Call Routing Function

**ESRP:** Emergency Services Routing Proxy

**LIS:** Location Information Server

**LVF:** Location Validation Function

**PIDF-LO:** Presence Information Data Format – Location Object

**PRF:** Policy Routing Function

**PSTN:** Public Switched Telephone Network

**SI:** Spatial Interface

**VoIP:** Voice Over Internet Protocol

**GCS:** Geocode Service\*

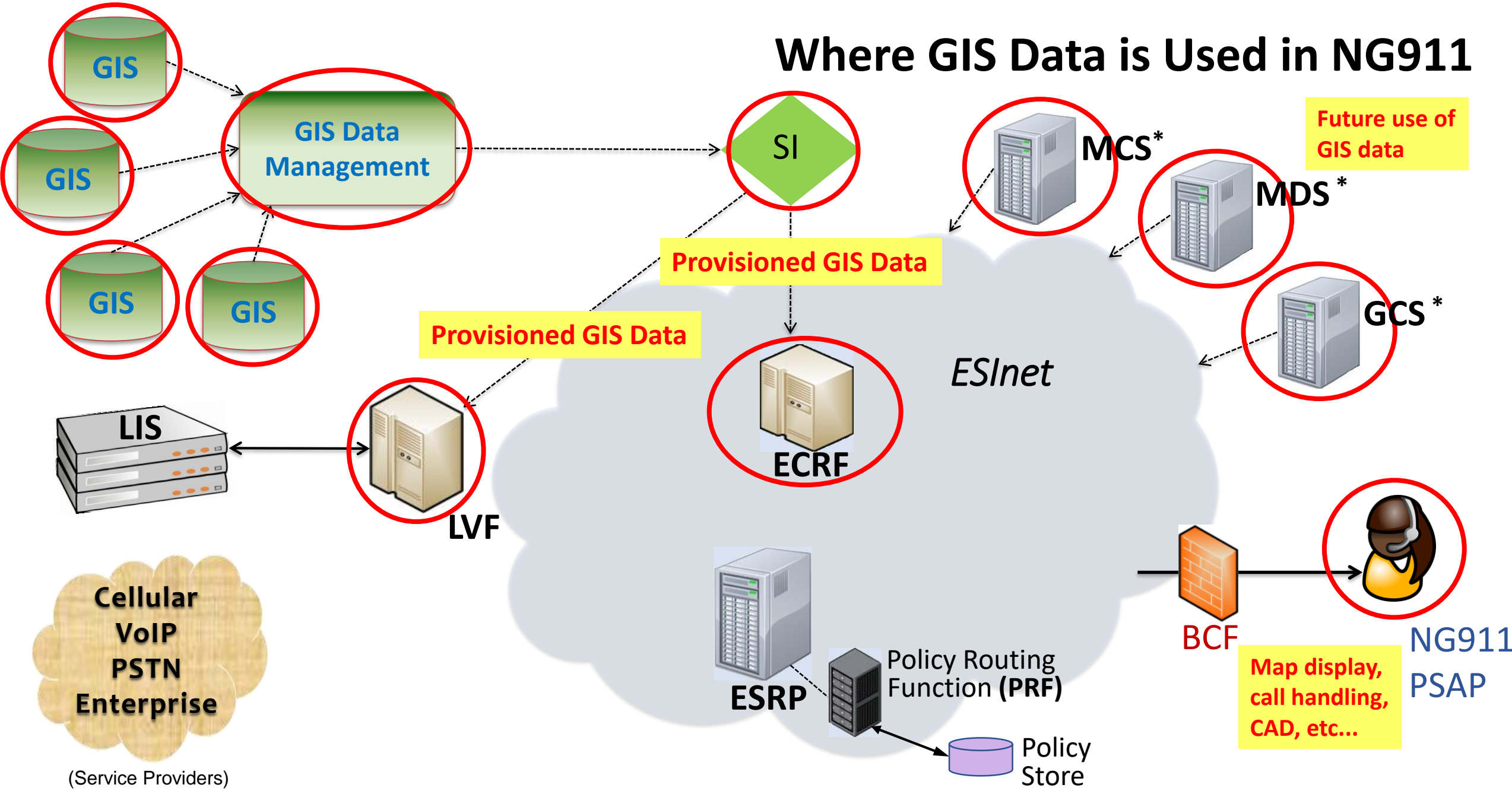
**MCS:** MSAG Conversion Service\*

**MDS:** Mapping Data Service\*

*\*Future Functional Element*



# Where GIS Data is Used in NG911



Future use of GIS data

Provisioned GIS Data

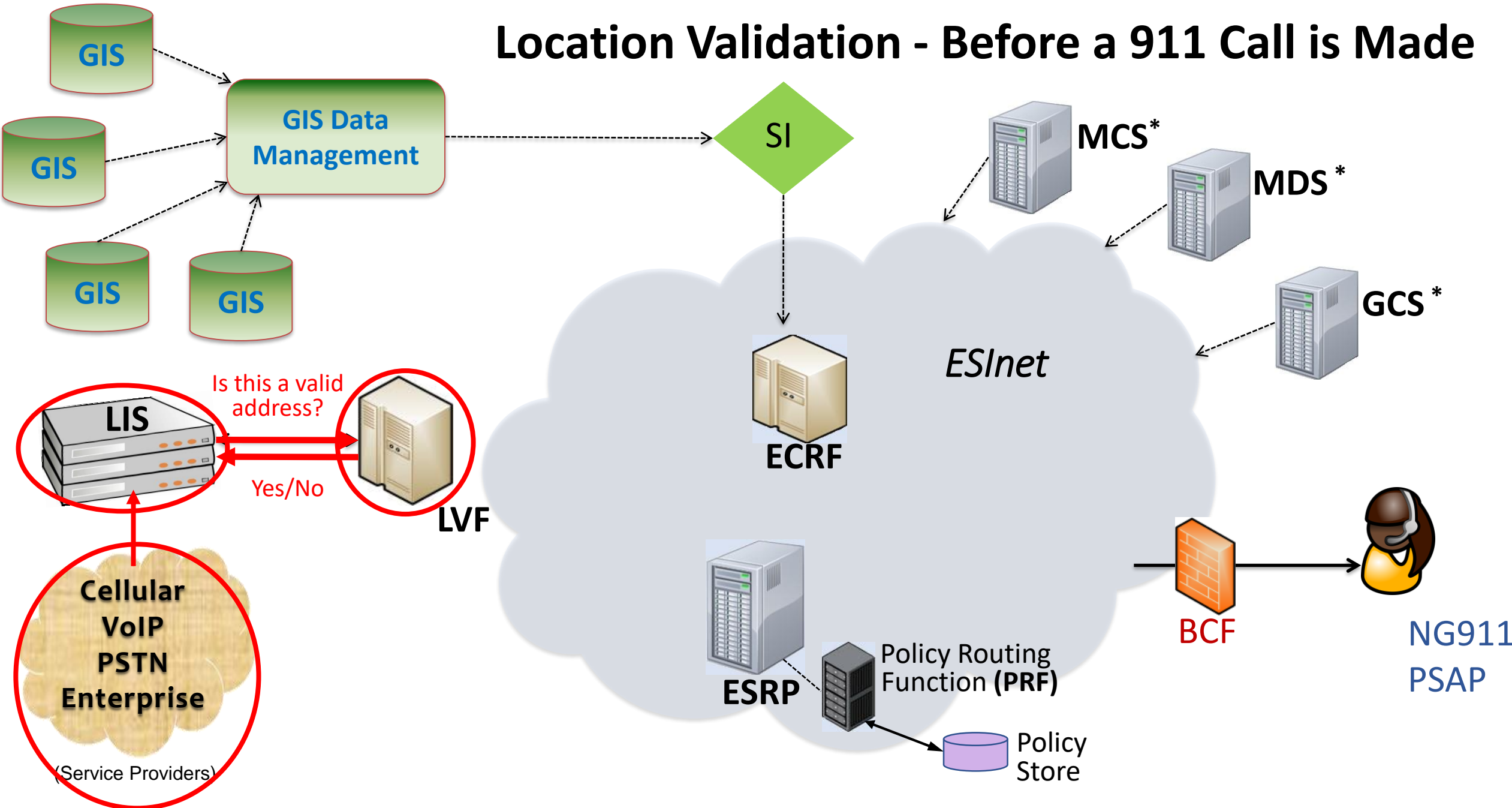
Provisioned GIS Data

Map display, call handling, CAD, etc...

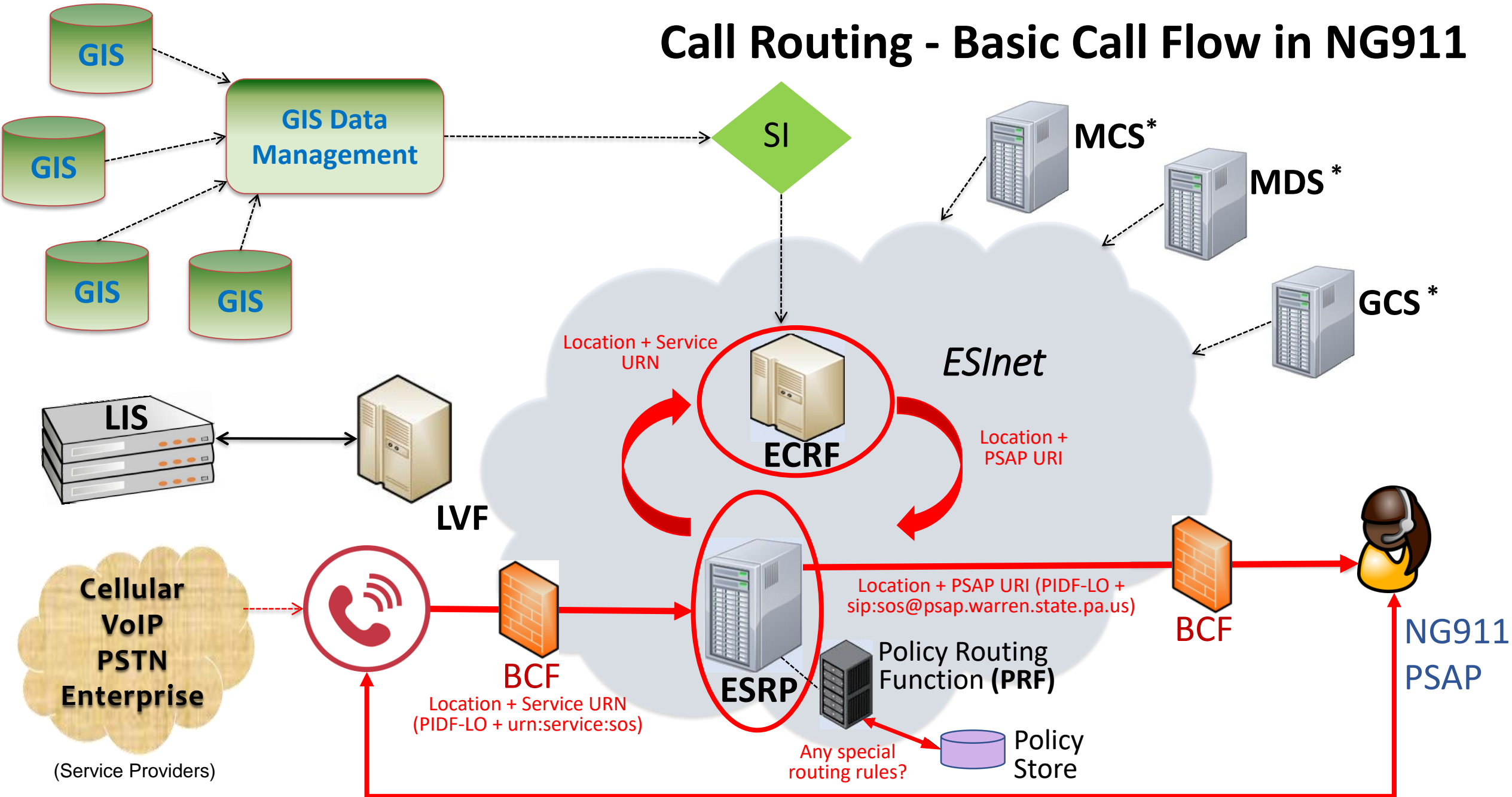
(Service Providers)

\*Future Functional Element

# Location Validation - Before a 911 Call is Made



# Call Routing - Basic Call Flow in NG911



\*Future Functional Element

# Why Do We Need Standardized Data?

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- Required for NG911 to work
- Standards:
  - Allow exchange of data with local, regional, state and federal agencies
  - Allow interoperability
  - Allow call transfers to anywhere
- NENA develops standards for NG911 GIS Data
  - **NENA-STA-010**, *NENA i3 Standard for Next Generation 911, Appendix B*
  - **NENA-STA-006**, *NENA Standards for NG911 GIS Data Model*



# NENA NG911 GIS Data Model

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- Defines the GIS data layers in a NG911 System that support:
  - Location Validation
  - Geospatial Call Routing
  - Dispatch Routing
  - Public Safety Mapping Applications
- Required data structure for GIS data exchange in NG911
  - May use any local GIS data model for daily maintenance
  - Must export data from the local GIS data model into the NG911 GIS Data Model
- Allows backwards compatibility with existing E911 systems

# NENA i3 Standard for NG911, Appendix B

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- Defines the Spatial Interface (SI) Provisioning Data Model
- The SI is a standardized interface between the GIS data and the NG911 functional elements that consume GIS data
- SI uses XML data structures
- “Machine to Machine” communication

# GIS Data Layers in NG911

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## Required Data Layers

- Road Centerlines (RCL)
- Site/Structure Address Points (SSAP)
- PSAP Boundaries
- Emergency Services Boundaries (ESB)
- Provisioning Boundaries

# GIS Data Layers in NG911

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## Strongly Recommended Data Layers

- Street Name Alias Table
- Landmark Name Part Table
- Complete Landmark Name Alias Table
- States or Equivalents
- Counties or Equivalents
- Incorporated Municipality Boundary
- Unincorporated Community Boundary
- Neighborhood Community Boundary
- Other Emergency Service Boundaries (e.g. Poison Control, Forest Service, Coast Guard, Animal Control, etc.)

