FINAL REPORT

Business Plan Creation For Statewide Parcel Data and Enhanced Elevation Data for Nevada

Nevada Geographic Information Society

Date: 1/10/2014

Agreement Number: G12AC20139

Project title: Business Plan Creation For Statewide Parcel Data and Enhanced Elevation Data for Nevada

Organization: Nevada Geographic Information Society, P.O. Box 7224, Reno, NV 89510

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Collaborating Organizations:
State Mapping Advisory Committee c/o Nevada Bureau of Mines and Geology; Jennifer Mauldin; mauldin@unr.edu; 775-682-8759

Nevada Division of State Lands; Holly Smith; hsmith@lands.nv.gov; 775-684-2720

Nevada Division of Water Resources; Luke Opperman,; lopperman@water.nv.gov; 775-648-2826

Jeff Hardcastle, AICP, Nevada State Demographer, jhardcas@unr.edu; 775-784-6353

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Executive Summary

Agreement Number G12AC20139 created two business plans for Nevada – one for statewide parcel data, the second for enhanced elevation data. The two business plans were created by members of the recipient organization -- the Nevada Geographic Information Society (NGIS) – by members of the state's GIS community, and by AppGeo (hired as consultants). The plans were developed in a series of statewide open meetings, webinars, and presentations throughout the state. Because Nevada lacks a single strategic plan for geospatial data acquisition and management, the business plans in part serve as roadmaps for such activities, as well as defining the costs and benefits of integrated geospatial data.

Major recommendations of the business plans are similar in some regards. Both plans point out the need for a group or office to set priorities for geospatial data at a statewide level and coordinate strategies for data acquisition and dissemination. For enhanced elevation data, for instance, the role of a coordinating body is to minimize redundant acquisition, publicize teaming

and “buy-up”” opportunities, and create a clearinghouse for geospatial data. Similarly, regarding parcels, the coordinating group or office must assist counties (who create and maintain parcel geospatial data) and the many consumers of parcel data. Both plans provide a series of short-term and long-term recommendations for the state.

Project Narrative

While awaiting the outcome of grant funding decisions, the Nevada Geographic Information Society (NGIS) formed a steering team for the overall project, composed of stakeholders and experts in both of the datasets for which business plans are being developed.

In May, 2012, NGIS held two workshops at the NGIS Annual Meeting in Las Vegas. The workshops presented the business planning effort to our members and meeting attendee and solicited questions and a list of interested parties. The workshops explained the goals of the business planning process. We also discussed how similar business plans have been useful in other states. Each workshop had a question and answer component. During the workshop, attendees were encouraged to sign up to either be kept informed about plan developments or to offer their help on a steering committee.

Our workshops were well attended – with over 50 people (approximately one-third of all annual meeting attendees) in each workshop. We had thought that because each workshop focused on one of the two plans we would have different audiences. In fact, most of the same people attended both. This probably indicates that at least in Nevada, the same people use parcel data and enhanced elevation data. We decided to form a single steering team for both business plans, so that the inevitable overlap in activities and discussion would be eliminated.

Shortly after our annual meeting, in late May, we began regular meetings of the steering team. Every two weeks, we met by telephone/web conference. Minutes and materials are exchanged on the project wiki site: http://nevadacap2012.pbworks.com, which is open to the public to read. Most of the materials mentioned in the rest of this report are available at this web site.

The steering team decided that there were three initial activities needed to move the project forward:

- Creation of a request for proposals (RFP) for a consultant to craft the business plans
- Creation of a user survey for parcel geodatasets in Nevada
- Creation of a user survey for enhanced elevation geodatasets

A request for proposals was created and sent to the NGIS Board of Directors for review. The RFP was issued on August 1, with a closing date of September 1, vendor interviews and selections in September, and a kick-off meeting with the selected consultant in early October. By and large, we kept to this schedule. The outcome of the RFP was that NGIS hired AppGeo, of Boston, Massachusetts, to create the two business plans.

