

## **Cadastral NSDI Reference Document**

### **July 2006**

#### **Purpose**

This document describes the Cadastral NSDI, its components and the public and private business processes that define the content. The Cadastral National Spatial Data Infrastructure (Cadastral NSDI) has been defined by the FGDC Cadastral Subcommittee as *a minimum set of attributes about land parcels that is used for publication and distribution of cadastral information by cadastral data producers for use by applications and business processes.*

The standards for the data content of the Cadastral NSDI are derived from the Cadastral Data Content Standard<sup>1</sup>, which is a standard for all cadastral elements and extends beyond the minimum elements in the Cadastral NSDI. This standard and many other documents related to the Cadastral NSDI and the Cadastral Subcommittee can be found at <http://www.nationalcad.org>.

#### **Business Applications**

The goal of the FGDC Cadastral Data Subcommittee is to provide a uniform coverage of parcel data that provides a multi-jurisdictional view of private, state and federal lands, their ownership, use, structures and the value of private property. Figure 1 shows an example of the characteristics of a single parcel and the type of information that would be available for entire region. GIS analysis of a regional coverage allows users to identify the location of properties with specific characteristics within a region. A recent study of the utility of parcel data by emergency responders after a hurricane found that local parcel information was uniquely capable of answering questions that ranged from the identification of vacant lands that could be used for debris removal to the location of organic farms to avoid spraying them with insecticides. A similar study of wildland fires where interdiction can save life and properties found that knowledge of the location of structures and their value was critical in the planning and deployment of limited resources.

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<sup>1</sup> Cadastral Subcommittee, *FGDC Cadastral Data Content Standard version 1.3*, May 2003, <http://www.nationalcad.org/data/documents/CADSTAND.v.1.3.pdf>

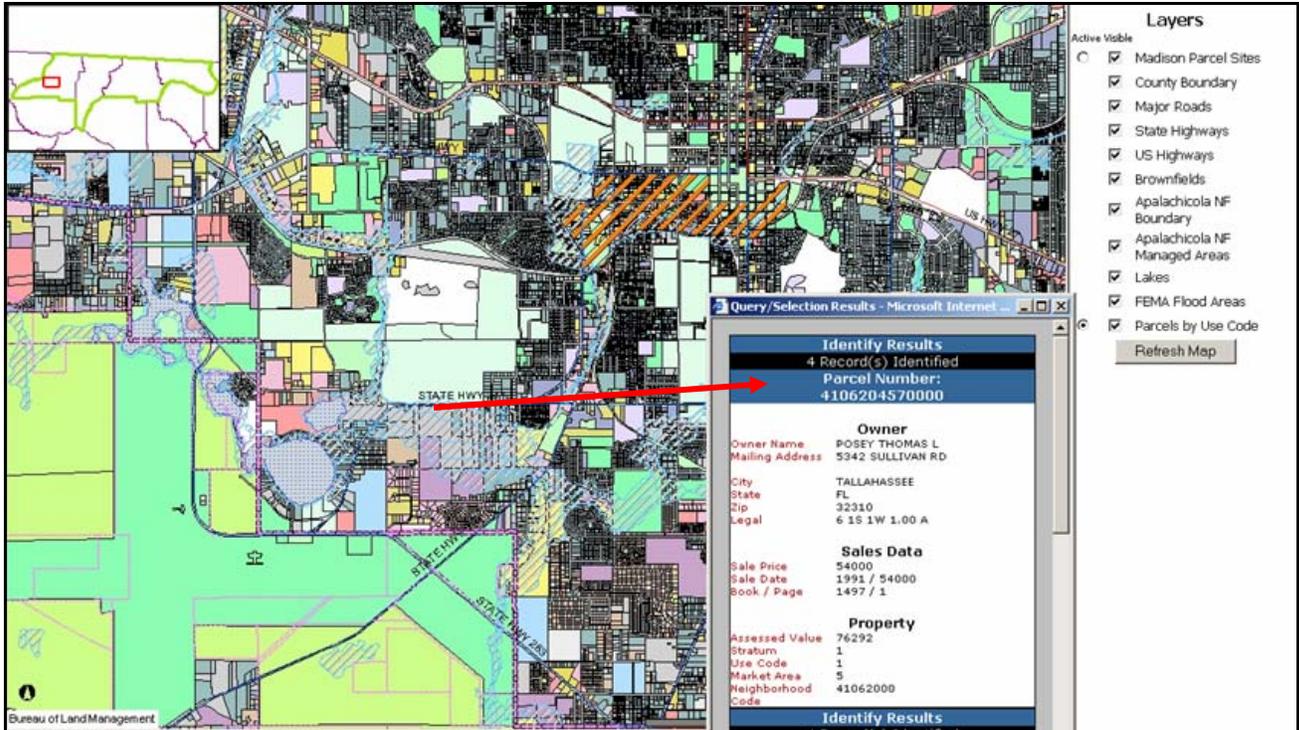


Figure 1 A Parcel within FEMA flood zone. An illustration of how parcel data would be incorporated into a business application. The inset identifies the extent of the regional coverage.

Figure 2 demonstrates how parcel data was used to assess the impact of two large wildfires, Crazy Horse and Black Mountain fires, that occurred during the 2003 fire season. This figure illustrates the type of information that local governments are able to provide about properties in the path of the fire. Here we see the location of structures, but what is also available is detailed

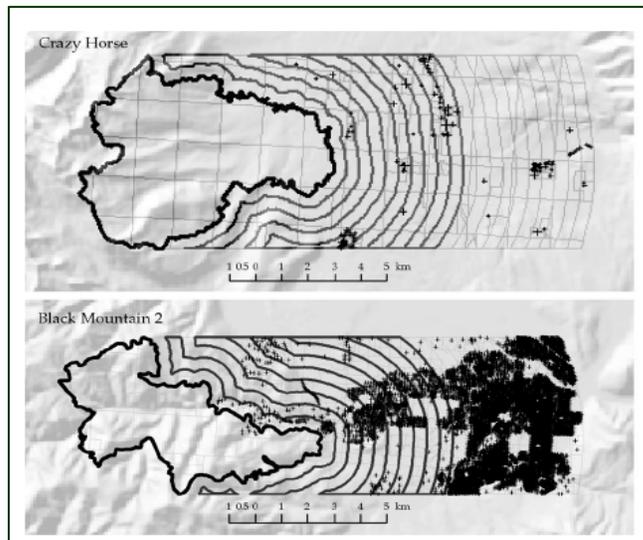


Figure 2. - Crazy Horse and Black Mountain Fire 2003. Marks show the location of structures. An associated database (not shown) can value the structures, list building material, roof type, and land use.

information about the structures value and type (residential, commercial), whether lands are agricultural and their use (crop type, pasture, not used), whether a structure is a primary or secondary residence, and what from what materials the structure is made. This information is updated on an annual basis. Having this level of detail when making decisions as where to best allocate resources needs no

elaboration. The issue that must be faced is how to ensure all communities have this data in a digital format and that the fire management community has access to it at the beginning of every fire season.