# GIS Data Layers in NG911

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## Other Recommended Data Layers

- Railroad Centerlines
- Hydrology Line
- Hydrology Polygon
- Cell Site Location
- Mile Marker Location

# Our Focus Today

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- **Road Centerlines**
  - Represent the approximate centerline of a real-world roadway
  - Each road segment has attribute data associated with it
- **Site/Structure Address Points**
  - Represent approximate location of a site, structure, subsite, substructure, or access location
  - Each point has attribute data associated with it
  - More precise location than geocoding to road centerlines

# What about the Other Required GIS Datasets?

- PSAP Boundaries
  - Geographic area of a PSAP that has primary responsibility for a 911 call
  - Used to identify which PSAP to route (send) calls to
- Emergency Service Boundaries
  - Geographic area of law, fire, and EMS responders
  - Separate layers in NG911; not Emergency Service Zones (ESZ)
  - Used to identify the responding agencies responsible for providing emergency services at the location of a 911 call
- Provisioning Boundaries
  - Geographic area of GIS data responsibility for data stewards
  - Used to identify who provides the GIS data for NG911 and fixes GIS data issues

# Available PEMA Resources

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- Public Safety Answering Point (PSAP) and Emergency Service and Provisioning Boundaries Best Practices Document (April 2019)  
[https://www.pema.pa.gov/911/Documents/PSAP\\_Boundary\\_Best\\_Practice\\_PEMA.pdf](https://www.pema.pa.gov/911/Documents/PSAP_Boundary_Best_Practice_PEMA.pdf)
- PSAP Boundary Development Webinar (April 2019)  
[https://www.pema.pa.gov/911/Documents/PSAP\\_Boundary\\_Webinar\\_0423.pdf](https://www.pema.pa.gov/911/Documents/PSAP_Boundary_Webinar_0423.pdf)
- Pennsylvania Statewide NG911 GIS Strategic Plan (March 2019)  
[https://www.pema.pa.gov/planningandpreparedness/Documents/9-1-1%20plans%20guides%20and%20templates/Statewide\\_NG911\\_GIS\\_Strategic\\_Plan.pdf](https://www.pema.pa.gov/planningandpreparedness/Documents/9-1-1%20plans%20guides%20and%20templates/Statewide_NG911_GIS_Strategic_Plan.pdf)



# How Long Will Transition to NG911 Take?

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- PEMA in the process of procuring a Commonwealth-wide ESInet and NG Core Services
- Existing infrastructure is not going away overnight
- Phased, multi-year implementation across the Commonwealth
- GIS data development, standardization, and synchronization to be NG911 compliant will take time
- MSAG and ALI will still exist during transition
- NG911 Data Model includes legacy fields for use during the transitional period

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# **Pennsylvania NG911 GIS Data Model for Road Centerlines and Site/Structure Address Points**



# RCL/SSAP Pennsylvania GIS Data Standard

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- Based on NENA's NG911 GIS Data Model Standard
- Defines the required data schema and associated fields
  - "Data schema" = database structure of the data
- Includes all NENA fields and a few Pennsylvania-specific fields
- ALL fields MUST be carried in the local data
- Local data may be stored in any projection
  - Statewide file in World Geodetic System of 1984 (WGS84)
  - Local data will be transformed to WGS84 prior to integration

# Pennsylvania NG911 Data Schema

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- Includes a table for each GIS data layer describing its attributes
- Information provided:
  - **Descriptive Name:** Basic description of the data field
  - **Field Name:** Standardized field name in the GIS data
    - Local data MUST use this field name
  - **M/C/SR/O:** Indicates whether populating the field is:
    - **M** - Mandatory
    - **C** - Conditional
    - **SR** - Strongly Recommended
    - **O** - Optional
  - **Type:** Required attribute type as defined by the NENA standard
  - **Field Width:** The maximum field width

# Section 5: Field Descriptions, Definitions & Domains

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- For each attribute field, provides:
  - Detailed attribute description
  - Required data domain (set of valid values)
  - Example field values
- Unless otherwise noted, all field values must:
  - Be fully spelled out
  - Use Title Case
- PEMA uses the NENA domains in the statewide file
  - Local data domains can implement a subset of the NENA domain
  - Limit values to only those that could occur in the local data (e.g. State, County, Incorporated Municipality)

# Pennsylvania NG911 Data Schema for RCL

1 of 4

Descriptive Name	Field Name	M/C/SR/O	Type	Field Width
Discrepancy Agency ID	<u>DiscrpAgID</u>	M	P	75
Date Updated	<u>DateUpdate</u>	M	D	-
Effective Date	Effective	O	D	-
Expiration Date	Expire	O	D	-
Road Centerline NENA Globally Unique ID	RCL_NGUID	M	P	254
Left Address Number Prefix	<u>AdNumPre_L</u>	C	P	15
Right Address Number Prefix	<u>AdNumPre_R</u>	C	P	15
Left FROM Address	<u>FromAddr_L</u>	M	N	6
Left TO Address	<u>ToAddr_L</u>	M	N	6
Right FROM Address	<u>FromAddr_R</u>	M	N	6
Right TO Address	<u>ToAddr_R</u>	M	N	6
Parity Left	<u>Parity_L</u>	M	P	1
Parity Right	<u>Parity_R</u>	M	P	1
Street Name Pre Modifier	<u>St_PreMod</u>	C	E	15
Street Name Pre Directional	<u>St_PreDir</u>	C	P	9

# Pennsylvania NG911 Data Schema for RCL

2 of 4

Descriptive Name	Field Name	M/C/SR/O	Type	Field Width
Street Name Pre Type	<u>St_PreTyp</u>	C	E	50
Street Name Pre Type Separator	<u>St_PreSep</u>	C	E	20
Street Name	<u>St_Name</u>	M	E	60
Street Name Post Type	<u>St_PosTyp</u>	C	E	50
Street Name Post Directional	<u>St_PosDir</u>	C	P	9
Street Name Post Modifier	<u>St_PosMod</u>	C	E	25
Legacy Street Name Pre Directional*	<u>LSt_PreDir</u>	C	P	2
Legacy Street Name*	<u>LSt_Name</u>	C	P	75
Legacy Street Name Type*	<u>LSt_Type</u>	C	P	4
Legacy Street Name Post Directional*	<u>LSt_PosDir</u>	C	P	2
ESN Left*	ESN_L	C	P	5
ESN Right*	ESN_R	C	P	5
MSAG Community Name Left*	<u>MSAGComm_L</u>	C	P	30
MSAG Community Name Right*	<u>MSAGComm_R</u>	C	P	30

# Pennsylvania NG911 Data Schema for RCL

3 of 4

Descriptive Name	Field Name	M/C/SR/O	Type	Field Width
Country Left	<u>Country_L</u>	M	P	2
Country Right	<u>Country_R</u>	M	P	2
State Left	<u>State_L</u>	M	P	2
State Right	<u>State_R</u>	M	P	2
County Left	<u>County_L</u>	M	P	40
County Right	<u>County_R</u>	M	P	40
Additional Code Left	<u>AddCode_L</u>	C	P	6
Additional Code Right	<u>AddCode_R</u>	C	P	6
Incorporated Municipality Left	<u>IncMuni_L</u>	M	E	100
Incorporated Municipality Right	<u>IncMuni_R</u>	M	E	100
Unincorporated Community Left	<u>UnincCom_L</u>	O	E	100
Unincorporated Community Right	<u>UnincCom_R</u>	O	E	100
Neighborhood Community Left	<u>NbrhdCom_L</u>	O	E	100
Neighborhood Community Right	<u>NbrhdCom_R</u>	O	E	100