In advance of our consultants starting work, two surveys were created on the internet – one concerning parcel geodatasets and the other enhanced elevation datasets. The purpose of the surveys was to find out who uses each kind of data, how they use it, how they acquire and pay

for it, whether they share it, and data characteristics of importance to them. We also asked if we could follow up with respondents via email or telephone. The team goal was to have the surveys completed by the time a consultant came in to the project. The surveys would then provide a rapid start for the consultant.

An email was sent to the NGIS mailing list (approximately 800 addresses), to the Nevada State government GIS interest group list, and to many other professional organizations and groups. Steering team members promulgated the survey throughout their professional networks.

We kept the surveys open for 70 days. The surveys garnered between 80 and 100 responses – an excellent response for a technical topic.

AppGeo began work on these two business plans in October, 2012. Through November and December 2012, the steering team met with AppGeo staff to review the surveys and provide background information. AppGeo used the meetings during these months to plan how it would conduct interviews, gather user needs, and start the outlines of the two business plans.

The Nevada State Demographer's Office provided extra funding to allow AppGeo staff to attend a meeting of the Nevada Assessor's Association (Marchl 2013). Because Nevada's Assessors' Offices are the primary creators and editors of parcel data throughout the state, the additional funds provided by the State Demographer's Office were essential to the creation of a sound plan.

AppGeo staff made visits to Nevada in March and May of 2013 to gather information for development of both plans. NGIS planned full schedules of meetings and workshops during the visit periods, trying to get as many stakeholders and interested parties involved in the development.

During March, 2013, we hosted a series of public workshops and meetings over three days. The workshops, meetings and presentations included both the enhanced elevation plan and the parcel plan. The March meetings and workshops included:

- Meeting with Holly Smith, Nevada State Lands GIS lead
- Workshop in Bryan Building, Capitol Complex, Carson City, Nevada with web presence from Southern Nevada Water Authority Headquarters, Las Vegas
- Meeting with Advanced Data Systems (CAMA database used in 15 of 17 Nevada counties), Carson City, Nevada
- Dinner Meeting with Douglas County GIS lead,
- Presentation to the Nevada Assessors Association in Minden, Nevada concerning the parcel business plan
- Workshop at Washoe County Offices, Nevada, with web presence from Clark County Offices, Nevada

- Dinner meeting with NGIS board and other members of state GIS community
- Workshop in USGS, Carson City with web presence from Southern Nevada Water Authority Headquarters, Las Vegas
- Meeting with Bureau of Land Management, Nevada, Cadastral Survey Lead (Byron Johnson), Reno, Nevada
- Meeting with State Demographer, University of Nevada, Reno
- Workshop with staff of Nevada Bureau of Mines and Geology, UNR Seismology Laboratory, Washoe County staff, and UNR Geology staff, University of Nevada, Reno

The NGIS steering team continued to meet to define necessary elements of the plans. We also created an agenda and second round of workshops for May, 2013. In May, 2013, NGIS hosted a second round of workshops in Reno, Las Vegas, and at the annual statewide GIS conference in Reno. These included:

- Meeting with Data Librarian, Keck Library, University of Nevada, Reno, concerning distributing GIS and spatial data
- Meeting with State Demographer, University of Nevada, Reno
- Two workshops in Las Vegas, Nevada – one on parcel business plan, one on high resolution elevation data, Southern Nevada Water Authority, Las, Vegas
- Presentation at the State Mapping Advisory Committee open meeting
- Workshops at the statewide annual GIS conference, Reno, Nevada

Attendance lists at the workshops and meeting are attached to this report as Appendix A.

The NGIS steering team and the NGIS board worked with the AppGeo team to craft draft business plans (two separate documents). These were reviewed in August, 2013, revised, and re-reviewed in November, 2013. Final drafts were submitted to the NGIS board in December, 2013.

