Administrative Boundaries Pilot Project

Compiled by Lane Council of Governments

for the

Administrative Boundaries
Framework Implementation Team (Admin-FIT)

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I. Introduction to Pilot Project

Objective

The objective of the Administrative Boundaries Framework Implementation Team (FIT) is to create a maintainable administrative boundary data layer containing all high priority administrative boundaries in the state of Oregon. Moving from the present in which no two jurisdictions share common digital layer nomenclature, attributes, geospatial registration, or resources to ensure a common state of currentness to a statewide framework is a significant, but worthwhile, undertaking. Issues relevant to such an undertaking include: common high-quality georeferencing and data compilation scales; stakeholder coordination; standards for data content, data processing, documentation, and maintenance.

Scope of Project

Lane Council of Governments (LCOG) was invited to submit a proposal to the Oregon GIS Council (OGIC) Administrative Boundaries Framework Implementation Team (Admin-FIT) for a pilot project that would examine creating administrative boundaries for approximately 17 different taxing districts in Lane and Douglas counties. These districts represent a relatively high-priority subset of common boundaries and provide the basis for the pilot project. In addition to delivering selected digital data files, the project documents the processes, issues, and general resource requirements associated with providing and maintaining a complete set of digital GIS taxing district boundaries for the two counties.

The pilot project provides an overview of many of the GIS issues related to administrative boundaries, including types of boundaries, uses and users of boundary information, conversion planning for non-digitized boundaries, general approaches to maintenance of boundaries, and planning for spatial adjustment of administrative boundaries. A number of critical issues are identified and discussed, including those related to establishing statewide compilations of boundary information.

While the primary focus of this pilot project is on *taxing districts*, other types of administrative boundaries that are important to local government are also described, and particular issues associated with them are briefly discussed. In order to explore cross-county issues, and to

explore issues related to different software platforms and business practices, Douglas County was also invited to participate in the pilot project. The full documentation of Douglas County's taxing district inventory and GIS pilot project is included as ***Appendix 1***.

II. Introduction to Administrative Boundaries

Taxing Districts in Oregon

In general, many of the important administrative boundaries in Oregon are taxing districts of one type or another. ***Table 1*** presents a comprehensive list of the 35 types of taxing districts that can be formed under Oregon law, with links to relevant chapters in Oregon Revised Statutes (ORS) for each type. As shown on ***Table 1***, there are 18 different types of taxing districts that currently exist in Lane County, comprising about 107 individual districts, and 18 types of taxing districts that exist in Douglas County, comprising about 115 individual districts. In some cases, it can be difficult to know for certain just what type of district a particular taxing district was formed as. For example, a district will sometimes be called a "hospital district" or an "ambulance district", but neither of those appears in state law as a specific type of taxing district. Similarly, a "water district" can be formed under at least a couple of different chapters.

TABLE 1: TAXING DISTRICT TYPES IN OREGON

District Type	Statute (ORS Chapter)	Link to ORS Chapter	Exists in Lane County?	Count	Exists in Douglas County?	Count
COUNTY	202	http://landru.leg.state.or.us/ors/202.html	YES	1	YES	1
CITY	221, 222	http://landru.leg.state.or.us/ors/221.html http://landru.leg.state.or.us/ors/222.html	YES	12	YES	12
PEOPLE'S UTILITY DISTRICTS	261	http://landru.leg.state.or.us/ors/261.html	YES	2	NO	
DOMESTIC WATER SUPPLY DISTRICTS	264	http://landru.leg.state.or.us/ors/264.html	YES	12	YES	9
CEMETERY MAINTENANCE DISTRICTS	265	http://landru.leg.state.or.us/ors/265.html	NO		YES	1
PARK AND RECREATION DISTRICTS	266	http://landru.leg.state.or.us/ors/266.html	YES	3	YES	6
MASS TRANSIT DISTRICTS; TRANSPORTATION DISTRICTS	267	http://landru.leg.state.or.us/ors/267.html	NO		NO	
METROPOLITAN SERVICE DISTRICTS	268	http://landru.leg.state.or.us/ors/268.html	NO		NO	
SCHOOL DISTRICTS	330	http://landru.leg.state.or.us/ors/330.html	YES	22	YES	17
EDUCATION SERVICE DISTRICTS	334	http://landru.leg.state.or.us/ors/334.html	YES	2	YES	3
COMMUNITY COLLEGE DISTRICTS	341	http://landru.leg.state.or.us/ors/341.html	YES	3	YES	3
TRANSLATOR DISTRICTS	354	http://landru.leg.state.or.us/ors/354.html	NO		NO	
LIBRARY DISTRICTS	357	http://landru.leg.state.or.us/ors/357.html	YES	2	NO	
COUNTY ROAD DISTRICTS; SPECIAL ROAD DISTRICTS; ROAD ASSESSMENT DISTRICTS	371	http://landru.leg.state.or.us/ors/371.html	NO	1	NO	14
HIGHWAY LIGHTING DISTRICTS	372	http://landru.leg.state.or.us/ors/372.html	NO		NO	
EMERGENCY COMMUNICATIONS DISTRICTS	401	http://landru.leg.state.or.us/ors/401.html	NO		NO	
HEALTH DISTRICTS	440	http://landru.leg.state.or.us/ors/440.html	YES	1	YES	1
SANITARY DISTRICTS; SANITARY AUTHORITIES; WATER AUTHORITIES; JOINT AUTHORITIES	450	http://landru.leg.state.or.us/ors/450.html	YES	1	YES	9
COUNTY SERVICE DISTRICTS	451	http://landru.leg.state.or.us/ors/451.html	NO		NO	
VECTOR CONTROL DISTRICTS	452	http://landru.leg.state.or.us/ors/452.html	NO		NO	
URBAN RENEWAL DISTRICTS	457	http://landru.leg.state.or.us/ors/457.html	YES	5	YES	2
FOREST PROTECTION DISTRICTS	477	http://landru.leg.state.or.us/ors/477.html	YES	2	YES	3
RURAL FIRE PROTECTION DISTRICTS	478	http://landru.leg.state.or.us/ors/478.html	YES	25	YES	29
GEOTHERMAL HEATING DISTRICTS	523	http://landru.leg.state.or.us/ors/523.html	NO		NO	
IRRIGATION DISTRICTS	545	http://landru.leg.state.or.us/ors/545.html	NO		NO	
DRAINAGE DISTRICTS	547	http://landru.leg.state.or.us/ors/547.html	NO		NO	
DIKING DISTRICTS	551	http://landru.leg.state.or.us/ors/551.html	NO		NO	
WATER IMPROVEMENT DISTRICTS	552	http://landru.leg.state.or.us/ors/552.html	NO		NO	
WATER CONTROL DISTRICTS	553	http://landru.leg.state.or.us/ors/553.html	YES	4	YES	2
CORPORATIONS FOR IRRIGATION, DRAINAGE, WATER SUPPLY OR FLOOD CONTROL	554	http://landru.leg.state.or.us/ors/554.html	YES	5	YES	
WEATHER MODIFICATION DISTRICTS	558	http://landru.leg.state.or.us/ors/558.html	NO		NO	
SOIL & WATER CONSERVATION DISTRICTS	568	http://landru.leg.state.or.us/ors/568.html	YES	3	YES	1
PORT DISTRICTS	777	http://landru.leg.state.or.us/ors/777.html	YES	1	YES	2

In each county in Oregon, all of these individual taxing districts combine and overlap to create that county's levy codes, also known as tax codes. Each tax code represents a unique combination of the various taxing districts that affect the parcels in that particular "tax code area" (or TCA, sometimes also known as a "levy code area"). In most, if not all counties, the tax code is a 4-digit or 5-digit number in which the first 2 or 3 digits usually denote the school district. For example, Table 2 lists the 12 tax codes in Lane County that make up Creswell School District 40, and all of the individual taxing districts which, in various combinations, make up those 12 tax codes (each beginning with "040").

TABLE 2: Tax Codes in Creswell School District 40

04000	CITY OF CRESWELL
	CRESWELL SCHOOL DISTRICT 40
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
	SOUTH LANE COUNTY FIRE & RESCUE
04001	CRESWELL SCHOOL DISTRICT 40
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
04002	CITY OF CRESWELL
	CRESWELL SCHOOL DISTRICT 40
	EMERALD PEOPLES UTILITY DISTRICT
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
	SOUTH LANE COUNTY FIRE & RESCUE
04003	CRESWELL SCHOOL DISTRICT 40
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
	SOUTH LANE COUNTY FIRE & RESCUE
04004	CRESWELL SCHOOL DISTRICT 40
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
	PORT OF SIUSLAW
04006	CRESWELL SCHOOL DISTRICT 40
	EMERALD PEOPLES UTILITY DISTRICT
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
04007	CRESWELL SCHOOL DISTRICT 40
	EMERALD PEOPLES UTILITY DISTRICT
	GOSHEN RURAL FIRE PROTECTION DISTRICT
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
04010	CRESWELL SCHOOL DISTRICT 40
	EUGENE RURAL FIRE PROTECTION DISTRICT 1
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
04011	CRESWELL SCHOOL DISTRICT 40
	EMERALD PEOPLES UTILITY DISTRICT
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
	SOUTH LANE COUNTY FIRE & RESCUE
04014	CRESWELL SCHOOL DISTRICT 40
	GOSHEN RURAL FIRE PROTECTION DISTRICT
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
04015	CITY OF CRESWELL
	CRESWELL SCHOOL DISTRICT 40
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT
04016	CITY OF CRESWELL
	CRESWELL SCHOOL DISTRICT 40
	EMERALD PEOPLES UTILITY DISTRICT
	LANE COMMUNITY COLLEGE
	LANE COUNTY
	LANE EDUCATION SERVICE DISTRICT

In theory, boundaries of individual districts could simply be "dissolved" from tax code information attached to GIS parcels, but in reality this approach has historically yielded unsatisfactory or incomplete results, primarily because: a) many tax lots are associated with more than one tax code, creating a many-to-one relationship that can be difficult to depict

spatially; b) non-taxlotted areas are often not represented in the GIS layer, or may not be properly attributed with tax code information; and c) some taxing districts exist but are not represented in the tax code system. However, most individual taxing districts are represented by a subset of the tax codes in a particular county (as shown by the example above), and even if a single coherent "boundary" cannot be easily extracted, the tax code information can be used to determine the general geographic extent of a particular taxing district, and it may be possible to display a "virtually dissolved" area, which may meet some users' needs. In addition, digital taxlot data standards now call for the creation of a separate GIS layer of TCA polygons, which may help solve the difficulties created by split-coded parcels and non-taxlotted areas. These issues are discussed in more detail in **Section IV** of this report.