# Pennsylvania NG911 Data Schema for RCL

4 of 4

Descriptive Name	Field Name	M/C/SR/O	Type	Field Width
Postal Code Left	<u>PostCode_L</u>	O	P	7
Postal Code Right	<u>PostCode_R</u>	O	P	7
Postal Community Name Left	<u>PostComm_L</u>	O	P	40
Postal Community Name Right	<u>PostComm_R</u>	O	P	40
Road Class *	<u>RoadClass</u>	O	P	15
One-Way	<u>OneWay</u>	SR	P	2
Speed Limit	<u>SpeedLimit</u>	O	N	3
Validation Left	<u>Valid_L</u>	O	P	1
Validation Right	<u>Valid_R</u>	O	P	1
Complete Alias Street Name	Alias	C	E	245

# Pennsylvania NG911 Data Schema for SSAP

1 of 3

Descriptive Name	Field Name	M/C/SR/O	Type	Field Width
Discrepancy Agency ID	<u>DiscrpAgID</u>	M	P	75
Date Updated	<u>DateUpdate</u>	M	D	-
Effective Date	Effective	O	D	-
Expiration Date	Expire	O	D	-
Site NENA Globally Unique ID	<u>Site_NGUID</u>	M	P	254
Country	Country	M	P	2
State	State	M	P	2
County	County	M	P	40
Additional Code	<u>AddCode</u>	C	P	6
Additional Data URI	<u>AddDataURI</u>	C	U	254
Incorporated Municipality	<u>Inc_Muni</u>	M	E	100
Unincorporated Community	<u>Uninc_Comm</u>	O	E	100
Neighborhood Community	<u>Nbrhd_Comm</u>	O	E	100
Address Number Prefix	<u>AddNum_Pre</u>	C	P	15
Address Number	<u>Add_Number</u>	C	N	6
Address Number Suffix	<u>AddNum_Suf</u>	C	P	15

# Pennsylvania NG911 Data Schema for SSAP

2 of 3

Descriptive Name	Field Name	M/C/SR/O	Type	Field Width
Street Name Pre Modifier	<u>St_PreMod</u>	C	E	15
Street Name Pre Directional	<u>St_PreDir</u>	C	P	9
Street Name Pre Type	<u>St_PreTyp</u>	C	E	50
Street Name Pre Type Separator	<u>St_PreSep</u>	C	E	20
Street Name	<u>St_Name</u>	C	E	60
Street Name Post Type	<u>St_PosTyp</u>	C	E	50
Street Name Post Directional	<u>St_PosDir</u>	C	P	9
Street Name Post Modifier	<u>St_PosMod</u>	C	E	25
Legacy Street Name Pre Directional*	<u>LSt_PreDir</u>	C	P	2
Legacy Street Name*	<u>LSt_Name</u>	C	P	75
Legacy Street Name Type*	<u>LSt_Type</u>	C	P	4
Legacy Street Name Post Directional*	<u>LSt_PosDir</u>	C	P	2
ESN*	ESN	C	P	5
MSAG Community Name*	<u>MSAGComm</u>	C	P	30
Postal Community Name	<u>Post_Comm</u>	O	P	40
Postal Code	<u>Post_Code</u>	O	P	7

# Pennsylvania NG911 Data Schema for SSAP

3 of 3

Descriptive Name	Field Name	M/C/SR/O	Type	Field Width
ZIP Plus 4	Post_Code4	O	P	4
Building *	Building	SR	P	75
Floor	Floor	SR	P	75
Unit *	Unit	SR	P	75
Room	Room	SR	P	75
Seat *	Seat	O	P	75
Additional Location Information	<u>Addtl_Loc</u>	O	E	225
Complete Landmark Name *	<u>LandmkName</u>	C	E	150
Mile Marker/Milepost	Milepost	C	P	150
Place Type	<u>Place_Type</u>	O	P	50
Placement Method	Placement	O	P	25
Longitude	Long	O	F	-
Latitude	Lat	O	F	-
Elevation	<u>Elev</u>	SR	N	6
Taxing Authority	<u>TaxAuth</u>	O	P	50
Parcel Identifier	UPI	O	P	50

# NENA Globally Unique ID (NGUID)

- Each record in a GIS layer must have a globally unique ID
- NGUIDs must only occur once when merging data into a national dataset
- Created by concatenating:
  - NENA-standard prefix “RCL” or “SSAP”
  - the locally assigned unique ID
  - the “@” symbol
  - the Agency Identifier (in the format <PSAP/County name>.state.pa.us)
- **Examples:**
  - RCL1234@somerset.state.pa.us
  - SSAP131044@lycoming.state.pa.us

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# Parsing Addresses into NENA Compliant Fields

# Street Address Elements

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- Address Number Prefix
- Address Number
- Address Number Suffix
- Milepost
- Street Name Pre Modifier
- Street Name Pre Directional
- Street Name Pre Type
- Street Name Pre Type Separator
- Street Name
- Street Name Post Type
- Street Name Post Directional
- Street Name Post Modifier

# Parsing Examples

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**3378 Broadway**

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier



# Parsing Examples

---

## 3378 Broadway

AddressNumberPrefix

AddressNumber

**3378**

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

**Broadway**

PostType

PostDirectional

PostModifier

# Parsing Examples

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## 307½ Seventh Street

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

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## 307½ Seventh Street

AddressNumberPrefix	
AddressNumber	<b>307</b>
AddressNumberSuffix	½
PreModifier	
PreDirectional	
PreType	
SeparatorElement	
StreetName	<b>Seventh</b>
PostType	<b>Street</b>
PostDirectional	
PostModifier	

# Parsing Examples

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## 408 Rear West Main Street

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

---

## 408 Rear West Main Street

AddressNumberPrefix	
AddressNumber	<b>408</b>
AddressNumberSuffix	<b>Rear</b>
PreModifier	
PreDirectional	<b>West</b>
PreType	
SeparatorElement	
StreetName	<b>Main</b>
PostType	<b>Street</b>
PostDirectional	
PostModifier	

# Parsing Examples

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## 1205 State Route 301

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

---

## 1205 State Route 301

AddressNumberPrefix	
AddressNumber	1205
AddressNumberSuffix	
PreModifier	
PreDirectional	
PreType	State Route
SeparatorElement	
StreetName	301
PostType	
PostDirectional	
PostModifier	

# Parsing Examples

---

**520 Avenue A**

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier



# Parsing Examples

---

## 520 Avenue A

AddressNumberPrefix

AddressNumber

**520**

AddressNumberSuffix

PreModifier

PreDirectional

PreType

**Avenue**

SeparatorElement

StreetName

**A**

PostType

PostDirectional

PostModifier

# Parsing Examples

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## 609 Avenue of the States

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

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## 609 Avenue of the States

AddressNumberPrefix

AddressNumber

609

AddressNumberSuffix

PreModifier

PreDirectional

PreType

Avenue

SeparatorElement

of the

StreetName

States

PostType

PostDirectional

PostModifier

# Parsing Examples

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## 1134 Lake of the Pines Boulevard South

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

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## 1134 Lake of the Pines Boulevard South

AddressNumberPrefix	
AddressNumber	1134
AddressNumberSuffix	
PreModifier	
PreDirectional	
PreType	Lake
SeparatorElement	of the
StreetName	Pines
PostType	Boulevard
PostDirectional	South
PostModifier	