## **1, Terminology and Key Concepts**

**Cadastral data** is the information about rights and interest in land. Cadastral data may also be known as real estate data or parcel information or tax parcel information. There are many legal and historical nuances and subtleties surrounding the management of cadastral information. The Cadastral NSDI attempts to simplify some of this in two ways, first by providing the cadastral information in two components, cadastral reference and parcels, and second by providing a limited set of parcel level information to support identified business process needs. The source of the cadastral NSDI data is derived from the databases of the data stewards.

**Data stewards** are cadastral data producers that provide data for the Cadastral NSDI. Federal and state land management agencies are generally the stewards of public lands while local government tax assessment offices are the stewards of private properties. A data steward may provide cadastral reference information or parcel information or both. The Cadastral NSDI will have defined data stewards based on geographic extent and Cadastral NSDI component. For example in the figure below (Figure 3) the cadastral reference is shown as one layer of information and the parcel geometry with related parcel information as another layer. These two components of the Cadastral NSDI may have different stewards, for example the cadastral reference may be maintained by a federal agency, a state organization or a surveying department in a county. The parcels may be maintained by the tax assessor or some other county department. In this case the geometry is integrated because the parcels are tied to and dependent on the cadastral reference, but there are two Cadastral Data Stewards for the same area. However, data stewards for a given Cadastral NSDI component do not overlap. That is, in any given geographic there will only be one data steward for the cadastral reference and one data steward for the parcels. The stewardship boundaries and any changes along those boundaries will need to be agreed to by the data stewards.

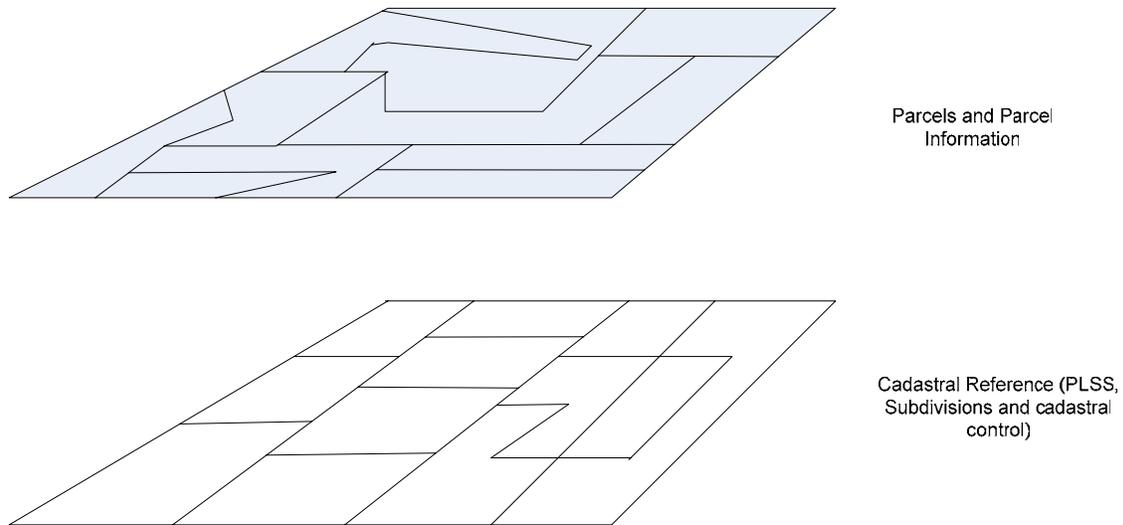


Figure 3 – Two cadastral components in the same geographic extent.

A second type of data steward is a data integrator. The data integrator combines information from producers to generate regional or statewide views. The data integrators will publish at least the core set of information and provide linkages to more detailed source information from the data producers.

**Cadastral Reference** is the set of information that allows parcel level information to be registered to other data themes and to be tied to features on the ground. Cadastral reference is composed of the spatial reference data (geodetic control and orthophotography) and survey frameworks such as the Public Land Survey System (PLSS), parcel map grids, subdivision boundaries or municipal boundaries. Parcels are nested into and tied to the reference data and the cadastral reference.

One example of an eastern cadastral framework is in North Carolina where the Cadastral NSDI reference is provided through the state. In this case the State has developed orthophotography standards to meet a wide range of uses, including cadastral information and other reference data such as county boundaries, municipal boundaries, subdivision boundaries and map grids. The parcels are nested in this framework.

**The Geographic Coordinate Database (GCDB)** is a program in the Bureau of Land Management (BLM) that supports the management of public lands, principally in the western states by managing coordinate values on Public Land Survey System (PLSS) corners and special survey areas. In contrast to the east the GCDB is a key data source for cadastral reference in the west. The GCDB often serves as the foundation for state and local parcel automation efforts as well as support the BLM and other federal land agencies such as the Forest Service and Park Service. On federal lands the BLM Cadastral Survey is the

data steward for the Cadastral NSDI and in some parts of the west they are also the data steward for the cadastral reference beyond federal boundaries.

More information about these concepts (data stewardship, GCDB, cadastral data and ongoing activities) can be found at <http://www.nationalcad.org>. This is the Internet home for the FGDC Cadastral Subcommittee and this site is updated regularly and there is a place to sign up for electronic notifications on the site.

## **2. The Cadastral NSDI**

The National Spatial Data Infrastructure (NSDI) is defined by the Federal Geographic Data Committee (FGDC) <sup>2</sup> as the technologies, policies and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors and the academic community. The Cadastral National Spatial Data Infrastructure (Cadastral NSDI) has been defined by the FGDC Cadastral Subcommittee as a minimum set of attributes about land parcels that is used for publication and distribution of cadastral information by cadastral data producers. The Cadastral NSDI is intended to provide sufficient information to support integrating basic land parcel information across jurisdictional boundaries providing a regional view of property ownership and rights. This regional view is designed to answer fundamental questions regarding land ownership and property characteristics (structures, land use, and parcel geometry) in support of end user business land ownership information.

The Cadastral NSDI is extracted (published) from data producers at all levels of government, but primarily from local governments, federal land management agencies, state land management agencies or state departments of revenue. There are other data producers that contribute to the Cadastral NSDI including county land survey programs, private surveyors and state GIS programs.

The Cadastral NSDI is standardized so it can be integrated across jurisdictional boundaries, from county-to-county and from state-to-state forming a seamless, non-overlapping representation of the Cadastral NSDI elements.

The Cadastral NSDI has two components: Cadastral Reference and Parcels. Supplemental information such as orthophotography and geodetic control are essential to building and integration parcel geometry. The supplemental information also provides context for the cadastral information and databases such as hydrography, transportation and even contours in some cases may be essential for vertical integration of parcel mapping. The standards for supplemental information are defined by non-cadastral groups but are essential for establishing an accurate geographic reference for the Cadastral NSDI so that published data can be integrated with other information. The standards for the

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<sup>2</sup> Federal Geographic Data Committee, *National Spatial Data Infrastructure*, Internet, December 2005, <http://www.fgdc.gov/nsdi/nsdi.html>

cadastral reference and parcel components are defined by the Cadastral Subcommittee and are in the Cadastral Data Content Standard <sup>3</sup>.