Other Important Boundaries

In addition to taxing districts, a number of other important boundaries are sometimes maintained as GIS polygon layers. At LCOG, many of these boundaries represent sub-areas within taxing districts, such as annexation-history polygons within incorporated cities, board zones within counties or PUDs, or school attendance areas within school districts. In other cases, the polygon coverages maintained by LCOG are combinations of taxing districts and non-taxing-district boundaries, such as the layer representing ambulance service areas, only one of which is an actual taxing district. Other boundaries, such as election precincts, may be derived (at least in part) from combinations of taxing districts. Many others have nothing to do directly with taxation or assessment, such as state representative districts, urban growth boundaries (UGBs), zip code areas, zoning designations, and transportation analysis zones, to name just a few. While the focus of this pilot is on taxing districts, it is important to remember that many other types of boundaries exist and that some of them play significant roles in important local-government functions, such as elections, planning, and emergency response.

Major Users of Boundary Information

Four major groups of boundary information users are described in this section: revenue, emergency response, elections, and planning/general information. The specific requirements of these different users determine what is acceptable to them in terms of the accuracy and currency of the boundary information.

1) Revenue

The primary use of taxing district information is for the collection of property taxes and other property-based assessments. The "revenue community" of boundary users deals strictly with taxing districts and has no direct interest in the other types of boundaries mentioned above.

As described in the previous section, taxing districts overlap in various combinations within each county to form tax codes and TCAs. In a typical county assessment and taxation data structure, individual taxing districts are not maintained as digital GIS boundary layers. Taxing districts are represented as one or more TCAs which include that particular district (e.g., the 12 TCAs that make up the Creswell School District). Those TCAs, in turn, exist as parcel-record attributes, and as TCA boundaries shown on tax maps. Increasingly, those TCA boundaries exist as digital GIS boundary data, but historically they have been more likely to exist only as hand-drawn or CAD-drawn linework on stand-alone map sheets.

As noted above, taxing district boundaries don't always follow taxlot lines. Taxlots are commonly split by taxing district boundaries and so will have multiple tax codes. Of the approximately 140,000 taxlots in Lane County, there are about 8,000 taxlots (almost 5%) that are split by one or more taxing district boundaries. In addition to boundary splits, many taxlots have multiple tax codes for other reasons (for example, personal property and/or mobile home accounts that are not subject to the same combination of taxing districts as the real property). Typically, in the taxation/assessment database structure, multiple tax codes are handled non-spatially, as multiple records associated with a given parcel. It is not possible from the tables alone to know which record corresponds to which portion of a parcel.

In addition, non-taxlotted areas (e.g., rights-of-way) traditionally don't carry tax codes on GIS parcel layers, and some taxing districts typically don't participate in the creation of tax codes and TCAs (e.g., Soil & Water Conservation Districts, Forest Protection Districts). For all of these reasons, it is not always possible to simply create taxing district boundaries by selecting and dissolving parcels based on tax code attribution, but it is often possible to use tax code attribution to gain at least a preliminary understanding of a given taxing district's location and extent. In some counties, the GIS parcel data does include a layer of digital TCA polygons, eliminating the

dissolve issues created by split-coded parcels and non-taxlotted areas. These issues are discussed in more detail in **Section IV** of this report.

In terms of currency of the boundary information, the specific needs of the revenue community are generally met by adherence to an annual update cycle, which is discussed in more detail in **Section V** of this report.

2) Emergency Response

As another major user of boundary information, the emergency response/911 community primarily deals with just a few types of taxing districts (city limits, fire districts, and ambulance districts) but has a very strong need for both accuracy and currency. In general, emergency response/911 can be divided into two primary functions: call-taking and dispatch. On the call-taking side of the operation, boundary information is used to determine how to route an incoming call to the appropriate dispatching agencies. Response areas for police, fire, and ambulance services are combined to form unique "emergency service numbers" (ESNs), which are then matched to addresses or address ranges to create a Master Street Address Guide (MSAG) for that area. At the dispatching agencies, digital boundary information is used to support computer-aided dispatch (CAD) systems.

While meeting specific local needs always plays a role in determining data structure and requirements, this seems to be particularly true of emergency response systems. For example, some water districts may be combined onto the same GIS layer as fire districts, because those specific water districts provide fire protection services (often by contracting with an adjacent city or other district). Those fire-protection service areas are typically further broken down into smaller response areas reflecting the specific response order for each location (first station in, second in, and so on). Boundaries sometimes need to be modified in specific ways to meet the particular needs of CAD systems. The current CAD system for most of Lane County, for example, requires response-area boundaries to align with address-ranged street centerlines, so that the city limits as represented in the CAD data do not correspond with the actual city limits (which generally do not run down the street centerlines), in essence meaning that two different GIS versions of the city limits be maintained.

3) Elections

As another major user of boundary information, elections staff typically rely on a combination of some taxing districts, some boundaries other than taxing districts, and a variety of sub-areas that are delineated *within* taxing districts, e.g.: city wards (inside city limits), county commissioner districts (inside counties), and various board zones (inside PUDs, ESDs, soil and water conservation districts, community college districts, etc.). To meet the needs of elections, updates of these boundaries are tied to election cycles and to legislative redistricting (which occurs every ten years).

Sub-area delineations within certain types of boundaries introduce numerous opportunities for vertical integration and "nesting" (e.g., city council wards inside of city limits, commissioner zones inside of counties, and director/commissioner/board zones inside of PUDs, community college districts, ESDs, etc.). Providing GIS boundary data in support of elections operations creates possibilities for vertical integration *between* certain layers. For example, LCOG has worked with county elections staff to create precincts by intersecting the most important election-related boundaries, such as state legislative districts, school districts, and city limits. Defining precincts as unique combinations of boundaries means fewer instances of precincts needing more than one style of ballot, which used to be a major headache for elections staff.

3) Planning and General Information

Other uses of boundary information might involve taxing districts, non-taxing districts, or sub-areas within taxing districts. Planning often involves what might be thought of as "land management" boundaries, such as zoning, comprehensive land use plans, or UGBs, which often have little or no conformance to taxlot lines or other administrative boundaries, but do sometimes nest within administrative boundaries, such as zoning nesting within city limits, or comp plan designations nesting within UGBs.

When nesting relationships do occur, they can provide additional potential opportunities for vertical integration. For example, individual school attendance areas are nested within school districts. At LCOG, ten formerly separate polygon coverages - representing elementary school, middle school, and high school attendance areas for three specific school districts, plus a tenth coverage representing countywide school district boundaries - have been merged into a single

polygon coverage, eliminating a large amount of duplicate and even triplicate linework. Within that single coverage, four sets of regions have been built on top of the polygons, representing elementary attendance areas, middle school attendance areas, high school attendance areas, and school districts. As discussed in **Section VI** of this report, this vertical integration can simplify spatial migration by eliminating redundant linework, and can form the basis for migration of the data into feature classes within a geodatabase.

III. Inventory of Taxing Districts in Lane and Douglas Counties

Table 3 is a complete listing of the approximately 100 individual taxing districts that exist in Lane County at the time of this compilation. (A true inventory is a moving target; new districts may be created, while other districts may be dissolved or merged.) ***Table 3a*** includes those districts which overlap in various combinations to create almost 300 unique tax codes within the Lane County assessment and taxation data system. The districts are grouped by type, with information as to whether each district currently exists as digital GIS boundary data at LCOG.

A handful of other taxing districts, listed in Table 3b, exist in Lane County but do not participate in creating tax codes areas: the Soil and Water Conservation Districts, the Forest Protection Districts, and a few others. While in some cases such districts have statutory taxing authority, they do not currently levy *ad valorem* property taxes (that is, taxes based on property value), but instead may generate revenue through "special assessments" attached to certain tax accounts. Information about the geographic extent of these districts will not be extractable from GIS tax code attributes or TCA polygons. (It should be noted that there are several other districts that do not currently levy *ad valorem* taxes, and yet *do* participate in the formation of tax codes and tax code areas, and so are included in ***Table 3a***.)

Appendix 1 includes an inventory of the approximately 115 taxing districts that combine to form the approximately 200 tax codes that currently exist in the Douglas County Assessor's data system. All of these are represented by digital GIS tax code data, but not all are represented by digital GIS boundary files, as described in **Section 3.2** of that appendix. As in Lane County, there are certain taxing districts that exist in Douglas County which do not participate in the formation of tax codes, such as the Soil and Water Conservation District, and this is expected to be true in other counties, as well.

TABLE 3a: Taxing Districts In Lane County That Comprise Tax Code Areas

DISTRICT TYPE	NAME OF DISTRICT	DIGITIZED?	AS NAMED ON GIS BOUNDARY-FILE POLYS
CITY	CITY OF COBURG	YES	COBURG
	CITY OF COTTAGE GROVE	YES	COTTAGE GROVE
	CITY OF CRESWELL	YES	CRESWELL
	CITY OF DUNES CITY	YES	DUNES CITY
	CITY OF EUGENE	YES	EUGENE (also have annexation history)
	CITY OF FLORENCE	YES	FLORENCE
	CITY OF JUNCTION CITY	YES	JUNCTION CITY
	CITY OF LOWELL	YES	LOWELL
	CITY OF OAKRIDGE	YES	OAKRIDGE
	CITY OF SPRINGFIELD	YES	SPRINGFIELD (also have annexation history)
	CITY OF VENETA	YES	VENETA
	CITY OF WESTFIR	YES	WESTFIR
COMMUNITY COLLEGE DISTRICT	LANE COMMUNITY COLLEGE	YES	with Board sub-zones (5)
	LINN/BENTON COMMUNITY COLLEGE	**NO**	remainder of County not in LCC?
COUNTY	LANE COUNTY	YES	with Commissioner Districts (5)
DOMESTIC WATER SUPPLY DISTRICT	BLUE RIVER WATER DISTRICT	YES	Blue River WD (in RFPD layer)
	GLENWOOD WATER DISTRICT	YES	Glenwood WD (in RFPD layer)
	HECETA WATER DISTRICT	YES	
	MAPLETON WATER DISTRICT	**NO**	
	MARCOLA WATER DISTRICT	**NO**	
	MCKENZIE PALISADES WATER SUPPLY CORP	**NO**	
	RIVER ROAD WATER DISTRICT	YES	River Road WD (in RFPD layer)
	RAINBOW WATER & FIRE DISTRICT	YES	Rainbow WD (in RFPD layer)
	SANTA CLARA WATER DISTRICT	**NO**	
	SHANGRI LA WATER DISTRICT	**NO**	
	WESTRIDGE WATER SUPPLY DISTRICT	**NO**	
EDUCATION SERVICE DISTRICT	LANE EDUCATION SERVICE DISTRICT	YES?	Same as LCC? Aggregation of School Districts?
	LINN-BENTON-LINCOLN ESD	**NO**	remainder of County not in Lane ESD?
HEALTH DISTRICT	WESTERN LANE AMBULANCE DISTRICT	YES	with other Ambulance service areas
LIBRARY DISTRICT	FERN RIDGE LIBRARY DISTRICT	**NO**	
	SIUSLAW PUBLIC LIBRARY DISTRICT	**NO**	
PARK AND RECREATION DISTRICT	BLUE RIVER PARK AND RECREATION DIST	**NO**	
	RIVER ROAD PARK & RECREATION DISTRICT	**NO**	
	WILLAMALANE PARK & RECREATION DISTRICT	YES	with planning sub-areas
PEOPLE'S UTILITY DISTRICT	CENTRAL LINCOLN PUD	**NO**	

