Draft
Data Exchange Standard
Emergency Service Zones
Rev. 5

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1.0 INTRODUCTION

This document defines the minimum characteristics required of a common data content model for Idaho's statewide Emergency Service Zones (ESZ) dataset, which is a critical component of geospatial support for Enhanced 9-1-1 (E9-1-1) systems.

An ESZ is a geographic region defined for the purposes of planning and directing emergency response. An ESZ dataset is a collection of areas where each area has exactly one primary police responder, exactly one primary medical responder, and exactly one primary fire responder. A Public Safety Answering Point (PSAP) is a physical location where 9-1-1 emergency telephone calls are received and the routed to the proper emergency service responder unit. Each ESZ is given an identifying number, called an Emergency Service Number (ESN), by its corresponding PSAP to use for succinctness in reference. The ESN is an identifier for the unique set of responders for the ESZ. Put into terminology familiar to most geographic information systems (GIS) practitioners – an ESZ is a polygon feature and an ESN is an attribute of the feature.

All Computer Aided Dispatch (CAD) systems use ESZ or other methodologies to identify the police, fire and medical responders responsible for a specific address or area. Some dispatch systems will use different terminology for the service areas. Also some dispatch systems maintain this information in a tabular format through a master street address guide (MSAG) in a non-spatial database versus a geographic information system (GIS) data format.

The common content model is intended to facilitate integration and sharing of ESZ data and to ensure that the data is as accurate and up-to-date as possible. This data model, formally referred to as the Idaho Emergency Service Zones Standard (IESZS) is designed to by system agnostic, in that it is cross-compatible with most software, hardware, and vendor configurations. It borrows heavily from and follows nearly exactly the data models for ESZ as described by Arizona state and National Emergency Number Association (NENA).

This data model was developed by the ESZ workgroup of the Idaho Public Safety Technical Working Group (TWG) for Framework, the base map component of the Idaho Spatial Data Infrastructure (IDSI).

1.1 Mission and Goals of Standard

The Idaho Emergency Service Zones Standard (IESZS) will provide a template for ESZ datasets that is consistent, maintainable, and compatible with other ISDI Framework elements as they are developed. Specifically, this standard will assist agencies responsible for the creation, maintenance, and distribution of ESZ datasets by streamlining methods of data sharing, data development, and data maintenance among source and integration stewards. It will also help to ensure that ESZ attribution (including geometry) is as current as possible by relying on source stewards' expertise and their local mandates for data quality (e.g., completeness, positional accuracy, attribute accuracy). Furthermore, this standard will ensure that data consumers are able to acquire and seamlessly integrate data from disparate sources and can utilize this information to efficiently address the business needs (e.g. mapping, emergency management, computer-aided dispatch, tax collection and allocation, 9-1-1 services, etc.).

1.2 Relationship to Existing Standards

This standard integrates with existing standards as much as possible. Several resources were used to develop this standard, including:

- Other standards being developed by the Federal Geographic Data Committee (FGDC), especially the *Geographic Information Framework Data Content Standard, Part 5: Governmental Unit and Other Geographic Area Boundaries* (May 2008), which will serve as a reference for the Idaho standard.
- Relevant National Emergency Number Association (NENA) standards, including the GIS Data Collection & Maintenance standard and the standard for Data Formats for ALI, MSAG, and GIS.

In addition, the IESZS has been written with consideration towards other standards potentially being developed through the Idaho Geospatial Data Standards Development Process. Specifically, these include the *Governmental Units framework theme.* As with all Idaho Framework datasets, those developed under the Public Safety theme must adhere to the *Idaho Metadata Standard*.

1.3 Description of Standard

The IESZS sets forth the essential elements and data structure necessary to adequately describe, produce, and use ESZ datasets within Idaho. The standard is primarily concerned with a core set of geospatial and tabular information that supports a uniform, accurate, and current representation of ESZ for the state of Idaho. This standard is devised to be:

- Simple, easy to understand, and logical
- Uniformly applicable, whenever possible
- Flexible and capable of accommodating future expansions
- Dynamic in terms of continuous review.

1.4 Applicability and Intended Use of Standard

This standard is applicable to the feature set that represents ESZ in Idaho. The intended use of this standard has three key components. First, it will enable data producers to share easily integrated data and users to understand how ESZ data sets are being produced locally. Second, it will guide accurate documentation of ESZ data sets that are produced for and in Idaho. And third, it will facilitate the discussion of additional geospatial data standards surrounding the attributes that the ESZ data standard optionally provides for identifying emergency service responders (e.g., law enforcement, fire, ambulance, and others).