The cadastral reference elements are needed to support query, mapping and navigation and are part of legal descriptions. This includes information about survey systems, such as subdivisions, geopolitical areas, land grants and the public land survey system. Figure 4 illustrates the cadastral reference concepts

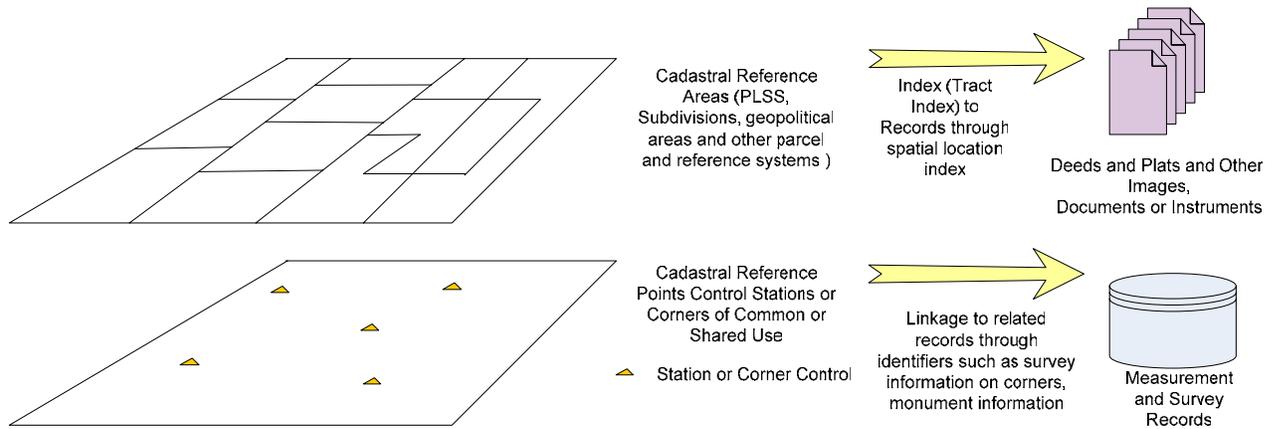


Figure 4 – Cadastral NSDI – Cadastral Reference

Figure 4 illustrates that the Cadastral NSDI provides linkages to more detailed information while meeting the basic business needs for many applications.

Parcels are the detailed information about property and its characteristics that are needed to meet the business needs of the user community. Spatially the parcels are tied to the earth through the cadastral reference information. Figure 5 illustrates the parcel component of the Cadastral NSDI.

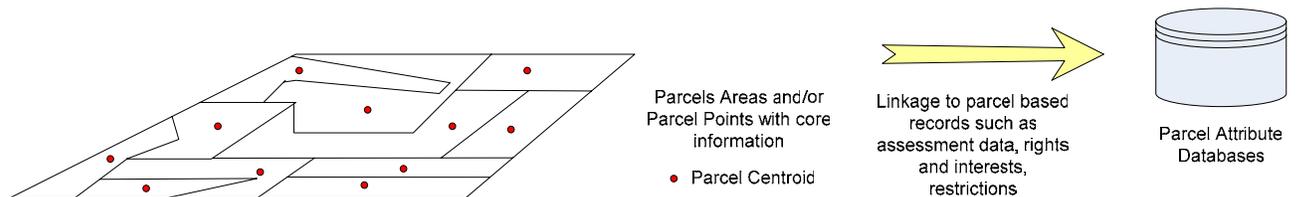


Figure 5 - Cadastral NSDI – Parcel Information

The parcel information may be polygons or parcel points. The attributes in the parcel component of the Cadastral NSDI contain sufficient information to link to the rich attribute databases from the data producer. On federally managed public lands the parcels represent transactions or decisions such as grazing

<sup>3</sup> Cadastral Subcommittee, *FGDC Cadastral Data Content Standard version 1.3*, May 2003, <http://www.nationalcad.org/data/documents/CADSTAND.v.1.3.pdf>

leases, mineral surveys or use authorizations. On private lands the parcels are typically tax parcels but may include use restrictions such as easements or rights of ways.

Metadata is a requirement for all NSDI themes. Metadata conforms to the FGDC Metadata standard and should include the contact information in Part 1 of the Metadata standard as a minimum. Additionally the Cadastral NSDI standard can be cited as the thesaurus and attribute definition source for Cadastral NSDI data sets in the metadata. Figure 6 illustrates how the metadata and the identification of the data stewards (both producer and integrator) are spatially tied to the parcel and cadastral reference information.

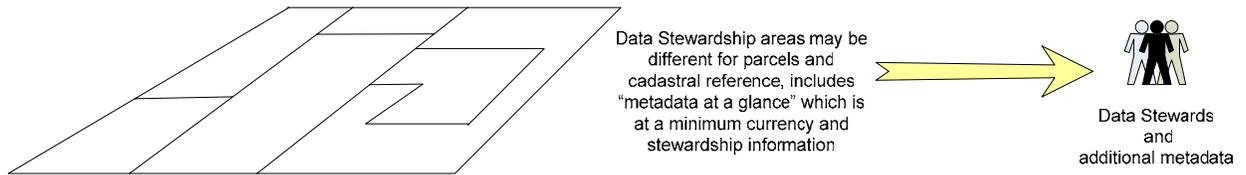


Figure 6 – Cadastral NSDI – Metadata and Data Stewards

## 2.1 Sample Implementation

The Figure below (Figure 7) illustrates the opening page of a demonstration of the Cadastral NSDI for the State of Arizona. The data on this site was generated from the BLM's Public Land Survey System spatial data sets for the state as enhanced with locally generated control.