	EMERALD PEOPLES UTILITY DISTRICT	YES	with Board sub-zones
PORT DISTRICT	PORT OF SIUSLAW	**NO**	
RURAL FIRE PROTECTION DISTRICT	BAILEY SPENCER RURAL FIRE PROTECTION DIST	YES	Bailey-Spencer RFPD
	COBURG RURAL FIRE PROTECTION DISTRICT	YES	Coburg RFPD
	CRESWELL RURAL FIRE PROTECTION DISTRICT	YES	Creswell RFPD
	DEXTER RURAL FIRE PROTECTION DISTRICT	YES	Dexter RFPD
	EUGENE RURAL FIRE PROTECTION DISTRICT 1	YES	Eugene #1 RFPD
	GOSHEN RURAL FIRE PROTECTION DISTRICT	YES	Goshen RFPD
	HAZELDELL RURAL FIRE PROTECTION DISTRICT	YES	Hazeldell Rural Fire District
	JUNCTION CITY RURAL FIRE PROTECTION DIST	YES	Junction City RFPD
	LAKE CREEK RURAL FIRE PROTECTION DIST	YES	Lake Creek RFPD
	LANE COUNTY FIRE DISTRICT #1	YES	Lane County FD #1
	LANE RURAL FIRE/RESCUE	YES	Lane Rural Fire/Rescue
	LORANE RURAL FIRE PROTECTION DISTRICT	YES	Lorane RFPD
	LOWELL RURAL FIRE PROTECTION DISTRICT	YES	Lowell RFPD
	MAPLETON FIRE DEPARTMENT	YES	Mapleton FD
	MCKENZIE RURAL FIRE PROTECTION DISTRICT	YES	McKenzie RFPD
	MOHAWK VALLEY RURAL FIRE PROTECTION DIST	YES	Mohawk Valley FD
	MONROE RURAL FIRE PROTECTION DISTRICT 5J	YES	Monroe RFPD
	PLEASANT HILL RURAL FIRE PROTECTION DIST	YES	Pleasant Hill RFPD
	SANTA CLARA RURAL FIRE PROTECTION DIST	YES	Santa Clara RFPD
	SIUSLAW RURAL FIRE PROTECTION DISTRICT	YES	Siuslaw RFPD #1
	SOUTHERN LANE COUNTY FIRE PROTECTION DIST	YES	Southern Lane County RFPD
	SWISSHOME DEADWOOD RURAL FIRE PROTECTION	YES	Swisshome-Deadwood RFPD
	UPPER MCKENZIE RURAL FIRE PROTECTION DIST	YES	Upper McKenzie RFPD
	WILLAKENZIE RURAL FIRE PROTECTION DIST	YES	Willakenzie/Eugene RFPD & Willakenzie/Springfield RFPD
	ZUMWALT RURAL FIRE PROTECTION DISTRICT	YES	Zumwalt RFPD
SANITARY DISTRICT	DEXTER SANITARY DISTRICT	**NO**	
SCHOOL DISTRICT	ALSEA SCHOOL DISTRICT 7J	YES	ALSEA
	BETHEL SCHOOL DISTRICT 52	YES	BETHEL
	BLACHLY SCHOOL DISTRICT	YES	BLACHLY
	CRESWELL SCHOOL DISTRICT 40	YES	CRESWELL
	CROW-APPLEGATE-LORANE SCHOOL DISTRICT 66	YES	CROW-APPLEGATE-LORANE
	EUGENE SCHOOL DISTRICT 4J	YES	EUGENE
	FERN RIDGE SCHOOL DISTRICT 28J	YES	FERN RIDGE
	HARRISBURG SCHOOL DISTRICT	YES	HARRISBURG
	HARRISBURG SCHOOL DISTRICT/WYATT	YES	MONROE
	JUNCTION CITY SCHOOL DISTRICT 69	YES	JUNCTION CITY

	LINCOLN COUNTY SCHOOL DISTRICT 143	YES	TENMILE
	LINCOLN COUNTY SCHOOL DISTRICT 165	YES	TENMILE
	LOWELL SCHOOL DISTRICT 71	YES	LOWELL
	MAPLETON SCHOOL DISTRICT 32	YES	MAPLETON
	MARCOLA SCHOOL DISTRICT 79J	YES	MARCOLA
	MCKENZIE SCHOOL DISTRICT 68	YES	McKENZIE
	MONROE SCHOOL DISTRICT 1J	YES	MONROE
	OAKRIDGE SCHOOL DISTRICT 76	YES	OAKRIDGE
	PLEASANT HILL SCHOOL DISTRICT 1	YES	PLEASANT HILL
	SIUSLAW SCHOOL DISTRICT 97J	YES	SIUSLAW
	SOUTH LANE SCHOOL DISTRICT 45J	YES	SOUTH LANE
	SPRINGFIELD SCHOOL DISTRICT 19	YES	SPRINGFIELD
SERVICE DISTRICT	LANE COUNTY METROPOLITAN WW SVC DISTRICT	**NO**	
SPECIAL ROAD DISTRICT	LEBLEU SPECIAL ROAD DISTRICT	**NO**	
URBAN RENEWAL DISTRICT	COBURG URBAN RENEWAL DISTRICT	**NO**	
	EUGENE RIVERFRONT URBAN RENEWAL DISTRICT	YES	
	EUGENE DOWNTOWN URBAN RENEWAL DISTRICT	**?**	
	ROW RIVER URBAN RENEWAL DISTRICT	**NO**	
	VENETA URBAN RENEWAL DISTRICT	YES	
WATER CONTROL DISTRICT	BLACHLY WATER CONTROL DISTRICT	**NO**	
	DEARBORN WATER CONTROL DISTRICT	**NO**	
	JUNCTION CITY WATER CONTROL DISTRICT	**NO**	
	RIVER ROAD WATER CONTROL SUBDISTRICT 1	**NO**	

TABLE 3b: Taxing Districts In Lane County That Are Not Associated With Tax Codes

DISTRICT TYPE	NAME OF DISTRICT	DIGITIZED?	AS NAMED ON GIS BOUNDARY-FILE POLYS
DOMESTIC WATER SUPPLY DISTRICT	CRESWELL WATER DISTRICT	**NO**	
FOREST PROTECTION DISTRICT	EASTERN LANE FOREST PROTECTION DISTRICT	YES	Eastern Lane
	WESTERN LANE FOREST PROTECTION DISTRICT	YES	Western Lane
SOIL & WATER CONSERVATION DISTRICT	SIUSLAW SWCD	YES	SIUSLAW SWCD
	EAST LANE SWCD	YES	EAST LANE SWCD
	LINN SWCD	YES	LINN SWCD
UNCERTAIN	MANUFACTURED STRUCTURES OMBUDSMAN	**NO**	
	NOTI STREET LIGHTING DISTRICT	**NO**	
	FERTILE DISTRICT IMPROVEMENT COMPANY	**NO**	

IV. Conversion Planning for Non-Digitized Boundary Data

One of the primary goals of this pilot is to provide information related to the conversion of non-digital boundary information into GIS data layers. As can be seen from ***Table 3***, some types of districts, such as cities, are routinely maintained at LCOG as a layer of GIS boundaries, while other types of districts may exist electronically as geographic clusters of tax codes, but have never been digitized as discrete GIS boundary layers, or have been only partially digitized, usually to meet some specific need. For example, certain water-supply districts have been digitized and included as part of the GIS layer of rural fire protection districts, because those specific water districts provide fire-response coverage, but other water-supply districts have not been digitized. Likewise in Douglas County, digital GIS boundaries exist for some but not all types of districts, or for some but not all districts of certain types (**Appendix 1**, **Section 3.2**).

<u>Conversion Based on Taxlots and Tax Maps</u>

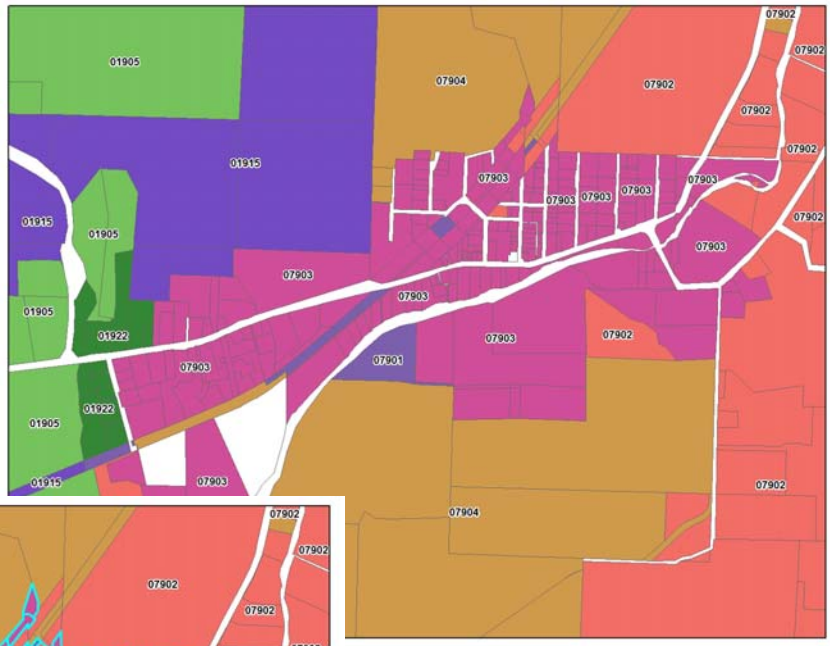
Because the specific boundaries being discussed in this pilot are taxing districts, probably the most likely place to start is with Assessors' tax code information, available either as part of a GIS parcel layer, or on hardcopy or scanned tax maps. In some cases, a county may have GIS parcels that can be associated with tax code attributes, but might not have a separate layer of digital TCA polygons. In this case, conversion can be accomplished by determining what sub-set of tax codes represent the district in question, and dissolving those into a preliminary set of polygons that can then be edited to create a reasonably accurate (depending on needs) GIS representation of the district (at that time).