1.5 Standard Development Procedures

The Idaho Framework Public Safety Technical Working Group, ESZ workgroup, is comprised of representatives from local governmental agencies. Beginning in the early spring of 2009, this team researched, designed, and produced a draft recommendation for a minimum required ESZ data structure. Development of the data model consisted primarily of internet research for information on existing data model/data content standards for ESZ, authoring of this document, and an iterative process of feedback and revisions including feedback from representatives of Ada County Dispatch and Canyon County Sheriffs Office. In June of 2009, the draft was distributed for review to the full Public Safety TWG, and feedback was incorporated into the standard. In October of 2009, the draft standard was presented to the GIS community at the annual Idaho Geospatial Forum. ESZ workgroup members are: Jimae Haynes, Eric Wing, Jay Young, and Dan Narsavage.

1.6 Maintenance of the Standard

The IESZS will be reviewed and revised on an as-needed basis. It is anticipated that as ESZ or associated boundary data (law enforcement, fire, ambulance, and other responder areas of responsibility) are collected at higher spatial accuracies, as geospatial applications mature, and as

technology for capturing that higher resolution data improves, the standard will need to be updated. The range of attributes or the refinement of attribute quality in the existing standard may also need revision. A Framework steward will be identified for this element; one of the duties in that role will be to facilitate the maintenance of this standard.

2.0 BODY OF THE STANDARD

2.1 Scope and Content of the Standard

The scope of the IESZS is for publicly available vector data which defines the boundaries of ESZ to be used primarily by public safety entities. The content is focused on the essential data, data quality, and metadata elements required to enable ESZ data to be maintained and used locally as well as compiled for regional and statewide use.

2.2 Need for the Standard

ESZ is one of the foundation data sets needed to support an E9-1-1 system. This standard will define the minimum required data specification and content standard by which the locally managed data can be integrated into regional and statewide datasets used to support the E9-1-1 system within Idaho.

2.3 Participation in Standards Development

The development of standards for ESZ geospatial data has not been extensively addressed anywhere. The National Emergency Number Association (NENA) has proposed data model and data quality standards for ESZ in its "GIS Data Collection & Maintenance" standard and the standard for "Data Formats for ALI, MSAG, and GIS."

Participation in the development of the IESZS has been relatively limited; however, input and feedback has been requested from representatives of multiple dispatch agencies and the GIS community in Idaho. The IESZS, and the process by which it will be updated and enhanced is open to all agencies concerned with the development, maintenance, and application of ESZ data to public safety-related business functions. As with all Idaho framework standards, public review of and comments on the IESZS is encouraged.

2.4 Integration with Other Standards

The IESZS follows the same format as other Idaho geospatial data standards. The specifics of this standard are related to the cadastral, road centerline, administrative boundaries, and metadata standards, mainly in relation to the extent and topology of police, fire, and emergency medical (EMS) service areas boundaries and in the type and extent of data source specifications, respectively. Guidance on the spatial and maintenance relationships between and among ESZ features and datasets and the metadata schema required to share them were taken directly from the NENA "GIS Data Collection & Maintenance" standard. The relationship with the other mentioned data standards is primarily georeferencing for spatial data quality purposes.

2.5 Technical and Operation Context

2.5.1 Data Environment

The data environment for IESZS is a vector model, comprised of areas (polygons) and spatial and maintenance relationships between areas. The exchange medium for ESZ data files is the ESRI shapefile, which is a public domain data structure relating feature geometry and feature attributes. The shapefile data format is supported by most GIS and spatial software in use in Idaho. Information about

the technical specification for the ESRI shapefile can be found on ESRI's website (www.esri.com). In designating the shapefile as the exchange format, this standard has been designed to accommodate its limitations, such as limiting attribute (field) names to ten characters. In a future version of this standard, other formats for data exchange which are able to preserve a more flexible data model will be investigated.

2.5.2 Reference Systems

The Framework steward will assemble and distribute Framework datasets in IDTM, Idaho's standard coordinate system. Source stewards may provide boundary data in native coordinate reference systems; however, they are encouraged to convert existing data to the most current realization of horizontal and vertical datums where such conversion is feasible and of value. As of this writing, the most current realization for horizontal coordinates is the North American Datum of 1983 (NSRS 2007); for vertical coordinates it is the North American Vertical Datum of 1988. No matter what reference system is used, the reference system and datum **must** be clearly documented in the metadata accompanying the dataset and a projection must be explicitly defined.

2.5.3 Global Positioning Systems

Not applicable.