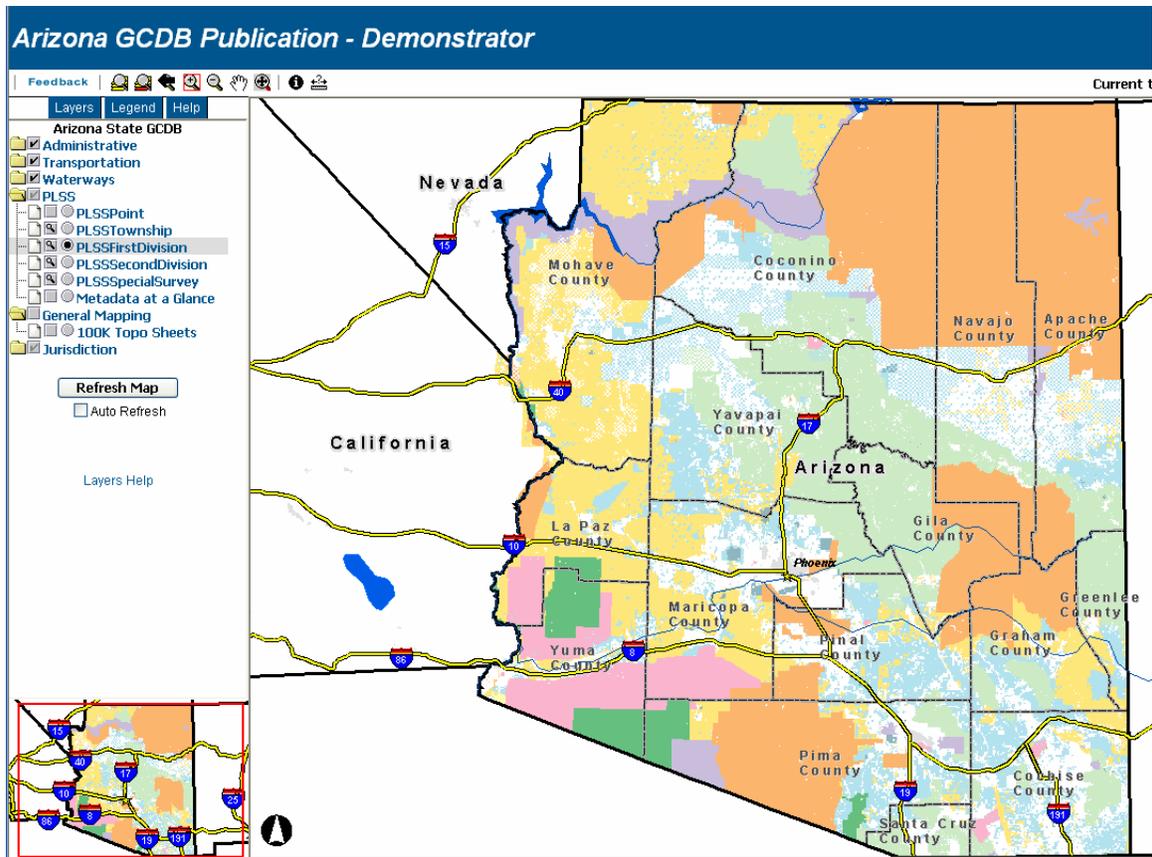


Figure 7 – State of Arizona Demonstration Cadastral NSDI Site

Zooming in on a portion of the state the Cadastral Reference information becomes visible and in Figure 8 the PLSS Townships and sections that form the basis of the cadastral reference in this area are visible.

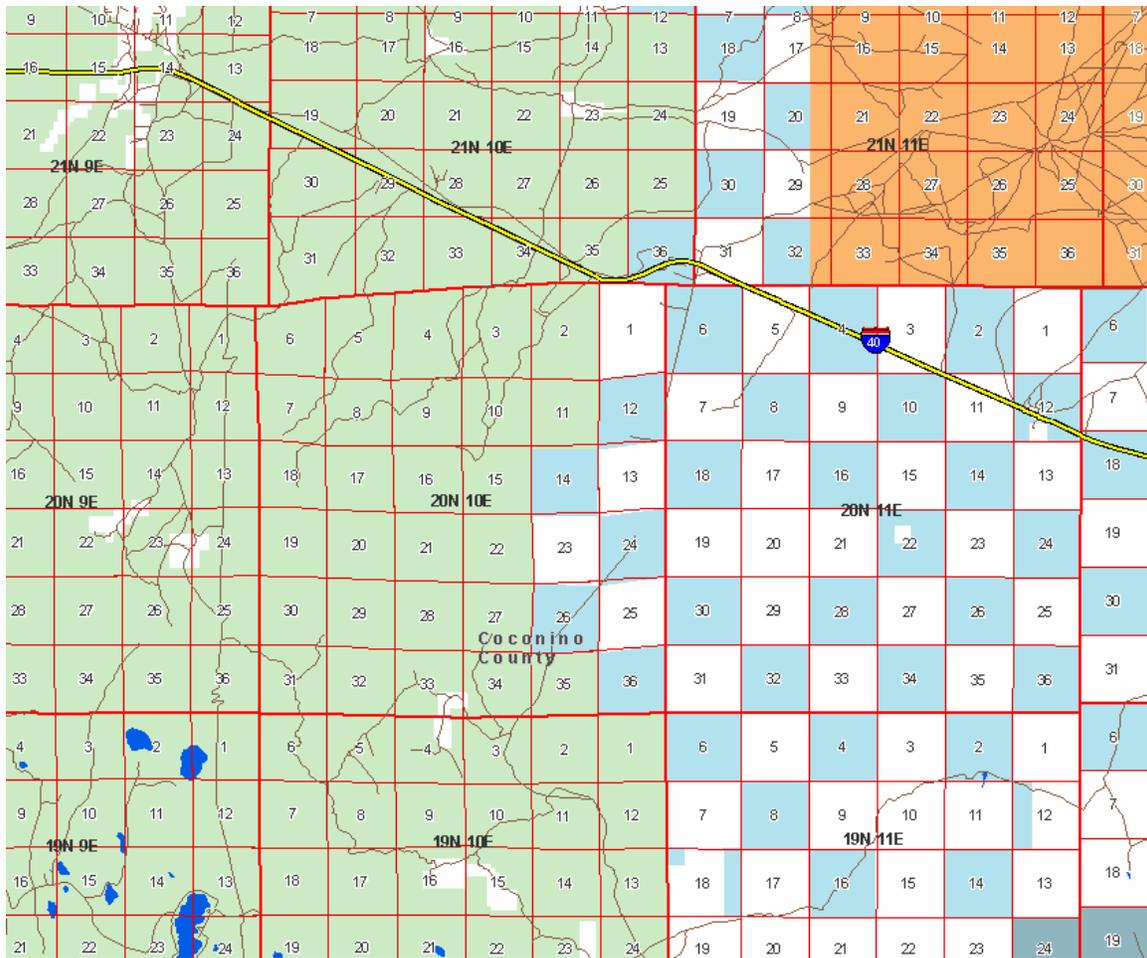


Figure 8 – Cadastral Reference Information with jurisdictional and data stewardship information from the Arizona Cadastral NSDI

Narrowing in on an area with mineral claims in the Figure below (Figures 9a and 9b) the cadastral reference information is shown in Figure 9a and federal mineral surveys are shown on top of the cadastral reference in Figure 9b. The mineral surveys are examples of federal parcels that are created by a transaction, which in this case is a mineral claim or mineral patent. The spatial representation of the federal transaction creates a federal parcel. There are many records related to these transactions in the federal land system. The Cadastral NSDI shows the outline of the federal parcel plus any unique identifying information about the federal parcel and linkages to documents and records about the transaction. Notice in Figure 9b that some of the outlines of the federal parcels match the cadastral reference and others lay “on top” of the cadastral reference. This is because in some cases the private land claims existed prior to the establishment of the PLSS and thus the PLSS did not cross into the existing private claims. In the second case the claims came after the PLSS survey and are referenced to and exist “on top of” the PLSS cadastral reference.