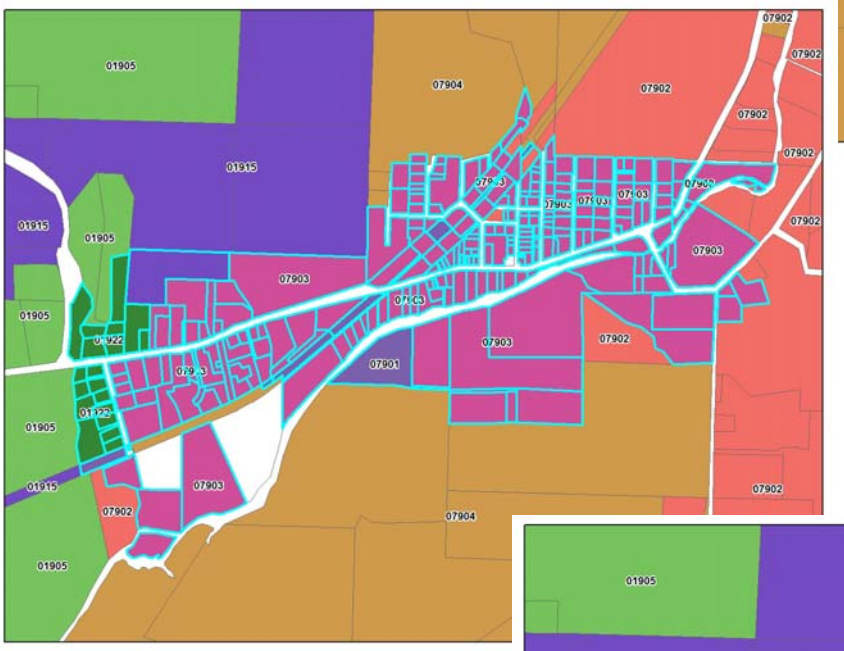
Editing and research will be required in order to accurately locate the district boundary where it falls across split-coded parcels, and to include non-taxlotted areas where appropriate. Sometimes only a limited amount of editing is needed to get from the initial dissolve to a "finished" boundary, for example, when the taxing district is small and encompasses only a small number of rural taxlots. In other cases, such as where the taxing district covers a large, urbanized area composed of many small taxlots and an intricate network of rights-of-way, a significant amount of work will be needed to get from the initial dissolve to a finished boundary. ***Figures 1*** and ***2*** show examples of these two cases.

FIGURE 1: Creating a Boundary Layer from Tax Codes for a Small Rural Taxing District

This example is based on the Marcola Water District in rural Lane County.

Step 1: Locate the subset of tax codes that represent the district in question. In this case, in a small rural community, only a handful of tax codes are involved. Note areas (not shaded) that are missing tax code information.





Step 2: Select those GIS parcels that carry one of the tax codes that make up the district in question, and dissolve them into a set of preliminary polygons.

Step 3: Use tax maps and other references to fill in missing information and to accurately determine how to handle split parcels and rights-of-way areas. In this case, the entire district can be represented as a single polygon, with no islands/outliers.

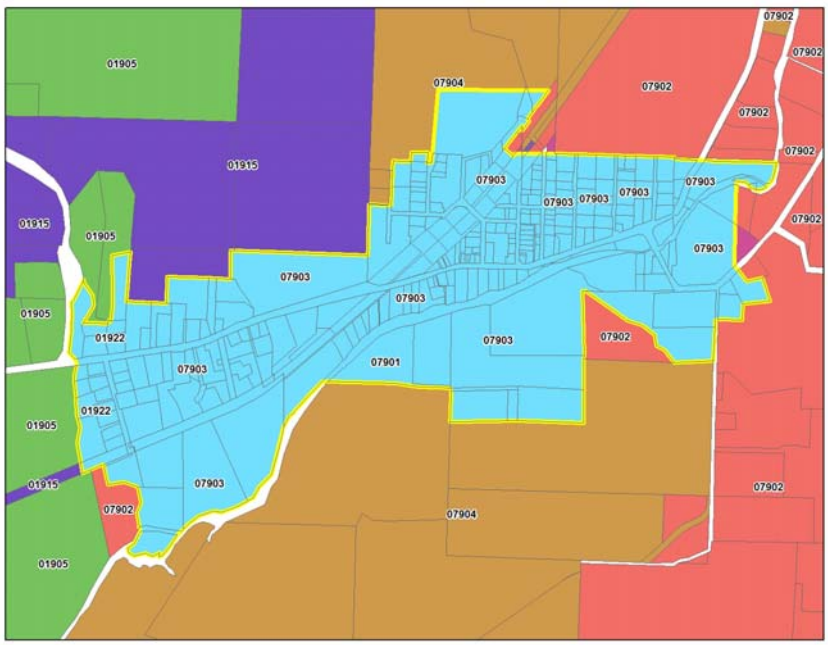
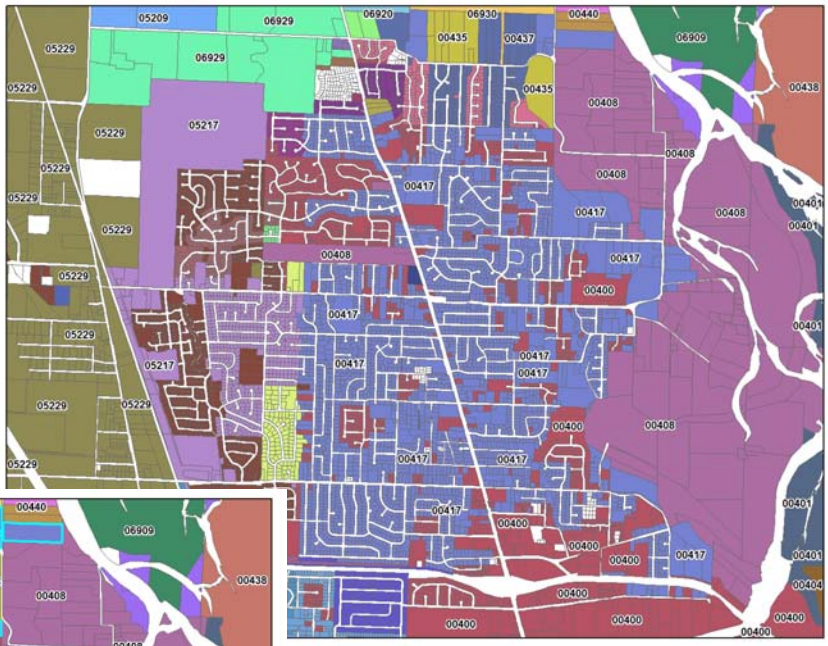
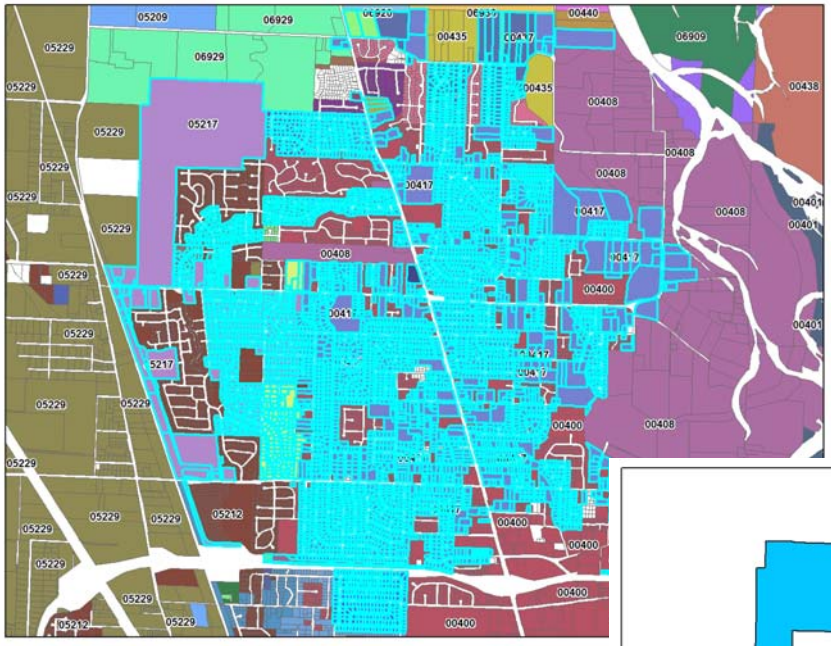


FIGURE 2: Creating a Boundary Layer from Tax Codes for an Urban Taxing District

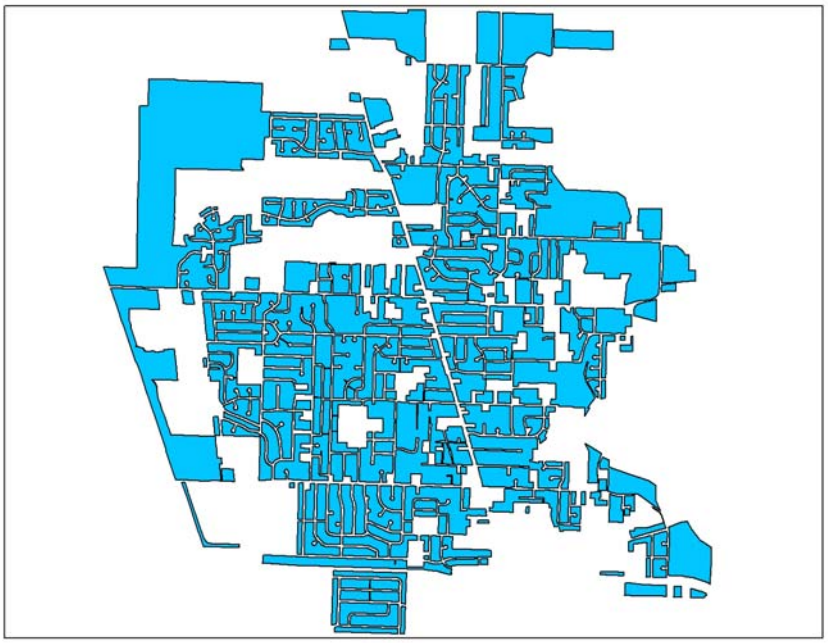
This example is based on the Santa Clara Water District, in a partly incorporated urban area.