# Parsing Examples

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## 105 Old North Main Street

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

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## 105 Old North Main Street

AddressNumberPrefix	
AddressNumber	<b>105</b>
AddressNumberSuffix	
PreModifier	<b>Old</b>
PreDirectional	<b>North</b>
PreType	
SeparatorElement	
StreetName	<b>Main</b>
PostType	<b>Street</b>
PostDirectional	
PostModifier	

# Parsing Examples

---

## 17A North Union Street

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier



# Parsing Examples

---

## 17A North Union Street

AddressNumberPrefix	
AddressNumber	17
AddressNumberSuffix	A
PreModifier	
PreDirectional	North
PreType	
SeparatorElement	
StreetName	Union
PostType	Street
PostDirectional	
PostModifier	

# Parsing Examples

---

## 17A North Union Street

AddressNumberPrefix	
AddressNumber	17
AddressNumberSuffix	A
PreModifier	
PreDirectional	
PreType	
SeparatorElement	
StreetName	
PostType	
PostDirectional	
PostModifier	

*\*When North Union is a Place Name (requires local knowledge)*

# Parsing Examples

---

## 17A North Union Street

AddressNumberPrefix	
AddressNumber	17
AddressNumberSuffix	A
PreModifier	
PreDirectional	
PreType	
SeparatorElement	
StreetName	North Union*
PostType	Street
PostDirectional	
PostModifier	

*\*When North Union is a Place Name (requires local knowledge)*

# Parsing Examples

---

## 4930 Big Vista Drive

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

---

## 4930 Big Vista Drive

AddressNumberPrefix

AddressNumber

**4930**

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

**Big Vista**

PostType

**Drive**

PostDirectional

PostModifier

# Parsing Examples

---

## 4930 Big Vista Drive

AddressNumberPrefix

AddressNumber

4930

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

---

## 4930 Big Vista Drive

AddressNumberPrefix	
AddressNumber	<b>4930</b>
AddressNumberSuffix	
PreModifier	<b>Big</b>
PreDirectional	
PreType	
SeparatorElement	
StreetName	<b>Vista*</b>
PostType	<b>Drive</b>
PostDirectional	
PostModifier	

# Parsing Examples

---

## 545 Main Street Extension

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier



# Parsing Examples

---

## 545 Main Street Extension

AddressNumberPrefix

AddressNumber

545

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

**Main Street\***

PostType

**Extension**

PostDirectional

PostModifier

*\*For consistency in statewide data*

# Parsing Examples

---

## 12B Main Street Extended

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

---

## 12B Main Street Extended

AddressNumberPrefix	
AddressNumber	12
AddressNumberSuffix	B
PreModifier	
PreDirectional	
PreType	
SeparatorElement	
StreetName	Main
PostType	Street
PostDirectional	
PostModifier	Extended

# Parsing Examples

---

## 122 Lakeview Road Fire Road 12

AddressNumberPrefix

AddressNumber

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

PostType

PostDirectional

PostModifier

# Parsing Examples

---

## 122 Lakeview Road Fire Road 12

AddressNumberPrefix

AddressNumber

122

AddressNumberSuffix

PreModifier

PreDirectional

PreType

SeparatorElement

StreetName

Lakeview

PostType

Road

PostDirectional

PostModifier

Fire Road 12

# Address Number Prefix

---

- 123 Main Street
- 307½ Seventh Street
- 8305B Algon Avenue
- 408 Rear West Main Street
- **116-15** Rockaway Beach Boulevard
- **123-01** Roosevelt Avenue

# Address Number

---

- **123** Main Street
- **307**<sup>1</sup>/<sub>2</sub> Seventh Street
- **8305B** Algon Avenue
- **408** Rear West Main Street
- 116-**15** Rockaway Beach Boulevard
- 123-**01** Roosevelt Avenue

# Address Number Suffix

---

- 123 Main Street
- 307<sup>1</sup>/<sub>2</sub> Seventh Street
- 8305**B** Algon Avenue
- 408 **Rear** West Main Street
- 116-15 Rockaway Beach Boulevard
- 123-01 Roosevelt Avenue



# Mile Marker / Milepost

---

- **Milepost 101.3** Pennsylvania Turnpike
- **Milepost 29.0** Interstate 90
- **Mile Marker 42** United States Route 219
- **Station 122** Appalachian National Trail

# Street Name Pre Modifier

---

- **Alternate** North Avenue B
- **Old** Route 40
- **South** West End Boulevard
- Bypass Highway 22

# Street Name Pre Directional

---

- **South** Main Street
- Alternate **North** Avenue B
- South **West** End Boulevard
- **East** North Avenue
- Bypass **North** Highway 22
- West Virginia Avenue

# Street Name Pre Type

---

- **Avenue** A
- **Route** 56
- **Interstate** 81 southbound
- **United States Highway** 22
- **Lake** of the Pines Boulevard South
- Old **Route** 40
- **Rue** d'Armour
- Villa at the Woods

# Street Name Pre Type Separator

---

- Boulevard **of the** Allies
- Avenue **of the** States
- Lake **of the** Pines Boulevard South
- Rue **des** Etoiles
- Villa at the Woods

# Street Name

---

- **Main** Street
- Old Route **40**
- Interstate **81** southbound
- East **North** Avenue
- **West Virginia** Avenue
- Lake of the **Pines** Boulevard South
- **Villa at the Woods**
- **Main Street** Extension\*

\* *For consistency in statewide data*

# Street Name Post Type

---

- Iroquois **Path**
- Roosevelt **Boulevard**
- Route 219 **Bypass**
- Lake of the Pines **Boulevard** South
- Main Street **Extension**\*
- Main **Street** Extended
- Lakeview **Road** Fire Road 12

*\* For consistency in statewide data*

# Street Name Post Directional

---

- State Street **East**
- North Avenue **Southwest**
- Lake of the Pines Boulevard **South**
- Maple Lane **South** Extension
- Interstate 81 southbound



# Street Name Post Modifier

---

- Main Street **Extended**
- Lakeview Road **Fire Road 12**
- Maple Lane South **Extension**
- Interstate 81 **southbound**

# Can You Stump Us??

---

- Send us your most complicated addresses
- We'll review and provide guidance on how to parse the address into the PEMA standard
- Examples that are beneficial to others will be added to the Best Practices document
- Send examples by COB Friday, August 9 to Carrie Tropasso at [ctropasso@pa.gov](mailto:ctropasso@pa.gov)

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# Best Practices for Road Centerlines and Site/Structure Address Points

# Data Submission for QC Checks

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**100% of data submitted!!!**

# QC Checks

- General QC Checks
  - In PEMA GIS Data Model format
  - Mandatory fields populated
  - NGUIDs are unique
- Boundary
  - No gaps/overlaps
  - ESBs entirely cover the Provisioning Boundary
- Site Structure Address Points
  - Addresses are unique
  - Addresses are not outside Provisioning Boundary



# QC Checks

- Road Centerlines
  - Segmented at boundaries and snapped to features
  - Segment long enough and drawn in correct direction
  - No address gaps, overlaps, directional or parity issues
  - Segments are not outside Provisioning Boundary
- Site Structure Address Points to Road Centerlines
  - Street name and place name matches
  - Address is in street segment range and block with no parity issue