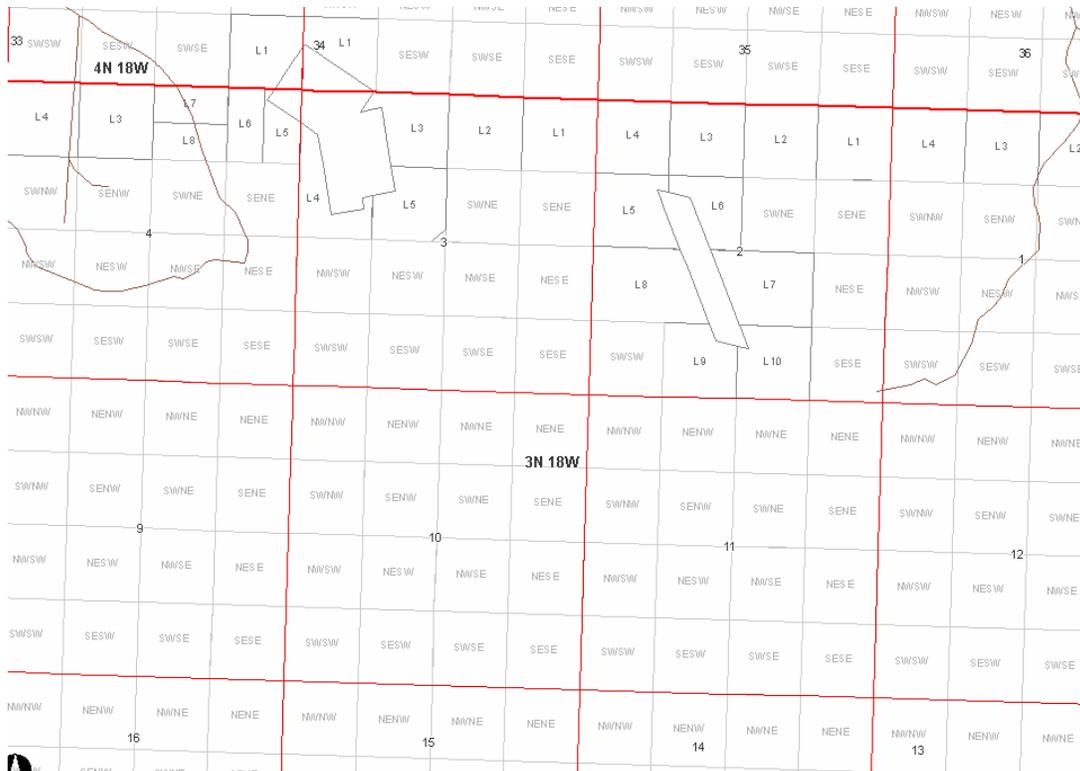


Figure 9a – Cadastral Reference Information (PLSS plus private lands)



Figure 9b- Cadastral Reference information with Federal Parcels

The Cadastral NSDI provides the data necessary to support business functions which includes the ability to index and link to related information. In some cases related information is tied to a point. This is the case with corner monumentation records. In this example the Cadastral NSDI provides a point for the corner with

a standardized identifier that can be used to link to another system, such as a detailed system for managing control and monumentation, or a linkage to a scanned image for a record of the corner or a survey to the corner. In other cases original plats and surveys, subdivision plats or other records are indexed based on the Cadastral Reference. The polygons of the Cadastral Reference provide the index to gain access to these images or documents.

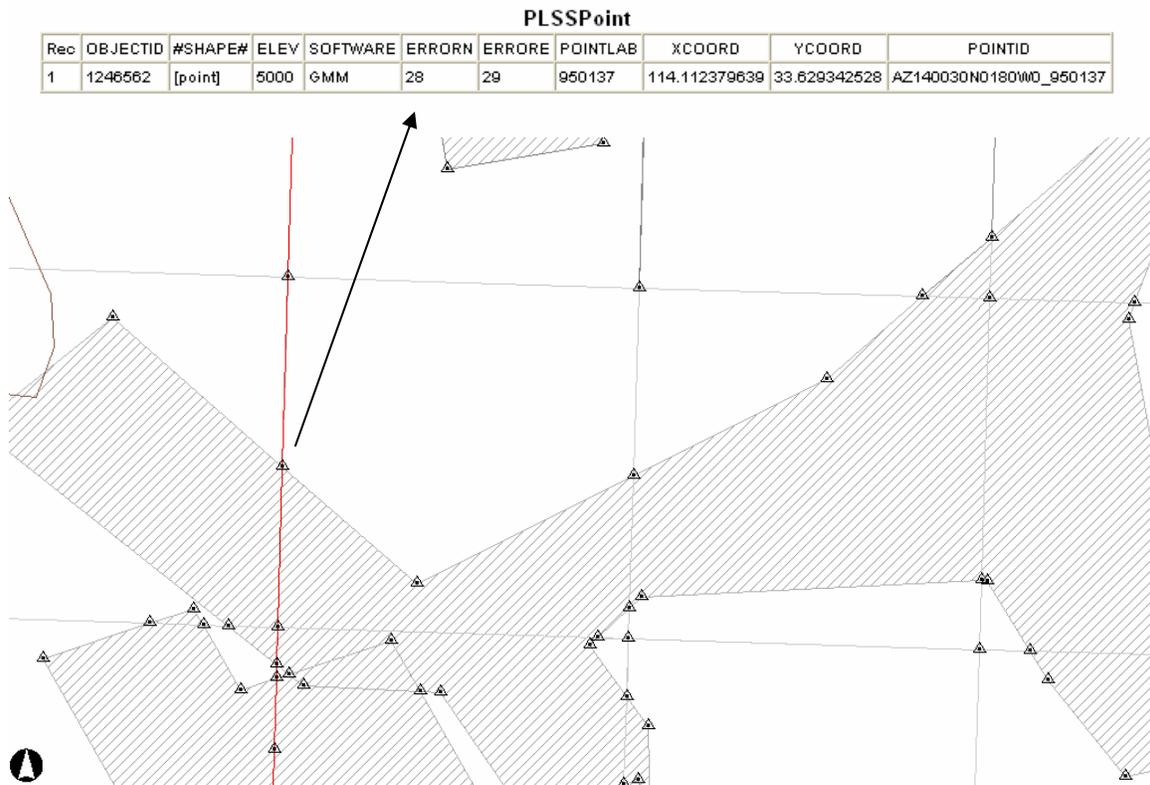


Figure 10 – Cadastral Reference Point tied to point attributes. Additional survey measurement and monument attributes are found in related survey tables.

In the example in Figure 10, the information contained in the attributes about the cadastral point includes a standardized point identifier that can be used to link the graphic of the point to images or more detailed data about the point that is not in the Cadastral NSDI.

### **3. Characteristics of the Cadastral NSDI**

The FGDC Cadastral Subcommittee has reviewed the concepts documents for the NSDI and the content and distribution of other themes as well as the needs and requirements from the business processes that drive the Cadastral NSDI. Based on these findings the following are the base characteristics of the Cadastral NSDI.

Attributes are as important as spatial information for decision support.

The Cadastral NSDI must be able to be updated at a minimum annually.

The Cadastral NSDI must be standardized so that information can be integrated across jurisdictional boundaries.

The Cadastral NSDI will need to provide linkages to more detailed information that can be obtained from data producers.

The Cadastral NSDI must be defined in the context of end user business processes, which means that the elements have been validated as meeting business process needs, such as emergency response, locating public lands, economic development, and integrating parcel data with other themes.