Step 1: Locate the subset of tax codes that represent the district in question. In this case, a largely unincorporated urban area served by multiple special districts. Numerous tax codes are involved.





Step 2: Select those GIS parcels that carry one of the tax codes that make up the district in question (shown at left), and dissolve them into a set of preliminary polygons (shown below).



Step 3: (not shown) Use tax maps and other references to accurately determine how to handle split parcels and rights-of-way areas. In this case, the work is complicated by the sheer number of tax codes and parcels involved, as well as by numerous islands/outliers, and an intricate network of streets.

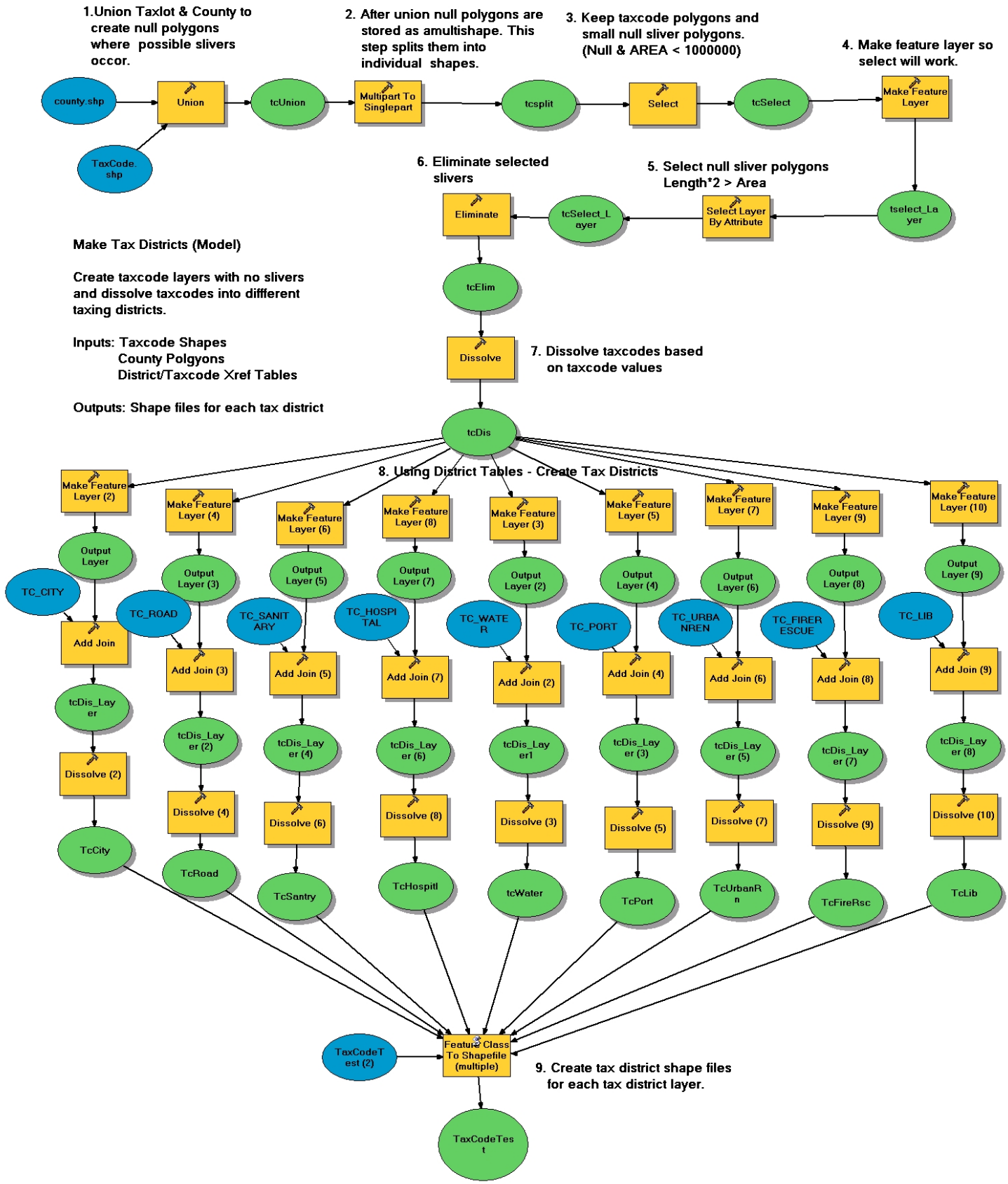
In order to carry out the research described above, or if an organization does not have a GIS parcel layer as a starting point, one will generally turn to the tax maps that are produced and maintained by the county offices of assessment and taxation. The conversion of taxing district boundary information to digital format based on tax maps is discussed in detail in **Appendix 2**.

It's difficult to make an accurate estimate of time requirements for conversion of non-digital taxing district information into GIS boundaries by the methods described above, because so much depends on what forms of source information exist, the relative complexity of the boundaries, the degree to which split-coded parcels will need to be researched, etc. For each district, it can take anywhere from several hours for a simple case, up to several days of work for a large complex situation. A layer comprised of numerous districts of a given type with a mix of complexities could take anywhere from a week to a month of concerted effort. However, recent developments in Oregon related to data models and standards for GIS parcel data may soon make it easier to convert tax code information into district boundaries.

Conversion Based on Digital TCA Polygons

The adoption of the Oregon Cadastral Data Exchange Standard may eventually result in most, if not all, counties maintaining a complete layer of TCA polygons as part of their GIS parcel data. These TCA polygons will solve the two major problems currently encountered when attempting to create taxing districts by dissolving GIS parcels: split-coded lots, and lack of TCA information for non-taxlotted areas. Several counties in Oregon already maintain digital TCA polygons, from which taxing districts can be more-or-less readily dissolved (although slivers and overlaps can still exist along map boundaries and county boundaries). A process currently in place in Polk County to create taxing districts from TCA polygons is diagramed in ***Figure 3***. Briefly, for each type of taxing district (school district, city, fire/rescue, etc.) the subset of tax codes that make up all districts of that type are selected from a cross-reference table, so that the district names can be joined from that table to the appropriate TCA polygons. The TCA polygons are then dissolved by district name to create a layer comprised of all districts of that type in the county. In Lane County, TCA boundaries are currently undergoing conversion from being maintained on a mix of hardcopy and AutoCAD map sheets to being maintained as a layer of digital GIS polygons. See **Appendix 2** for more details on that conversion process.

FIGURE 3: Creating Taxing District Boundaries from GIS Tax Code Polygons



However, while digital TCA boundaries are included in the Oregon Cadastral Data Exchange Standard, they are not included as part of the Oregon Department of Revenue (DOR) ORMAP Goals, nor considered to be a required ORMAP deliverable, so it remains to be seen how universal they will become.

Conversion Based on Other Sources

If the boundary to be digitized is one of those taxing districts that does not participate in the formation of tax code areas, or is not a taxing district, then other sources of information must be found. Which official source of information to use will, in most cases, depend on the specific boundary in question. For example, soil and water conservation districts (SWCDs) exist throughout the state, but in many (perhaps most) counties it appears they are not represented by tax codes. And while they generally follow county lines, and most counties comprise only a single SWCD, there are exceptions to these conventions. For example, Lane County is mostly divided into two soil and water conservation districts, the Siuslaw SWCD and the East Lane SWCD, but a small portion of Lane County falls inside the Linn SWCD. According to ORS Chapter 568, the Oregon Department of Agriculture (ODA) has the authority to establish SWCD boundaries (and to establish the zones within districts from which directors are elected), so ODA would be a logical source of boundary information, if not actual boundary GIS layers.

Similarly, ORS Chapter 330 gives primary authority for establishing school district boundaries within a given county to the board of the Education Service District in that county (or to the county governing board if no ESD exists). The ESD should have descriptions on file of district boundaries and boundary changes that can be used to supplement or verify tax code information. Individual school district boards have the authority to establish zones within school districts from which directors are elected (ORS Ch. 332). The county elections office may also have descriptions of these boundaries on file. School attendance areas are also determined by individual school districts. In order to provide school attendance information to agency staff, real estate professionals, and the general public, LCOG has solicited information from each district regarding attendance area boundaries, and maintains contacts with the larger districts in order to ensure that the boundaries remain reasonably current.

V. Boundary Data Maintenance Approaches and Issues

Creation of digital boundary information, as described in the previous section, is just the first step. If the boundary information is to remain reliable, then a maintenance process must be implemented and adhered to. As with other issues related to accuracy and currency, the specific needs of the users will determine what process is needed in specific situations.

Maintenance of Taxing Districts and other Boundaries at LCOG

Lane Council of Governments has been using GIS technology since about 1970, first employing a locally developed program called Map Model, and later using Synercom software. Regional GIS data layers were migrated to ESRI's ArcInfo platform in the mid-1990s. Throughout this time, data layers that have been created and maintained by LCOG have included a wide variety of administrative and other boundaries. These data layers cover all or various parts of Lane County and serve a wide variety of public and private users and uses, including assessment, planning, public works, elections, emergency services, real estate and finance, and education.

The GIS boundary layers maintained at LCOG, which include some taxing districts, make up an important component of the shared regional GIS enterprise. Parcel and site address layers are routinely geocoded against many of these boundary layers in order to acquire attribute information, and to support the RLID data warehouse (the Regional Land Information Database). All of these GIS boundaries are currently maintained at LCOG as ESRI polygon coverages. As indicated in ***Tables 1*** and ***2***, the majority of the taxing district boundaries in Lane County are currently maintained in this way, primarily on 3 coverages: city limits, school districts, and rural fire protection districts. Other types of taxing districts are only partially maintained as polygon coverages. For example, only those water districts which also provide fire protection are currently maintained at LCOG.