# QC Checks

- ALI to Road Centerlines Synchronization
  - Street name and place name matches
  - Address is in street segment range
- ALI to Site Structure Address Points Synchronization
  - Address number, street name and place name matches
- MSAG (low to high) to Road Centerlines
  - Address range, street name and place name matches
- 98% Match Rate
- Quality Control Exceptions
  - Feature level flags to omit from QC checks
  - Will need to create standardized code list



# Best Practices - Considerations

---

## Road Centerlines

- Accuracy of Boundary Data
- Limitations of CAD software

## Site Structure Address Points

- Placement Method
- Amount of Subaddress Detail Needed
- Limitations of CAD Software

**BEST PRACTICE**



# Best Practices - Road Centerlines (RCL)

---

## Road Centerlines Segmentation

- Should be split at the following:
  - Road Intersections
  - Boundaries
- Under/Overpasses
  - Dependent on local CAD Vendor
  - Data has Z values (elevation)
- Split where changes in road centerline attributes occur



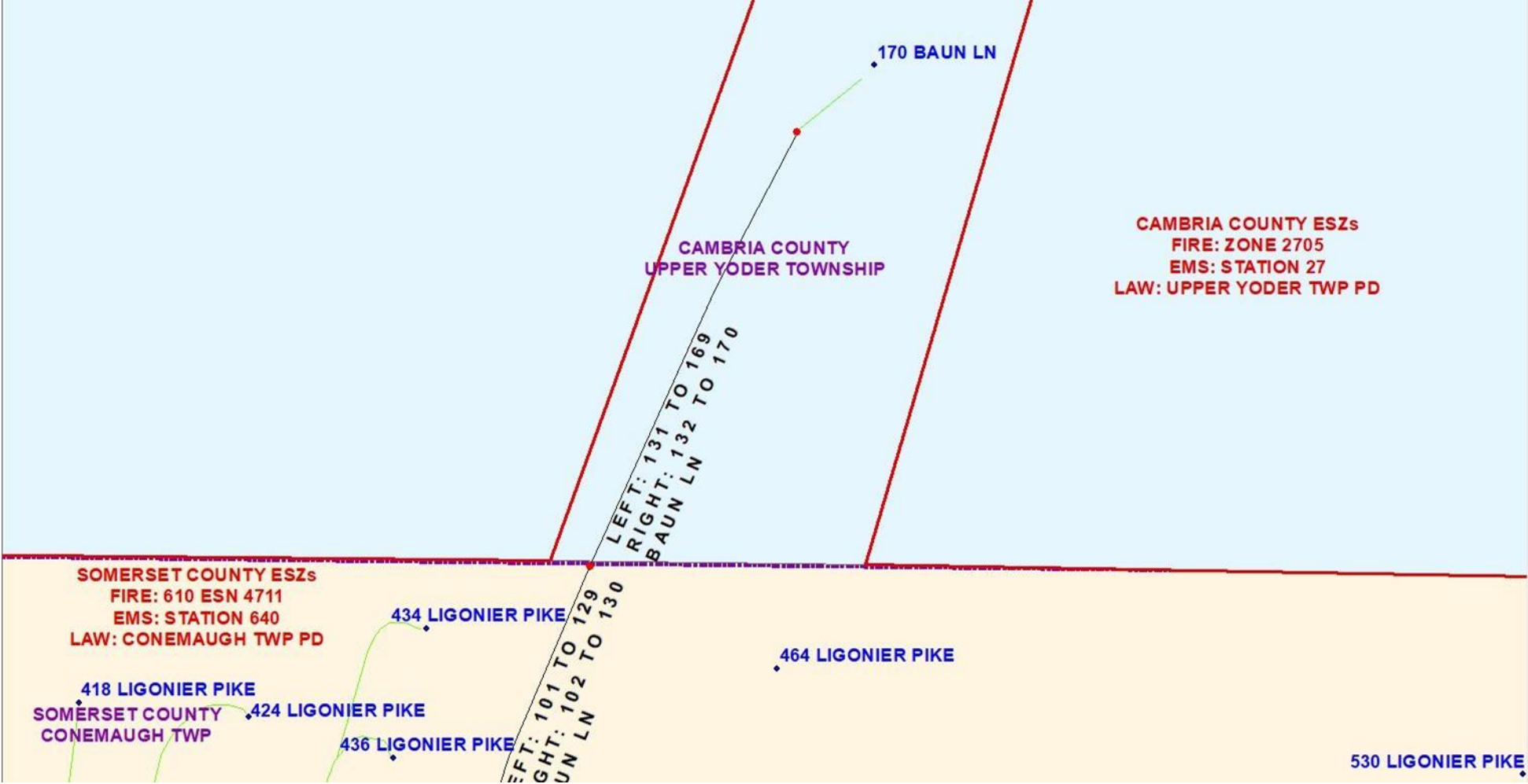
# Best Practices - Road Centerlines (RCL)

---

## Alignment at Borders

- Essential to maintaining accurate NG911 location data.
- Data must be “snapped” to borders with different jurisdictions
- Especially important with border states
  - New York
  - New Jersey
  - Delaware
  - Maryland
  - West Virginia
  - Ohio

# EXAMPLE: Road Centerlines Segmentation



# Best Practices - Road Centerlines (RCL)

## Naming and Addressing

- **0-0 Address Ranges**

- Recommend against using them
- CAD software may require it
- Street segment has ½ address and range must start with 0

- **Interstates/Highways**

Example:	I80 eastbound
Street Name Pre Type:	Interstate
Street Name:	80
Street Name Post Modifier:	eastbound

# Best Practices - Road Centerlines (RCL)

- **Crossovers/Interchanges/Ramps**

- PennDOT standardize name: Emergency or Maintenance Crossover
- Put all information into the Street Name field including:
  - From Road, To Road
  - Travel Direction
  - Exit Number (as appropriate)

*Example: Exit 16A I476 northbound to I76 eastbound*

*Example: Ramp US62 westbound to I79 southbound*

- **Rest Areas/Service Plazas**

- Isolated service plazas should be treated as a driveway
- Local road access should be treated as any other local road

# Best Practices - Road Centerlines (RCL)

---

## Overlapping Routes and Multiple Street Names

- What goes into which field?
  - **Street Name** field for official 911 street name
  - **Complete Alias Street Name** for “other names”
- Field population based on hierarchy
  - Local 911 Street Name (highest priority)
  - Interstate Name
  - US Route Name
  - State Route Name
  - County Route Name
  - Other local or memorial street name (lowest priority)

# Best Practices - Road Centerlines (RCL)

---

## Overlapping Routes and Multiple Street Names

EXAMPLE 1: US Route 30 in Gettysburg, PA

- Locally assigned by 911 as York Street
- Also known locally as “Lincoln Highway”

Street Name: York

Street Name Post Type: Street

Complete Alias Street Name: United States Route 30



# Best Practices - Road Centerlines (RCL)

## Overlapping Routes and Multiple Street Names

EXAMPLE 2: PA 85, PA 210 & PA 954 in Beyer, PA

- All signed in the field
- All overlap

Street Name Pre Type:

State Route

Street Name:

85

Complete Alias Street Name:

State Route 210



# Best Practices - Road Centerlines (RCL)

---

## Overlapping Routes and Multiple Street Names

EXAMPLE 3: PA 283 between Harrisburg and Lancaster

- PA 283 is signed in the field
- PA 300 is recorded in the PennDOT database

Street Name Pre Type: State Route

Street Name: 283

Complete Alias Street Name: State Route 300

# Best Practices - Road Centerlines (RCL)

---

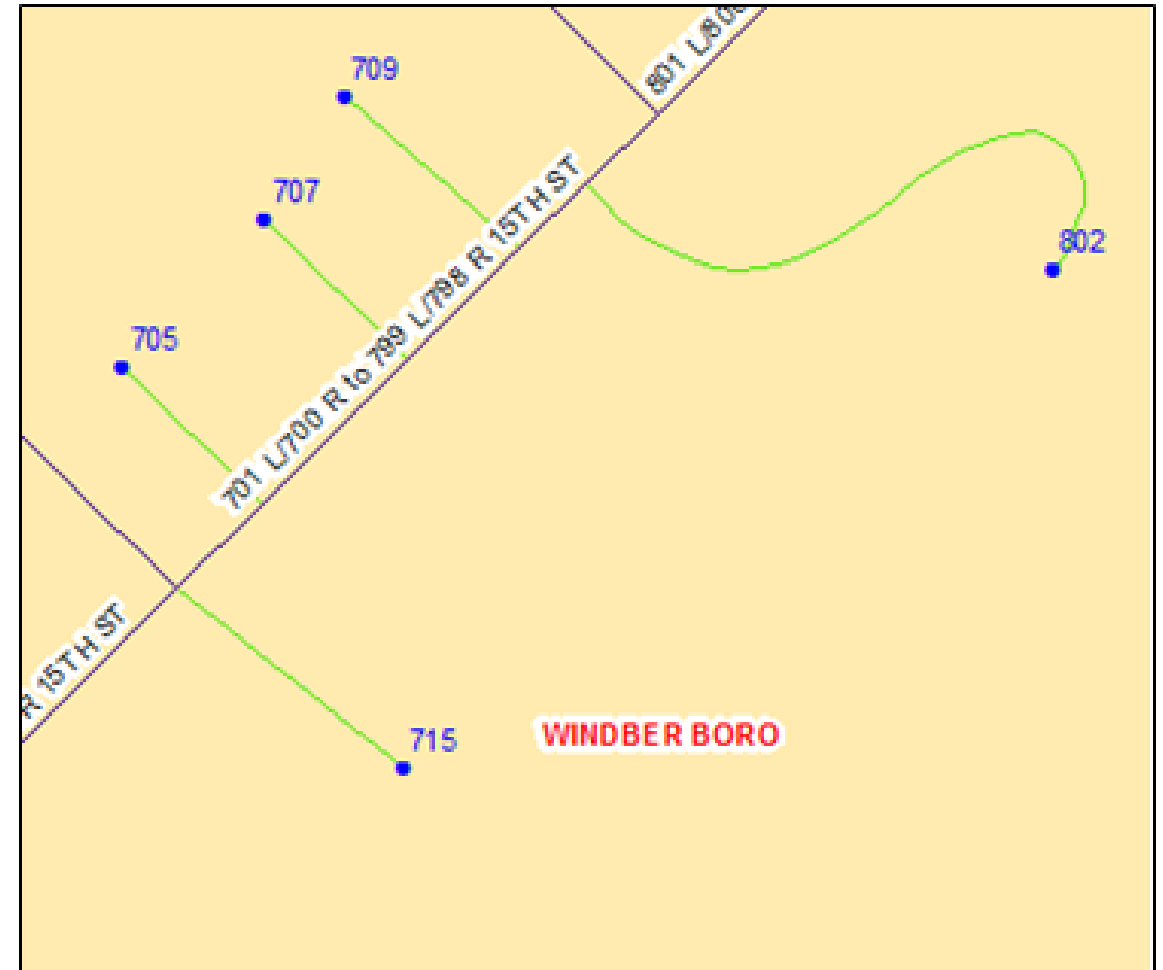
## Military Bases

- Can prove challenging as they can have their own emergency response services/PSAP
- Provide limited address information - usually only street names
- Local jurisdictions should reach out to military facility to obtain most recent information that the facility will release
- Contact PEMA if assistance is needed

# Best Practices - Road Centerlines (RCL)

## Populating Validation Right / Validation Left

- Grandfathered address ranges where numbers are out of sync
- Identifies where the LVF for validation should only use SSAP and ignore the road centerlines
- N = do NOT use RCL for validation



# Best Practices - Site/Structure Address Points (SSAP)

---

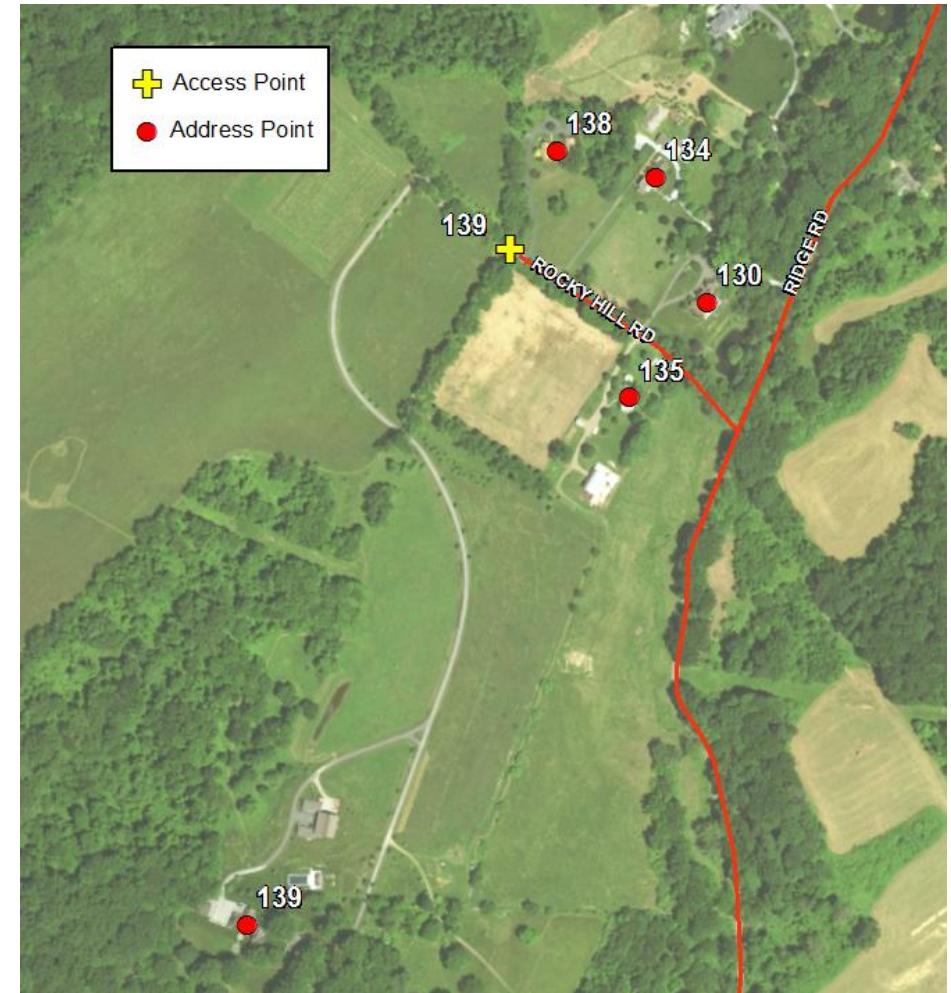
## Address Point Placement

- *NENA Information Document for Development of Site/Structure Address Point Data for 911*
- Address point placement and subaddress development guidelines
- Five address point placement methodologies:
  - Placement of address point based on geocoding from RCL
  - Placement of address point based on a parcel
  - Placement of address point based on a site
  - Placement of address point based on structure(s)
  - Placement of address point based on property access