2.5.4 Interdependence of Themes

The ESZ data theme is dependent upon multiple administrative boundaries themes (county boundaries; municipal boundaries; law enforcement, fire, and ambulance service area boundaries; and other land ownership boundaries) and road centerlines, and at times other natural and transportation related elements. The location of ESZ boundaries is directly tied to the locations of these other elements; in many cases some or all of these boundaries are coincident, and a change to any of these underlying boundaries can trigger a change to one or all of the others, including ESZ boundaries. For instance, an annexation can expand the area of a municipality and contract the area for a county by the same amount - any change along the border between governmental units affects the area of all units involved. These are examples of dependent relationships, and integration is accomplished through design of the data model.

In addition to dependencies, rules need to be defined for determining issues such as which jurisdiction's data is used where more than one version exists or where a jurisdiction maps beyond its limits. The general rule is that the jurisdiction in possession of the best representation of the boundary should take precedence. In most cases this will be the jurisdiction in which the boundary occurs. The specific arrangements implementing the general rule will be set forth in the stewardship agreements for each jurisdiction and organization contributing boundary data to the Framework.

2.5.5 Encoding

Encoding translates user formats into standard formats, like the shapefile specified here for exchange. All GIS software used in Idaho has the capability of encoding its data to the shapefile format.

2.5.6 Resolution

ESZ datasets have different resolutions depending on scope (national, statewide or local) and data capture methods. It is the intent of this standard to allow regional, county, and municipal datasets to nest within the data collected at a statewide scale, and ultimately this will be facilitated by defining spatial relationships within the data model. Resolution will be tracked as a metadata element, and it is intended to reflect the best available attribution related to relevant geographic area boundaries.

Resolution issues will be addressed more specifically within data standards developed subsequently, and resolution will be documented in the metadata.

2.5.7 Accuracy

As with resolution, the intent of the IESZS is to support varying levels of positional and attribute accuracy. However, it is essential to the success of the data standard that all aspects of ESZ data be completely documented in the associated metadata (either at the feature or dataset level). The target positional accuracy is 40 feet or less, reported by the method set forth in *Part 3: National Standard for Spatial Data Accuracy* (NSSDA).

2.5.8 Edge Matching

The IESZS is intended to support seamless datasets across Idaho. Similar datasets from adjacent states using the same projection and horizontal/vertical datum should merge with the Idaho ESZ data without gaps. Data resulting in gaps and overlaps between adjacent jurisdictions submitted to the Framework steward will be referred back to the ESZ authorities for resolution.

2.5.9 Unique Identifier

A unique feature identifier is necessary to link geographic areas and associated boundaries to their attributes and to external databases. At the state level, the combination of CountyID, PSAPID, and ESN will form a unique identifier. At the county level, the combination of PSAPID and ESN may form a unique identifier.

2.5.10 Attributes

Attributes are any of the additional information that is collected and shared in relation to emergency service zone polygons. Refer to Section 3 for the specification of minimal and optional characteristics for emergency service zones attributes.

2.5.11 Stewardship

Perpetual maintenance is essential to ESZ Framework. Details of stewardship partners, their roles and responsibilities, and stewardship design and processes will be set forth in a charter and related documents in the near future. Since up-to-date GIS data is required for E9-1-1 applications, it is imperative that the data be continually updated with new streets, subdivisions, annexations, and other data. Responsibility for data maintenance and quality control must be tied to the specific organizations or groups that maintain or use the data. These will be identified in the stewardship charter.

2.5.12 Records Management and Archiving

Records management and archiving will be provided for with specificity in the stewardship documents established for ESZ Framework.

2.5.13 Metadata

Metadata will conform to the Idaho Geospatial Metadata Standard, which follows the Federal Metadata Content Standard, version 2. A user will be able to access metadata for all Framework easily and reliably. Metadata detailing the characteristics and quality of submitted ESZ data must be provided. Metadata must provide sufficient information to allow the user to determine whether the dataset is appropriate for an intended purpose, as well as telling the user how to access the data.

3.0 DATA CHARACTERISTICS

The data characteristics specified below are subject to revision based on implementation of the ESZ statewide mapping effort, E9-1-1 recommendations, and future decisions made within the Idaho Government Boundaries TWG.

3.1 Minimum Graphic Data Elements

The spatial data for ESZ is modeled as a polygon feature class that usually contains multiple polygons, one polygon per designated emergency service zone.