Because many of the boundaries are used for emergency response functions, there is a strong focus on keeping them as current as possible. All changes to those boundaries (e.g., annexations to cities) are reflected in the GIS layers on the effective date of each boundary change. Routine

geoprocessing to create datasets used to support call-taking and dispatch functions (e.g., the MSAG described in **Section II**) occurs weekly.

There are typically about 60 annexations to the cities in Lane County in a given year, with most occurring in the Eugene-Springfield metropolitan area and only a handful occurring in the ten smaller cities. However, there is significant variation in the pace of annexations from year to year. Generally speaking, annexations to the cities also affect the wards, precincts, zoning and fire protection providers. In some jurisdictions, these other boundaries are changed automatically with the annexation, while in other jurisdictions separate actions are needed to implement those changes. These relationships mean that for the 60 annexations to cities that occur in a typical year, somewhere between 180 and 240 boundary changes are actually made. Boundary-layer maintenance adds up to approximately 0.5 FTE at LCOG, including maintenance of zoning and comprehensive plan layers as well as city limits, UGBs, fire protection providers, and many others.

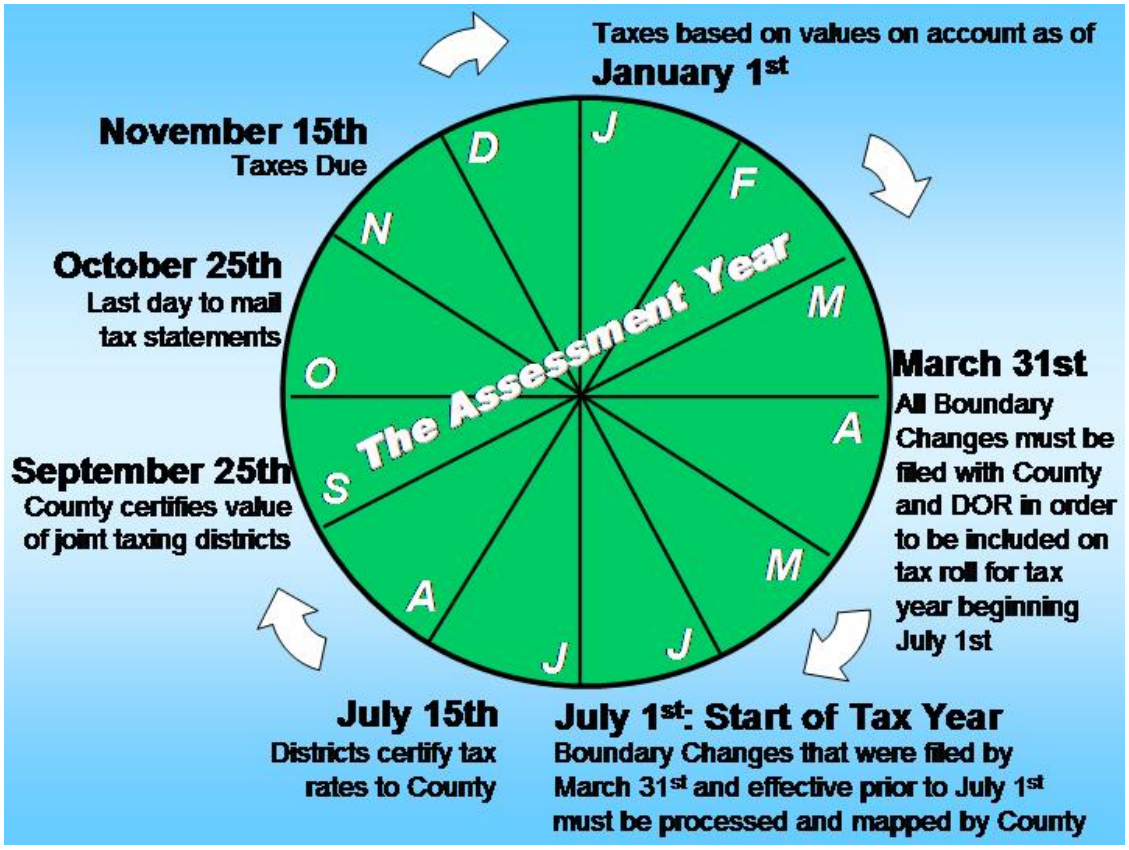
Maintenance of Taxing Districts at Lane County Assessment and Taxation

As has been described previously, TCA boundaries, not the boundaries of individual taxing districts, are maintained by Lane County Assessment and Taxation (LC A&T). **Appendix 2** provides a complete description of taxing district maintenance at LC A&T, and only a brief overview is provided here. As mentioned previously, TCA boundaries are currently undergoing conversion from being maintained on a mix of hardcopy and AutoCAD map sheets to being maintained as a layer of digital GIS polygons.

The TCA boundaries are shown on tax assessor maps, and TCAs are tabulated in the assessment database (known as the Ascend system). As noted previously, the tax code boundaries delineate the unique combinations of overlapping taxing districts, such as school districts, rural fire districts and city limits. A tax code ID is maintained as the unique identifier for each combination of taxing districts. These are five-digit numbers where the first three digits are the school district number and the following two digits are described in the TCA table maintained in the Ascend database. See ***Table 2*** for an example of the 12 tax codes, all starting with “040”, which make up Creswell School District 40.

Update of taxing district information within the typical revenue system has traditionally been tied to the Assessment Cycle, depicted in ***Figure 4***. Any changes to taxing district boundaries (e.g. district formations, mergers, annexations, withdrawals) must be properly filed with both the county and state prior to March 31 in order for those changes to be reflected on tax maps by July 1 and incorporated into tax rates for the tax statements that will be mailed out that fall. This means that boundary changes which occur in April may not be reflected on tax maps (or in tax code tables) for as long as 15 months after they become effective. Boundary changes which occur in October may not be reflected on tax maps for about nine months, etc.

FIGURE 4: The Assessment Cycle



While this annual update cycle meets the specific needs of property assessment and taxation functions, it obviously would not yield sufficiently current boundary information to meet all of the needs of the emergency response community, for example. However, as counties move to convert hardcopy TCA boundaries to digital GIS layers, they may also be streamlining the

update cycle, so that boundary changes will appear throughout the year as they are filed and become effective.

Maintenance of Taxing Districts at Douglas County

Douglas County first began using a GIS program called Ultimap in 1989, later converted to Intergraph technology, and currently uses Geo Media software, although some GIS files still remain in Intergraph format. Tax codes are updated annually, following the same assessment cycle described above. See **Appendix 1** for more information about Douglas County's GIS.

VI. Migration Planning for Boundary Data

Spatial Migration

Another of the goals of this pilot is to provide information related to an important issue that currently confronts Lane County and other jurisdictions in Oregon: the spatial adjustment of boundary data to fit an entirely new parcel base. At the time of this writing, Lane County is in the final stages of a $1.3 million, three-year project to completely remap taxlots countywide. This new parcel base will require a host of other GIS information, including dozens of digitized boundaries, to be spatially adjusted. Similar efforts have been or will need to be undertaken in other counties across Oregon, many as part of the ORMAP project sponsored by the Oregon Department of Revenue (DOR). In Lane County, boundary and other GIS data have been inventoried and a plan has been drawn up to spatially adjust those data to the new parcel base. **Appendix 3** addresses many of the coordination and technical issues specific to spatial adjustment.

The five partner agencies that make up the regional GIS consortium will each be responsible for a number of regional data layers. For example, Lane County has taken on the complete rebuilding of a rural zoning layer as well as rural fire protection districts based on the newly remapped parcels. Much of LCOG's responsibility lies in boundary adjustments for the smaller cities in Lane County, including city limits, UGBs, zoning, and comprehensive plan designations. Our experience to date is that it takes about four hours to adjust the city limits for one small city, which can then be used to assist with the adjustment of the UGB, which takes about two additional hours. Adjustment of the zoning layer or the comprehensive plan layer for a small city can take as little as two hours or as much as eight hours.

In addition, LCOG is spatially adjusting school district boundaries and school attendance-area polygons. In rural areas, where most districts do not have internal attendance sub-areas, and where more of the district linework is likely to follow the boundaries of large rural taxlots, the adjustment is essentially a re-building of the districts using the taxlot lines where possible. In the metro area, where each district contains many schools so that most of the linework is not district boundary but attendance-area boundaries, the process is more time consuming and adjusted

boundaries can not be built from taxlot lines. As described in a previous section of this report, vertical integration of school districts with elementary school, middle school, and high school attendance areas into a single layer instead of separate coverages has eliminated a large amount of duplicate linework, simplifying the spatial adjustment process.

Software and Data Migrations

Other types of migrations that are occurring in many counties, including Lane County, include the migration from GIS data stored as shapefiles or coverages to GIS data stored in geodatabases, and the migration of applications from proprietary scripting languages such as AML and Avenue to more standard object-oriented development environments such as Visual Basic, and newer scripting languages such as Python. LCOG is coordinating the region's Arc 9.x migration, including geodatabase design and development. **Appendix 3** also addresses some of the technical issues specific to these other kinds of migration.

VII. Critical Issues

The pilot project surfaced a number of issues important to the creation and maintenance of standard GIS based taxing districts data. Following is an overview of some key issues.

Relationship Between Taxing Districts, Tax Lots, and Tax Code Areas

As has been discussed in previous sections, overlapping taxing districts are combined in each county to create tax code areas (TCAs). Each TCA represents a unique combination of taxing districts, and each participating taxing district is represented by a sub-set of TCAs in the county or counties where it is located. However, there are a number of issues which can, in some cases, make it difficult to create taxing district boundaries by aggregating or "dissolving" taxlots. Many taxlots are associated with more than one TCA, and this many-to-one relationship is sometimes represented only as tabular data or on hardcopy maps, but not as spatial GIS data. Non-taxlotted areas are not always represented in digital taxlot layers, so that dissolving taxlots to create taxing districts will sometimes yield highly fragmented results. However, as described in previous sections, some counties do maintain a GIS layer of TCA boundaries which properly represent both the split-coded lots and non-taxlotted areas, and other counties are in the process of building such layers. Even so, other issues will remain. For example, not all taxing districts participate in the make up of TCAs, and changes to taxing district boundaries may be captured only once each year through the tax revenue system.