# Best Practices - Site/Structure Address Points (SSAP)

## Address Point versus Access Point

- An Access Point defines the point of access to an addressed location
- Useful when not obvious or multiple entrances exist
- If both points are shown, population of the Placement Method attribute field is strongly recommended



# Best Practices - Site/Structure Address Points (SSAP)

---

## Multiple Address or Units within a single structure

- Commonly occurs in shopping centers, condos, duplexes, etc.
- Placement based on whether entrances are shared
- Placed at or near each addressed unit's building entrance
- Shared entrances may require “stacked points”
- Points should fall within the building footprint

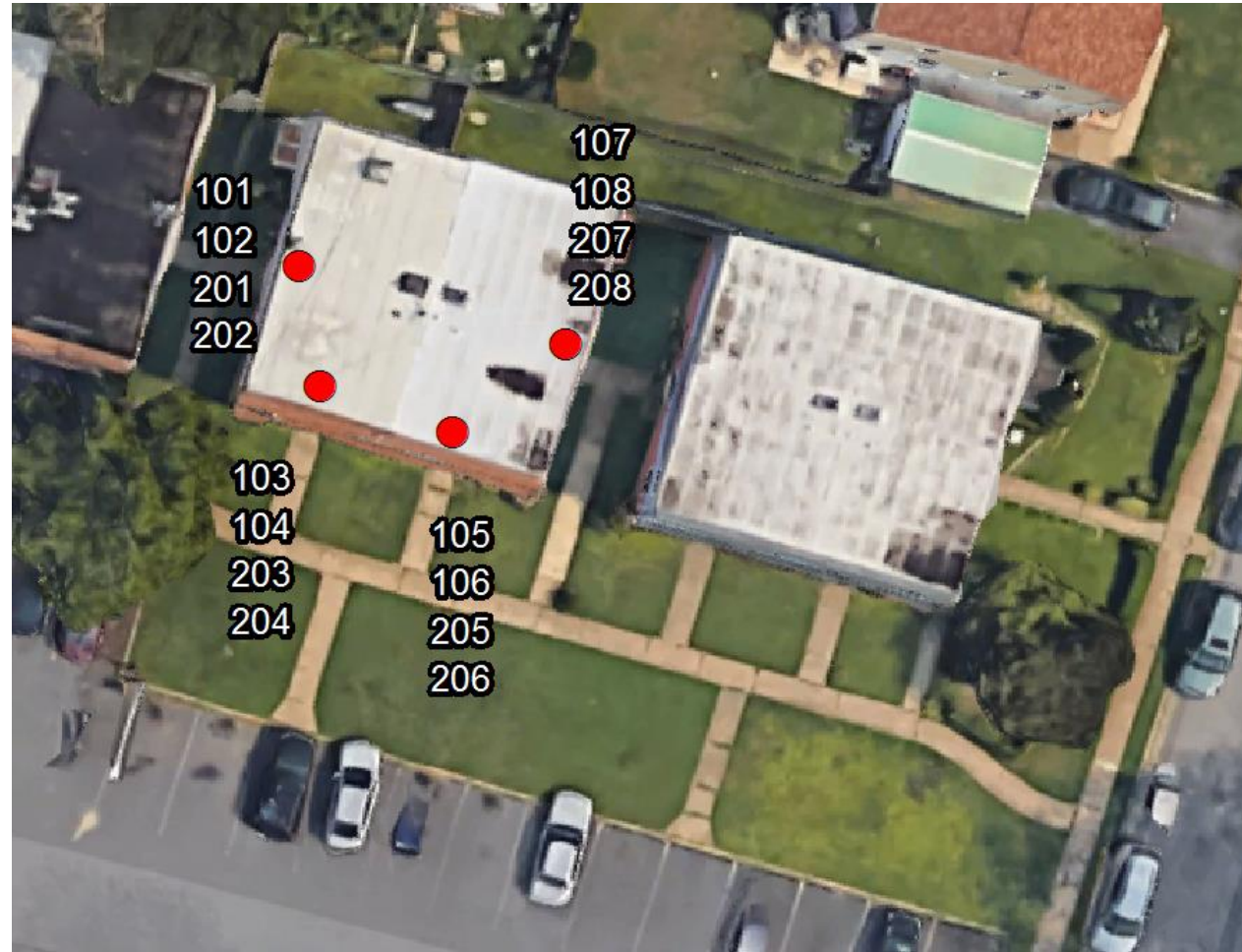


# EXAMPLE: Multiple Addresses w/Separate Entry





# EXAMPLE: Multiple Addresses w/Shared Entry



# Best Practices - Site/Structure Address Points (SSAP)

---

## Multiple Structures/Sites that share the same address

- Commonly occurs in campuses, apartment complexes, large companies, mobile home parks, recreation areas, etc.
- Minimally, each subsite/building should have an Address Point with an appropriate subaddress field populated
- Points should fall within the subsite or building footprint
- If PSAP/ESB Boundary splits the subsite/building, place point on correct side of boundary
- Can add Access Point w/o subaddress information at primary entrance

# EXAMPLE: One Address for Multiple Structures



# Best Practices - Site/Structure Address Points (SSAP)

---

## Transient Structures

- Temporary structures that can be moved
- If seasonal or frequently moved, place point at property access
- If moved less frequently or a small area, place point where the transient structure would normally be

## Named Sites and Structures

- Often currently found in Common Places or Landmarks layer
- In NG911 these should be address points, even if no civic address
- Populate Complete Landmark Name with feature name



# Best Practices - Site/Structure Address Points (SSAP)

---

## Address Number Suffix

- These are typically units within a structure but could be a separate unit located on the same site
- Avoid assigning an Address Number Suffix to a new address
- Instead, treat new addresses as Units using:
  - Apartment # or Unit # (for residences)
  - Suite # (for businesses)

# Best Practices - Site/Structure Address Points (SSAP)

---

## Populating Parcel Identifier

- Pennsylvania-specific optional field
- Added to link address points to local parcel databases for data analysis purposes
- Can be populated with Parcel ID, Uniform Parcel Identifier (UPI) or other unique identifier
- PEMA NG911 GIS Working Group will develop guidance in the future

# Data Development and Maintenance

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- Requires cooperation between GIS and Public Safety Offices
  - Often separate, with little communication
  - Get to know your counterparts!
- Will be a continual process that can be approached in phases
- Basic metadata will need to be created and maintained
  - PEMA GIS Working Group identifying minimum elements needed
- NENA standards will change over time
  - Typically small, incremental changes
  - Once published, PEMA would evaluate and plan implementation

# Thank You!



Carrie Tropasso:  
[ctropasso@pa.gov](mailto:ctropasso@pa.gov)

Jeff Boyle:  
[jefboyle@pa.gov](mailto:jefboyle@pa.gov)

Jessica Frye:  
[jfrye@geo-comm.com](mailto:jfrye@geo-comm.com)