### **4. Business Processes and the Cadastral NSDI**

The Cadastral Subcommittee's strategy for determining the requirements for the Cadastral NSDI is to assess the business needs of user communities' and use these requirements to define the elements of the Cadastral NSDI. Through this analysis it was determined that the Cadastral NSDI needed two components Cadastral Reference and Parcels. Additional Supplemental information was critical to cadastral maintenance and to put the cadastral information in context. The cadastral community is responsible for the two components and is reliant on the activities of other groups for the standards and stewardship of the Supplemental Information. The cadastral reference is the information necessary to fit the parcel information into a continuous and related fabric. In the public domain states, the Public Land Survey System (PLSS) is a key component of the cadastral reference. In non-public domain states and in the PLSS states there are other cadastral reference systems that form a hierarchy for parcel information and define a cadastral reference. This includes municipal boundaries, hydrography (although this is as supplemental information), map grids, subdivision plat boundaries and blocks and lots. The parcel data are the elements that describe the characteristics of a parcel including the polygon or centroid and attributes that describe ownership, land use, presence of structures and type and value.

The Cadastral Subcommittee found it essential to assess the utility of these components in the context of real world applications. Affirmation of the cadastral

NSDI elements was achieved by evaluating the business needs for regional user communities that needed land ownership and characteristics for navigation and discovery or emergency planning and response. Appendix A summarizes these findings.

## **5. The Components of the Cadastral NSDI**

The elements and details of the three components to the Cadastral NSDI; Spatial Reference, Cadastral Reference and Parcels are described below.

### **5.1 Supplemental Information**

The Supplemental Information includes geodetic and geographic control necessary to reference cadastral information to a real world coordinate system. Every application and business process that was examined in the development of the Cadastral NSDI implied or explicitly stated the need for this underlying reference. Spatial reference begins with a geodetic network system that can be densified with a High Accuracy Reference Network (HARN) and further extended to base maps and orthophotography. One key point is that orthophotography for cadastral information in most urban area must be at one foot pixel or smaller resolution with the associated vertical information to support the generation of the orthophotography. In areas of the country with severe terrain changes or more rural areas the digital ortho quarter quadrangle standards may be sufficient.

#### **The National Geodetic Reference System (NGRS)**

This is coordinated and managed by the National Geodetic Survey and provides a consistent and uniform definition of coordinate system, datums and monumented points across a jurisdiction. The attribute content of the NGRS points will be consistent with the standards supported by the National Geodetic Survey.

#### **Orthophotography**

This is orthophotography that is tied to the NGRS and is current. Ideally, the orthophotography includes the underlying terrain model to support the generation of the orthophotography and basic terrain information such as break lines. However, many jurisdictions are able to take advantage of orthophotography without the underlying detailed terrain model. The resolution of orthophotography ranges from six inches in the urban areas to as much as 10 meters in steep sloped wilderness areas.

#### **Roads, Hydrography and Contours**

This information is often essential to building parcel polygons from legal descriptions and for fitting the cadastral data together. The standards for this information are not part of the Cadastral Subcommittee's mission but it is recognized that these layers are essential for cadastral information. In particular the transportation information is often necessary to support and provide integrity to parcel address information. Some states may chose to include these layers as cadastral reference.

### **5.2 Cadastral NSDI – Cadastral Reference**

The Cadastral NSDI Cadastral Reference components have been defined in the FGDC Cadastral National Spatial Data Infrastructure (NSDI) Standard as the elements needed to support query, mapping and navigation. Cadastral Reference items are a part of legal descriptions and are contained in the Cadastral Data Content Standard.

**Cadastral Reference** - This is the information necessary to fit the parcel information into a continuous and related fabric. In the public domain states, the Public Land Survey System (PLSS) is a key component of the cadastral reference. In non-public domain states and in the PLSS states there are other cadastral reference systems that form a hierarchy for parcel information and define a cadastral reference. This includes municipal boundaries, map grids, subdivision plat boundaries and blocks and lots.

A more detailed description of the elements of the Cadastral NSDI Cadastral Reference is as follows.

**Metadata** - The metadata will contain information about the entire data set such the jurisdiction name, the jurisdiction contact, a description of coordinate systems, units of measure, horizontal and vertical datum if this information is the same for all coordinates reported in the data set. If there are varying reference systems provided in the data set then these items are captured at the feature level. Other metadata includes the date of the file coded domain of values and accuracy reports.

**Corners of Common Usage** – These are corners or reference points that are used extensively by land surveyors and others to generate legal descriptions and surveys. These might be points of commencing, corners common to several land divisions, or corners of the Public Land Survey System. There may be road intersections, control monuments or corners of municipal boundaries that are used commonly as a starting point for land descriptions. Each jurisdiction that collects and maintains cadastral information (cadastral stewards) will identify what they would consider to be Corners of Common Usage. Generally these corners would be at one to two mile spacing in rural areas and block-by-block to one half mile to spacing in urban areas. Corners of Common Usage are also often used in other themes to control those themes such as political boundaries.

The suggested attributes for the corners of common usage are as follows.

**Control ID** - Primary key for the corner of common usage that the provider assigns to the point. This may be a name or a number, such as the National Geodetic Survey's point identifier (PID) or the Bureau of Land Management's GCDB standard corner identifier.

**East X** - This is the easting, the X coordinate or the longitude of the corner of common usage reported as an attribute.

**North Y** - This is northing, the Y coordinate or the latitude of the corner of common usage reported as an attribute.

**Elevation Z** – This is the height or elevation of the corner of common usage.

**Coordinate Surveyor** - The surveyor who established the coordinate positions, which may be different than the monument surveyor. This may also be an agency or firm.

**Coordinate Date** - The date of the coordinate values.

**Coordinate System** - The coordinate system for the coordinate value such as latitude longitude, state plane coordinate or UTM. This should include the units of measure. This is only needed if the coordinate system for the corner of common usage varies from that described in the metadata.

**Elevation Units** - The units of measure for the reported elevation. This is only needed if the elevation unit for the corner of common usage varies from that described in the metadata.

**Horizontal Datum** - The horizontal datum for the reported coordinate value. This is only needed if the horizontal datum for the corner record varies from that described in the metadata.

**Elevation Datum** - The vertical datum is the reference datum for the reported elevation value. This is only needed if the elevation datum for the corner of common usage varies from that described in the metadata.

**Horizontal Accuracy** - The accuracy or reliability for the reported horizontal coordinate position for the corner of common usage.

**Elevation Accuracy** - The accuracy or reliability for the reported elevation for the corner of common usage.

**Grid or Cell Reference System** – This is a reference system that is used to support parcel mapping and may be a regular grid cell or an irregular set of polygons. Grid or cell reference systems are most commonly found in non-public domain areas and are often used to support tax mapping or the assignment of tax parcel identifiers. As examples, the State Plane Coordinate System or a land lot grid cell system or a tax map sheet system may be used to define a set of grids or cells. In the public domain states the divisions of the Public Land Survey System (township, section and section divisions) typically form the grid or cell reference system for mapping and be called a nominal division since the use of the PLSS in this manner is to provide an index rather than to support legal descriptions. The grid or cell reference system description should be included in the metadata.

**Hydrography** – For the purposes of cadastral reference hydrography is included to the extent needed to support the definition of cadastral features. These are generally meanderable water bodies or water that may form the extent of riparian boundaries. In Coastal areas this may include tidal limit definitions as possible. As mentioned above Hydrography may be considered as supplemental information if another agency has collected this information and made it available to support cadastral information.