Boundary Integration Between Adjacent Counties – Including Joint Districts

One of the goals of this pilot is to explore issues related to the integration of taxing district boundaries between adjoining counties and, in particular, issues related to districts that lie in more than one county, known as "joint districts". Joint school districts are commonly denoted with a "J" as part of the district number, but other types of taxing districts can also be joint districts. Collection of property taxes is the shared responsibility of each county in which the district falls. To better explore this issue, GIS layers representing school districts, fire districts, and tax code areas were obtained from Linn and Benton Counties in addition to Douglas and Lane Counties. An overview of school districts in this four-county region is shown in ***Figure 5***.

Creators of local GIS boundary data, such as COGs and counties, will sometimes extend their digital boundary data beyond the limit of their respective county or service area, but typically only for districts that originate inside their county or service area. In such instances, the same boundary will be found in the neighboring county's data, resulting in data overlap. For example, the school district boundary layer maintained at LCOG contains boundary information for a handful of joint school districts that originate in Lane County, but extend into neighboring counties. LCOG's boundaries that extend beyond Lane County are known to be approximate, and it is assumed that digital data created by neighboring counties will be more accurate in those areas. Similar situations occur between other counties. Detail maps of specific joint-district overlap areas are shown in ***Figure 6***. Some gaps can also be seen.

FIGURE 5: Overview of School Districts in the Four-County Region

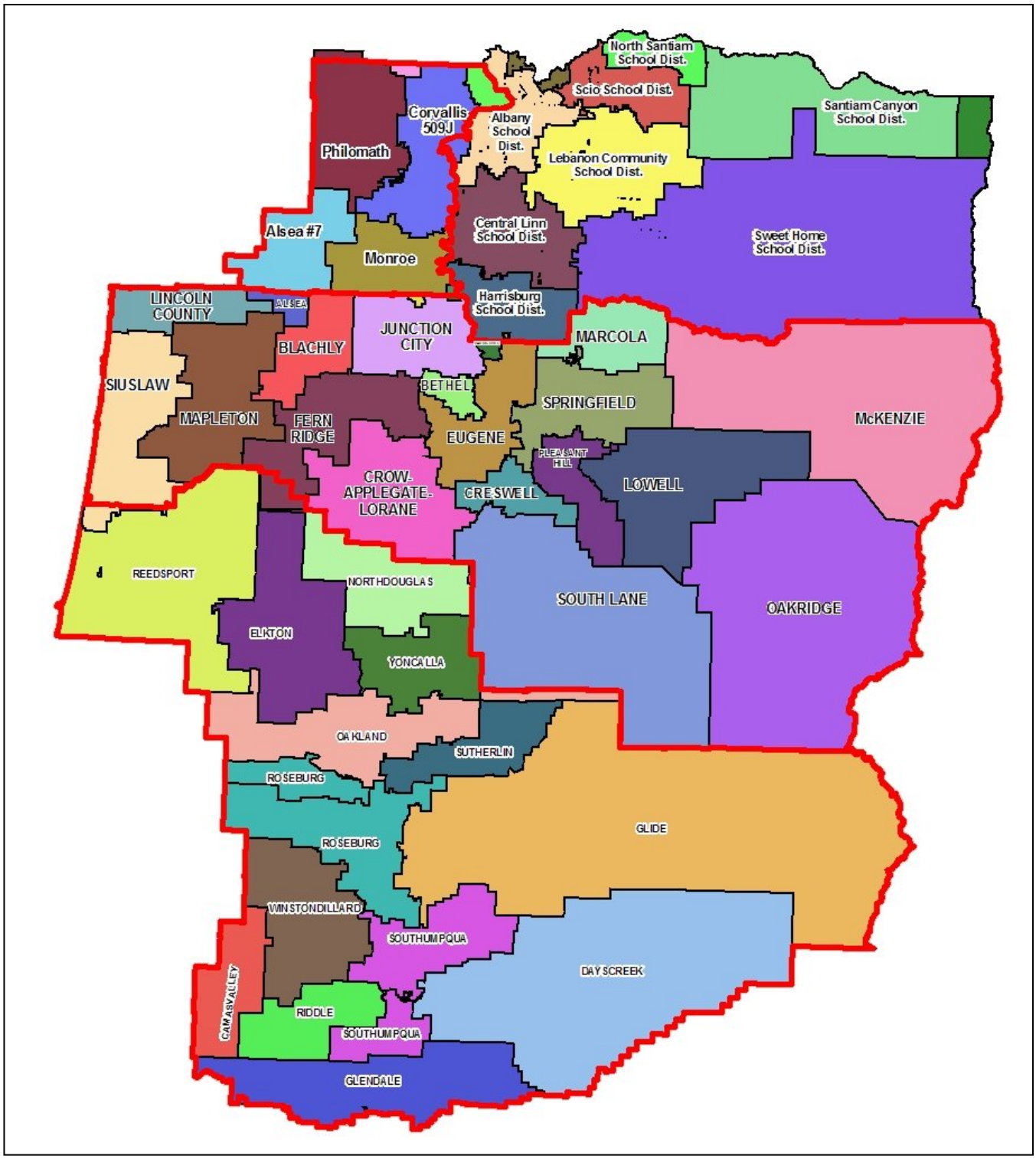
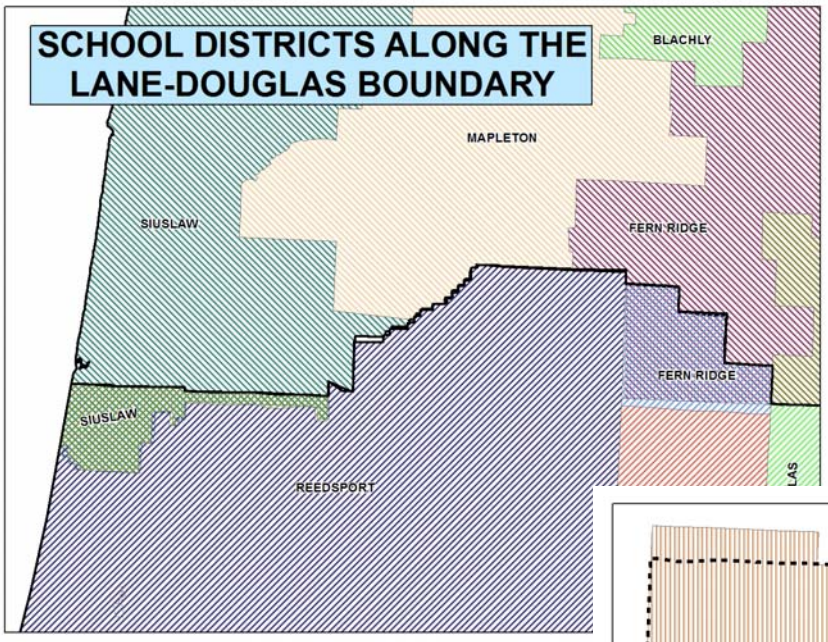
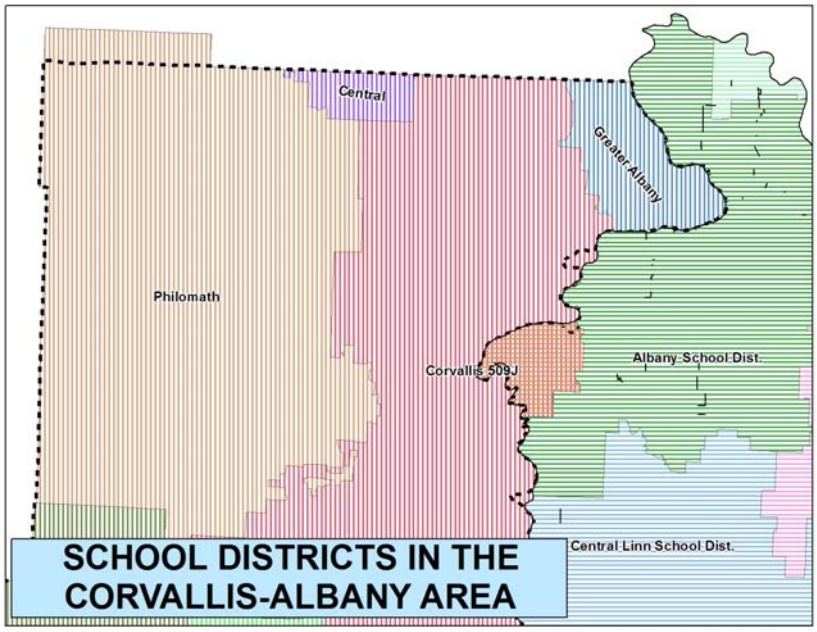


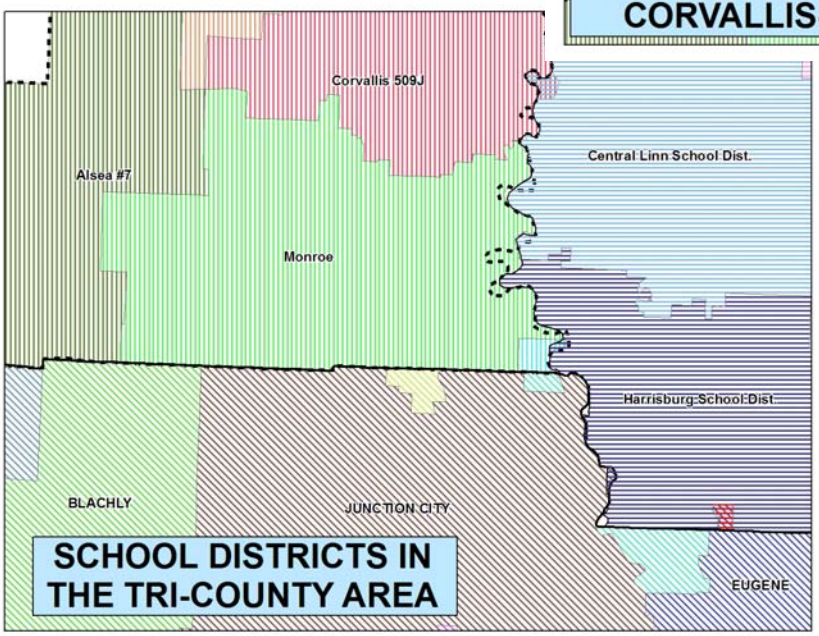
FIGURE 6: Joint School District Overlap Areas



As shown on the left, the Siuslaw (97J) and Fern Ridge (28J) School Districts extend beyond Lane County into Douglas County, creating overlap areas and visible disagreement between the two sets of GIS data (striped in opposite directions). The assumption is that the Douglas County GIS data will be more accurate for the overlap area, which occurs in Douglas County.