3.2 Minimum Attribute or Non-graphic Data Elements

NAME	SIZE	TYPE	REQUIRED	UNIQUE	DATA DESCRIPTION	Comments
PSAPID	8	Text	Yes	No	Code identifying the PSAP associated with the assigned ESN. PSAP is short for ***p**ublic **s**afety **a**nswering **p**oint*, a physical location where 911 emergency telephone calls are received and then routed to the proper emergency services.	The workgroup anticipates that the combination of PSAPID and ESN will form unique value that could be used as a primary key.
ESN	5	Text	Yes	No	Emergency Service Number associated with this polygon. *Note: The Service Provider, providing the E9-1-1 Selective Routing will assign ESNs.* An **ESN** (emergency service number) is defined as a number assigned to specific geographic area within which all E911 calls are routed to one specific PSAP and the residents within the area are served by the same police, fire, and emergency medical agencies.	
LAW	100	Text	Yes	No	Identifies the Law Enforcement agency responsible for responding to the ESN	
FIRE	100	Text	Yes	No	Identifies the Fire Protection agency responsible for responding to the ESN	
EMS	100	Text	Yes	No	Identifies the Emergency Medical Service agency responsible for responding to the ESN	

As this data model matures and ESZ is used at a regional or statewide level, we will develop conventions for values used in the LAW, FIRE, and EMS fields. Additionally identifiers for Municipality and County are likely to be needed to support aggregation of the local data up to a county and state level. At a regional or state level, the combination of CountyID, MunicipalityID, PSAPID, and ESN is one method for forming a unique identifier for every ESZ polygon. There are several workflows that could be used in assigning unique identifiers for municipalities and counties, including recording those values at the local level or assigning those values when the data is aggregated at the state level. Best practice is to use GNIS numbers for all place-based identifiers.

3.3 Optional Graphic Data Elements

None at this time.

3.4 Optional Attribute or Non-graphic Data Elements

NAME	SIZE	TYPE	REQUIRED	UNIQUE	DATA DESCRIPTION	Comments
GIS_STEW	12	Text	No	No	Source of the GIS feature.	Optional, but strongly recommended.

						INSIDE Idaho assigns a unique GIS_STEW code to each participating county/tribe/agency

3.5 Data Quality

Data quality considerations for Emergency Service Zones

- Must be free of sliver polygons (i.e. no gaps, overlaps, or tiny unwanted polygons are allowed).
- ESZ boundaries must be snapped to street segments.
- ESZ boundaries must cover the PSAP 9-1-1 system's entire response area.
- The scale of source vector GIS data must be 1:24,000 or better.
- Every 9-1-1 system will eventually exchange GIS data with surrounding 9-1-1 systems. For this reason, it is necessary for agencies to maintain metadata for each spatial dataset used in the mapped Automated Location Identification (ALI) systems.

Other considerations:

- In a wireless Phase II environment, the wireless 9-1-1 caller's coordinates are provided to the PSAP in a WGS84 projection. Thus, all 9-1-1 GIS map data must utilize projections that are capable of displaying WGS84 coordinates.
- It is likely that the data will be converted multiple times and into different data formats; therefore, the GIS community should adopt naming conventions for file names and field names that are easily converted into many data formats (including shapefiles). Likewise, data types should be as vendor-neutral as possible.

APPENDIX A: References

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APPENDIX B: Glossary

What are ESNs/ESZs?

While often used synonymously, an **ESN** (emergency service number) is defined as a number assigned to a specific geographic area within which all E911 calls are routed to one specific PSAP (public safety answering point) and the residents within the area are served by the same police, fire, and emergency medical agencies.

An **ESZ**, or emergency service zone, is a geographic region consisting of unique law, medical, and fire response zones. Thus the ESZ is a GIS polygon formed by intersection of polygons for fire, ambulance and law enforcement. ESNs/ESZs are used by the 9-1-1 system to determine which PSAP will receive the call and which emergency response agency will respond to a given incident. A PSAP may have multiple ESN's associated with it, but all ESN's will only be associated with a single PSAP (in relational database terms, a many to one relationship).

PSAP

A **Public Safety Answering Point** (**PSAP**) is a call center responsible for answering calls to an emergency telephone number for police, firefighting, and ambulance services. Trained telephone operators are also usually responsible for dispatching these emergency services. Enhanced 9-1-1, 2009.

ALI

In all North American jurisdictions, special privacy legislation permits emergency operators to obtain a 9-1-1 caller's telephone number and location information. This information is gathered by mapping the calling phone number to an address in a database. This database function is known as **ALI**, **Automatic Location Identification**. The database is generally maintained by the local telephone company, under a contract with the PSAP. Each telephone company has its own standards for the formatting of the database. Most ALI databases have a companion database known as the MSAG, Master Street Address Guide. Enhanced 9-1-1, 2009.

MSAG

The **Master Street Address Guide** is a system used to associate a telephone number from a customer subscriber to an Emergency Service Zone (ESZ). MSAG describes address elements including the exact spellings of street names, and street number ranges. Enhanced 9-1-1, 2009.