**Significant Cadastral Reference Features** – These are areas and features that define or are used to reference legal descriptions. As examples this might be the Public Land Survey System components, the exterior boundaries of subdivisions or the boundaries of large public land holdings. Typically these are features that are important for understanding and using parcel information. Some examples are as follows.

**Survey System Area** – A survey system area is generally a simultaneous conveyance that defines an area of land within which there is a consistent method of land description. The most commonly known example is a subdivision or a condominium. Survey system areas typically have a name or number.

**Public Land Survey System Township** - In the Public Land Survey System a Township refers to a unit of land, that are nominally six miles on a side, usually containing 36 sections.

**Public Land Survey System Township First Division** - Public Land Survey System Townships first divisions are normally sections or tracts. But there can be exceptions.

**Survey Name** - Public Land survey areas in Ohio are identified by a name. The named areas have an origin of Public Land Survey System value and then are further identified by Survey Name. These would be areas in Ohio only.

**Secondary Survey Name** - Secondary Survey Name further identifies named areas within the Ohio surveys. These would be areas in Ohio only.

### 5.3 Cadastral NSDI – Parcels

The attributes for the Cadastral NSDI Parcels have been developed through a series of studies of business processes with the parcel level information being the detailed information needed by those business processes. The elements in the Cadastral NSDI Parcel are defined in the Cadastral Data Content Standard.

The business processes that have been examined to identify the parcel elements to date include navigation and discovery of parcel information, emergency planning, emergency response, recovery, mitigation, economic development and regional integration and community planning. All of these business processes indicated a need find additional detail about parcels through linkages to data producers. The Cadastral NSDI Parcels were specified to support immediate and overall needs of these business processes not the case by case processing.

A more detailed description of the elements of the Cadastral NSDI Parcels is as follows.

**Metadata** - The metadata will contain information about the entire data set such as the data steward, the parcel contact, a description of the basis for the assessment system (sale price, use, market value etc), the date of the file, information on interpretation of the assessment classifications and any other metadata that would support the use and application of the information.

**Parcel Outline (Polygon)** - This is geographic extent of the parcel, the parcel boundaries forming a closed polygon.

**Parcel Centroid** - This is a point within the parcel that can be used to attach related information. This may be a visual centroid or a point within the parcel. It may not be the mathematical centroid as this point needs to be contained within the parcel polygon.

**Parcel ID** - A unique identifier for the parcel as defined by the data steward or data producer. The parcel identifier should provide a link to additional information about the parcel and should be unique across the data stewards geographic extent.

**Source Reference** - This is a pointer to, or an attribute describing, the source reference for the parcel. This could be a deed, plat, or other document reference.

**Source Reference Date** - The date of the Source Reference, which is essentially the last update date for this parcel. The entire data set may have a last updated date or an “unloaded for publication” date that is different than the specific currency or update date for each individual parcel.

**Owner Type** - The type of ownership is the classification of owner. In some local governments tax parcels are tagged as either taxable or exempt and the owner classification is not known. In these cases an owner types of taxable and exempt may be added to this list.

international  
tribal  
federal  
state  
county  
local/municipal  
private  
not for profit  
other  
unknown

**Improved** - This is an attribute to indicate whether or not there is an improvement on the parcel.

**Owner Name** - An indication of the primary owner name, recognizing that there may be multiple owner names or that some owner names may be blocked for security reasons or that some jurisdictions may not allow the distribution of owner names. For publicly held lands the owner name is the surface managing agency, such a Bureau of Land Management, Department of Transportation, etc

**Assessment / Value for Land Information** - This is the total value of the land only. The basis of the value, such as market value, resale value, sale price or use value should be described in the metadata.

**Assessment / Value for Improvements Information** - This is the total value of improvements on the parcel. The basis of the value, such as market value, resale value, sale price or use value should be described in the metadata.

**Assessment / Value Total** - This information is the total value of the land and improvements. The basis of the value, such as market value, resale value, sale price or use value should be described in the metadata.

**Primary Assessment / Value Classification** - This is the assessment or tax classification of the parcel. This attribute is the primary or dominate assessment or value classification.

**Secondary Assessment / Value Classification** - This is the assessment or tax classification of the parcel. There may be more than one assessment classification for a parcel, these are multiple classifications. Include them all.

**Tax Bill Mailing Address** - This is the US Postal Service address for the tax bill mailing.

**Parcel Street Address** – This is the street address (site address) for the parcel. If there is more than one, select the first or primary site address.

**Parcel Area** - The area of the parcel expressed in acres.

**Parcel Zoning** – This is the current land use zoning classification for the parcel. There may be more than one zoning classification for a parcel - include them all.

**Public Parcel Name** - For publicly owned parcels, this is the commonly recognized name of the parcel (ex: Dad Dunham Park or Yellowstone Park)

## **Appendix A – Business Process Summary**

The Cadastral NSDI Parcel elements have been defined and described from a series of business process studies. These studies ranged from one day workshops with surveys and interviews to teleconference interviews of key players from identified business sectors. Summaries of the business cases and their resulting Cadastral NSDI Parcel element needs are described below.

The Cadastral NSDI Cadastral Reference elements that are needed to support these elements have been included in the Cadastral NSDI. The Subcommittee did not expect the business area experts to identify the reference data needed to support their needs. Instead cadastral data producers and members of the Subcommittee met to review the parcel needs and identified the reference elements necessary to support the parcel needs.

### **Navigation and Discovery**

This business application supports the Geospatial One Stop business case for the facilitation of data exchange. Navigation describes the process of identifying a geography or area of interest. For example a national application may open with a map of the United States. The navigation and discovery describes the data necessary to zoom into or to navigate to a specific area of interest. Discovery is the process of identifying the existence of cadastral information in an area. It is not the full data set that would be applied to an application or a business case but it is sufficient information to identify the existence of cadastral data and to identify the data provider.

### **Economic Development and Regional Integration**

This business application is the process of assembling parcel data from varied sources across jurisdictional boundaries. This business case does not include the information for an application but it does include the data necessary to assemble and “stitch together” data from varied sources and providers. Regional integration supports the following activities:

- Inventory and analysis of the progress and completion of the Cadastral NSDI,
- The identification of areas where parcel data is missing,
- Assembling average and patterns of land and improvement values
- The identification of areas with potential data integration issues, such as areas with multiple providers for the same geography, and
- Managing data stewardship relationships.

### **Emergency Event Planning**

This business application is the process of preparing for the response to emergency events. Typically this is not in reaction to a pending event but instead is long term and more broadly based than a single event. The events examined included hurricanes, wildland fire and toxic gas plume release.

### **Emergency Event Preparation**

This business application is the preparations and provisioning in response to a developing event. In this application the impending danger has been identified and the checklists and activities from the planning stage are being put into action. The events that were examined for this business application were wildland fires and hurricanes.

### **Emergency Event Response**

This business application is the reaction to the event. The event or disaster is in full force during this stage and the activities defined in the planning stage are being put into action. The events that were examined for this business application were wildland fires, hurricanes and toxic gas plumes.

### **Emergency Event Recovery**

This business application begins after the response and is the process of recuperation. Recovery may not restore the environment to its pre-event conditions but it is the phase where food, shelter and safety needs are met.