Similarly, an overlap area (right) exists where part of the Corvallis School District (509J) appears in both Benton County's and Linn County's GIS data (again striped in opposite directions). The boundaries appear to agree at this scale, but the assumption is that Linn County's GIS data will be more accurate.



A number of small overlap areas can be seen where Linn, Benton, and Lane Counties all come together (left). Disagreement between different county lines is also visible in this view and the one above. An older version of Benton County's GIS county boundary is shown as a dotted line. Even though the boundary has since been improved, small gaps are still visible between school districts.

In summary, where overlap does occur, it will usually be best to use each county's data within that county, and not make use of extra-county mapping, which may be less accurate than district boundary delineations within each county.

Ideally, each county's taxing district data would nest neatly within its own county boundary, which would, in turn, abut neatly against neighboring county boundaries, with no gaps and no overlaps. In this scenario, county boundaries should be agreed upon first, if possible. If county boundaries change, other boundaries may need to be adjusted or re-derived.

Effects of Water-Course Changes on Certain Taxing District Boundaries

In property law, *avulsion* generally refers to a sudden loss or addition to land resulting from the action of water, whereas *accretion* describes a gradual loss or addition to land resulting from the action of water. This distinction becomes important where a river or stream forms the boundary between two *riparian* taxlots (where riparian essentially means "touching water"). If the river changes channels suddenly, or avulsively, the boundary does not change; it remains in the middle of (or along the banks of) the old channel. However, as a river changes course gradually, through accretion, the boundary changes with it. A much more complete discussion of these and other terms can be found at http://www.ormap.org/mapmanual/pdfs/10-Chapter_10.pdf.

The principles of avulsion and accretion apply not just to taxlot boundaries but also to many other kinds of boundaries, including states, counties, cities and, presumably, school districts and other types of taxing districts. Adjudication of disputes arising from riparian boundary changes falls to the neighboring parties and to the court system, not to the county assessor or the state department of revenue. One well-known case in Oregon involves the county boundary between Benton and Linn counties, where changes in the course of the Willamette River have occurred over time, some gradual and some sudden, resulting in some portions of each county being left on the "wrong" side of the river. As mentioned in the previous section, taxing districts that "nest" inside or are otherwise co-located with other boundaries, such as county boundaries or taxlot lines, can be affected by changes to those other boundaries.

Opportunities and Technical Challenges for Boundary Maintenance

As described in **Section II** and elsewhere in this report, many kinds of boundaries, including some kinds of taxing district boundaries, have relationships with other boundaries. School districts and fire districts may sometimes, but not always, nest within counties, and cannot overlap. City council wards will nest within the city limits, cannot overlap, and will completely cover the incorporated area. Changes to some boundaries require changes in others, such as annexations to cities sometimes (but not always) triggering a simultaneous or subsequent withdrawal from a rural fire protection district or other special district.

These relationships can pose both significant challenges and also opportunities for those involved in creating, maintaining, or integrating boundary information. For example, the vertical integration of school attendance areas within school districts can eliminate redundant linework and simplify boundary maintenance or spatial adjustment. Similarly, current city limits can be derived from annexation polygons, rather than being separately maintained. Such business practices can not only eliminate redundancies, but can simplify the process of keeping different boundaries in sync with each other.

Not all spatial data storage environments lend themselves to enforcement of these relationships. The ESRI coverage data model can be used to enforce basic topological relationships, such as shared boundaries with no gaps and no overlaps between polygons. The geodatabase provides a comprehensive set of tools for defining and enforcing a variety of topological relationships among features. Other storage models, such as Shapefiles, do not inherently support shared boundaries or topology, but because the specifications for the Shapefile have been openly published, and they can be read from and written to by a wide variety of GIS software suites, they can be highly useful as a medium for digital data exchange.

Technical Issues Related to Statewide Integration

If boundary data are to be successfully integrated across the state, then it will be necessary to provide an adequate level of statewide uniqueness. At a minimum, unique feature identifiers will be needed among taxing districts of any given type (e.g., school districts). Trying to ensure simultaneous feature uniqueness among taxing districts of all types would be more complicated,

and may not be necessary. Because taxing districts are closely associated with counties, through their revenue and property tax systems, and because the counties are among the most likely sources of taxing district boundary information, it makes sense to use an existing system of unique county identification codes as part of the taxing district feature identifier, especially for the counties themselves, which comprise perhaps the simplest category of taxing district.

Currently, the most well-known and widely used coding system is probably the national Federal Information Processing Standards (FIPS) codes, developed for tabulation of Census and other federal data. However, FIPS codes have recently been officially replaced by GNIS codes for all federal information. The USGS provides online access to both FIPS codes (http://geonames.usgs.gov/fips55.html) and GNIS codes (http://geonames.usgs.gov/bgn.html). The Census Bureau also provides a lookup for FIPS codes (http://www.census.gov/geo/www/fips/fips65/index.html). In Oregon, counties are also widely known by their DOR codes, as reflected in the Digital Cadastral Standard. The BLM uses a set of county IDs known as "COB" codes. All four of these coding systems are shown in ***Table 4*** below, as they are applied to Oregon counties:

TABLE 4: Standard County Coding Schemes

COUNTY	FIPS	DOR	COB	GNIS
Baker	41001	1	OR001	1135845
Benton	41003	2	OR003	1155126
Clackamas	41005	3	OR005	1155127
Clatsop	41007	4	OR007	1135846
Columbia	41009	5	OR009	1135847
Coos	41011	6	OR011	1135848
Crook	41013	7	OR013	1155128
Curry	41015	8	OR015	1155129
Deschutes	41017	9	OR017	1155130
Douglas	41019	10	OR019	1135849
Gilliam	41021	11	OR021	1135850
Grant	41023	12	OR023	1135851
Harney	41025	13	OR025	1135852
Hood River	41027	14	OR027	1155131
Jackson	41029	15	OR029	1135853
Jefferson	41031	16	OR031	1155132
Josephine	41033	17	OR033	1155133
Klamath	41035	18	OR035	1155134

COUNTY	FIPS	DOR	COB	GNIS
Lake	41037	19	OR037	1135854
Lane	41039	20	OR039	1135855
Lincoln	41041	21	OR041	1135856
Linn	41043	22	OR043	1135857
Malheur	41045	23	OR045	1135858
Marion	41047	24	OR047	1135859
Morrow	41049	25	OR049	1135860
Multnomah	41051	26	OR051	1135861
Polk	41053	27	OR053	1135862
Sherman	41055	28	OR055	1135863
Tillamook	41057	29	OR057	1135864
Umatilla	41059	30	OR059	1156673
Union	41061	31	OR061	1164165
Wallowa	41063	32	OR063	1155135
Wasco	41065	33	OR065	1155136
Washington	41067	34	OR067	1155137
Wheeler	41069	35	OR069	1135865
Yamhill	41071	36	OR071	1135866

The advantage of the FIPS, GNIS, and BLM COB codes is that they are unique not just statewide but nationwide, so that multi-state integration is already accommodated. The BLM COB codes could be seen as more user-friendly, in that the "OR" prefix is instantly recognizable, whereas the FIPS "41" may not be as immediately meaningful, and the GNIS is even more cryptic.

Similarly, both FIPS and GNIS coding schemes exist for incorporated cities. Within the FIPS system, incorporated cities are categorized separately from other kinds of "places", and it would be relatively easy to generate a list for all incorporated cities in Oregon, which could then serve as a discrete set of unique identifiers (a domain) for that category of taxing district boundary. In the GNIS system, there does not appear to be a classification specifically for incorporated cities, and they are mixed in with a very long list of "populated places", but they should exist for all cities and could be used as unique identifiers. As with counties, one of the benefits to using either FIPS or GNIS would be the assurance of uniqueness not just statewide but nationally, so that integration beyond the state level would be facilitated.

Unique and persistent coding schemes may or may not exist for other types of taxing districts, such as school districts and fire districts. Any such systems that have been established by Oregon DOR, Oregon Dept. of Education, or other state government department should be explored prior to creating something from scratch. In theory, GNIS codes could be requested for these areas, although the GNIS is intended primarily to be used for geographic features and places as depicted on maps, not for administrative units such as taxing districts. In some cases, as described above for counties, there may be more than one coding scheme to choose from, so integrators and end users of boundary data will need to know what scheme is being used in each specific instance.

In addition to unique feature identifiers, integrated boundary data will be expected to carry the identification of the agency responsible for originating/contributing the GIS data, and of the agency responsible for establishing the boundaries and processing changes to them. These will not always be the same agency. For example, a county might contribute school district boundary information to the statewide integrator, but is not the agency responsible for establishing the district boundaries. These roles will need to be fully defined to ensure successful statewide integration and usefulness of the boundary data.

Currency Issues

As discussed in **Section II** of this report, different users of boundary information will have vastly different requirements for both accuracy and currency. In addition, changes to boundaries occur at widely different rates. Some types of boundaries, such as county lines or school districts, are relatively static, although they can and do change. Other types of boundaries, such as city limits or fire protection providers, undergo frequent change, perhaps a dozen or more times each year in some cases. It is critically important that users of boundary information know how current the information is, and understand the limitations on its use that may be imposed by lack of currency.

Policy Issues Related to Statewide Integration

A full treatment of policy-related issues is beyond the scope of this pilot study, but such issues would likely include access, intended use, limitations, potential liability, and others.

VIII. Conclusions

While there are significant technical challenges involved in the creation and maintenance of accurate taxing district boundaries, recent developments hold out some hope that certain kinds of taxing district boundaries can be extracted more or less directly from GIS taxlot data. However, issues of currency and accuracy will remain. The bottom line is that the specific requirements of the intended user of boundary information determine what is acceptable in terms of the accuracy and currency of that boundary information. For example, what is perfectly acceptable (and even prescribed) for use by county and state departments of revenue would likely not meet the specific needs of the emergency response community. Conversely, purely informational users may be satisfied with highly generalized boundaries that would not meet the needs of revenue or other users. Any attempt to compile, integrate, and distribute taxing district boundary information from multiple counties will need to remain cognizant of this fact, and will need to provide qualifications and limitations on use of the data which are appropriate to the quality of the data in terms of accuracy, completeness, and currency.

Appendix 1: Douglas County GIS Pilot Project

Appendix 2: Tax Code Area Mapping at Lane County Assessment and Taxation

Appendix 3: Administrative Boundary Data Adjustment and Migration