### **Emergency Event Mitigation**

This is a longer stage and in the parlance of the Federal Emergency Management Agency. Mitigation is the ongoing effort to lessen the impact disasters have on people's lives and property through damage prevention and flood insurance. Mitigation in the wildland fire scenario includes preventive plantings and fuel reduction activities.

### **Cadastral NSDI Parcels and Business Applications**

The following table summarizes the parcel elements that are required for each of the business processes that were examined. Knowing which elements are needed for which business processes can assist cadastral data producers in identifying what level of standardization and the extent of the Cadastral NSDI Parcels that are needed.

All of the business processes required that the parcel and cadastral reference information be tied to a known geographic reference system and that the information be available in a known and widely accepted data format so that information could be incorporated into business process applications.

	Navigation and Discovery	Econ. Devel. and Regional Integration	Emergency Event Planning	Emergency Event Preparation	Emergency Event Response <sup>2</sup>	Emergency Event Recovery	Emergency Event Mitigation	Energy Management
<b>Cadastral NSDI - Parcels</b>								
Metadata	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Parcel Outline (Polygon) <sup>1</sup>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Parcel Centroid (Point) <sup>1</sup>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Parcel ID	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Source Reference		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Source Reference Date		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Surface Owner Type	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Improved	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Owner Name (Surface Management Agency)				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Assessment / Value for Land Information			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Assessment / Value for Improvements Information			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Assessment / Value Total			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Primary Assessment / Value Classification			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Secondary Assessment / Value Classification			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tax Bill Mailing Address						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Parcel Street Address		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Parcel Area			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Parcel Zoning			<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>
Public Parcel Name		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Subsurface Owner Type								<input checked="" type="checkbox"/>
Subsurface Management Agency or Owner Name								<input checked="" type="checkbox"/>
<b>Cadastral NSDI - Cadastral Reference</b>								
States/Counties	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Municipalities	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
PLSS Townships		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>
PLSS Section (Township Division)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>
Survey System Area (subdivisions)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Survey Named Area (Ohio)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					

Secondary Survey Named Area (Ohio)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
Grid/Cell Reference		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<p>NOTES</p> <p><sup>1</sup> The standard intends that either a centroid point or a polygon is available but both are not needed</p> <p><sup>2</sup> Emergency Response uses maps and data developed during event planning.</p>								

## Appendix B

### Attributes for the Cadastral Framework Elements

#### PLSSTownship

STATEABBR - State is one of the primary divisions of the United States. The suggested domain follows the abbreviation and format coding of Federal Information Processing Standards Publication 10-4.

<http://www.nima.mil/gns/html/fips10-4.html>

PRINMERCDCD - In the Bureau of Land Management a series of codes have been developed to use in automated systems as an abbreviation of the Principle Meridian codes.

PRINMER - The Principal Meridian is the Origin of Public Land Survey System. It is a reference for the numbering of townships and ranges within a public land survey area.

TWNSHPNO - The number of rows of townships, north or south from a PLSS Origin.

TWNSHPFRAC - Township Fractions are created when there are gaps between surveyed Township boundaries or due to excess size in Townships that arose from executing original surveys.

TWNSHPDIR - The direction of a row of Townships from a PLSS Origin.

RANGENO - The number of columns of townships, east or west from a PLSS Origin.

RANGEFRAC - Range Fractions are created when there are gaps between surveyed Township boundaries or due to excess size in Townships that arose from executing original surveys.

RANGEDIR - The direction of a column of townships from a PLSS Origin.

TWNSHPDPCD - This is the duplicate township code reserved for duplicating townships within the same meridian.

PLSSID - This is a concatenation of the principal meridian, township number, fraction and direction, the range number, fraction and direction and duplication code that form a unique identifier for the township.

UPDATEDATE - This is the date of the last edit or change to a PLSS Township geometry.

STEWARD - This is the data steward for a particular PLSS Township.

TWNSHPLAB - This is the label for the township that is used for cartographic display on a web site or hard copy map.

#### Survey System

SRVNAME - This is the name of the survey area. Most survey areas are in Ohio and represent early survey efforts in the state of Ohio.

SECSRVNAME - This is the secondary survey name. The secondary survey is contained within a survey area. These occur in Ohio.

UPDATEDATE - This is the date of the last edit or change to a Survey System geometry.

STEWARD - This is the data steward for a particular Survey System Area.

**SURVSYSSLAB** - This is the label for the survey system that is used for cartographic display on a web site or hard copy map.

**PLSSFirstDivision**

**FRSTDIVID** - This is a unique identifier for the first division that is built by appending the first division elements on the Township identifier.

**FRSTDIVNO** - This is the number, letter or designator for the first division of the PLSS Township.

**FRSTDIVDUP** - This is a code to indicate whether the first division is a duplicated area or identifier.

**FRSTDIVTYP** - This is the type of first division and is commonly the section but may be a lot, parcel, tract or other division.

**FRSTDIVTXT** - This is the number or designator for the first division as a text to facilitate labeling and query.

**PLSSID** - This is the unique identifier for the PLSS Township in which the first division is located.

**FRSTDIVLAB** - This is the label for the first division that is used for cartographic of web display purposes.

**PLSSSecondDivision**

**FRSTDIVID** - This is the unique identifier for the first division that contains the second division.

**SECDIVNO** - This is the text or letter that identifies or designates the second division.

**SECDIVSUF** - This is any suffix identifiers or designator for the second division.

**SECDIVTYP** - This is the type of second division which is commonly an aliquot part but could be a lot or other division.

**SECDIVTXT** - This is the second division designator as a text to facilitate search or query.

**ACRES** - This is the area of the second division in official acres.

**PLSSID** - This is the unique identifier for the plss township where the second division is located.

**SECDIVLAB** - This is the label for the second division that is used for cartographic display or web display.

## Appendix B

### PLSS Principle Meridian Codes – From the Bureau of Land Management National Land Information System

1	1st Meridian
2	2nd Meridian
3	3rd Meridian
4	4th Meridian
5	5th Meridian
6	6th Meridian
7	Black Hills Meridian
8	Boise Meridian
9	Chickasaw Meridian
10	Choctaw Meridian
11	Cimarron Meridian
12	Copper River Meridian
13	Fairbanks Meridian
14	Gila-Salt River Meridian
15	Humboldt Meridian
16	Huntsville Meridian
17	Indian Meridian
18	Louisiana Meridian
19	Michigan Meridian
20	Montana Meridian
21	Mount Diablo Meridian
22	Navajo Meridian
23	New Mexico Meridian
24	St. Helena Meridian
25	St. Stephens Meridian
26	Salt Lake Meridian
27	San Bernardino Meridian
28	Seward Meridian
30	Uintah Meridian
31	Ute Meridian
32	Washington Meridian
33	Willamette Meridian
34	Wind River Meridian
48	Base Line of the U.S. Military Survey
46	Extended 4th Meridian
36	Between the Miamis
44	Kateel River Meridian
37	Muskingum River
47	West of the Great Miami
40	Scioto River (Second)
39	Scioto River (First)
29	Tallahassee Meridian
91	Connecticut Western Reserve
43	Twelve Mile Square Reserve
45	Umat Meridian
99	Not Applicable