The plans were complete in draft as of January. Over the next few months, the NGIS board created executive summary statements and performed final content edits. At the time of the final revision of this document (August, 2014), the NGIS board has decided that the elevation plan is complete both in content and form. The parcel business plan is complete, but it is the NGIS board's intent to make this a dynamic document because we think the parcel data creation and acquisition community is in a state of (productive) change. Both plans are attached to this document as Appendix B.

One of the major findings in the business plan studies is that Nevada's governments are key beneficiaries of coordinated business plans for elevation data and especially for parcel data. For instance, Nevada requires that each of its seventeen counties provide the State Demographer's Office with geospatial parcel information annually, if they can do so. This creates a data collection problem for this particular office of state government and a significant data management and transmittal problem for Nevada's counties. To be effective, a successful plan must address these different demands – ease of consumption at the statewide level and ease of production at the local level.

Nevada's state government lacks any central repository or office for geospatial information. Nevada's university system, (especially the Nevada Bureau of Mines and Geology and the Keck Library at University of Nevada, Reno) fills some clearinghouse roles. However, the State of Nevada's day to day consumption, production, and storage of geospatial information has no mechanism for governance or coordination within the State's agencies. Consequently, both business plans recommend a well-thought out plan for Nevada State government to create a coordinating and planning mechanism at a minimum.

Next Steps

The NGIS Board has considered several actions to promote the statewide business plans for the two kinds of geospatial data. At present, the NGIS Board will focus on promulgating the business plans as living documents through forum discussions. As well, the Board will begin briefing Nevada's local and state governments on how their participation can build an effective geospatial data partnership.

Nevada's statewide business plan for enhanced elevation data ties in well with current USGS and multi-agency efforts to create LiDAR partnerships. The NGIS Board will continue collaborating in these efforts as a way to move forward with the statewide business plan for elevation data.

On the parcel business plan front, one idea the NGIS Board may consider is creating a stop-gap data depot for local governments to post their parcel datasets. This could be a secured portal with read-only access granted only to those with statutory rights to the information or explicit permission. This would ease the burden of gathering and updating seventeen datasets on varying schedules.

The two business plans have added a lot to Nevada's progress in GIS at a statewide level. However, the NGIS Board still sees a lack of an overall strategic plan or vision. Thus, in addition to planned actions already described, we still see a need for an overall strategic plan for geospatial information within Nevada. Support for this more general master plan is an identified need.

Feedback on Cooperative Agreements Program

The NGIS Board thinks the CAP program is a very worthwhile and cost-effective mechanism to advance geospatial information throughout the nation. Without the CAP program, Nevada would not have even considered creating the two business plans discussed here. We would like to see the CAP progam open to "special projects". Nevada's "special project" would be a statewide strategic plan for geospatial information, providing a context for the parcel and elevation data business plans.

The assistance received was sufficient for our purposes. As discussed above, we were very fortunate to have the Nevada State Demographer's Office contribute $5,000 in additional funding, allowing our consultant to make an extra trip to Nevada. AppGeo billed the Nevada State Demographer's Office for the travel and labor costs directly.

Our grants were a bit different than others, perhaps, in that the NGIS Board is an all-volunteer board. Consequently, we chose to run the grant through a volunteer project manager. This delayed the reporting on the grant, though not its execution otherwise. Something we would do in a different way in the future is to provision support for reporting, even if the grant activities (workshops, meetings, etc.) were run by a volunteer professional.

APPENDIX A. WORKSHOP AND MEETING ATTENDEES

Attendee	Affiliation	Email													
Nancy Damar	USGS	nadamar@usgs.gov	S. Nevada Workshop - Elevation / LiDAR			2.5 hours	2.5	2.5							
Don Harper	US FWS	don_harper@fws.gov	S. Nevada Workshop - Elevation / LiDAR			2.5 hours	2.5	2.5							
Craig Hale	SNWA	craig.hale@snwa.com	S. Nevada Workshop - Elevation / LiDAR			2.5 hours	2.5								
Lee Bice	Clark County	bice@clarkcountynv.gov	S. Nevada Workshop - Elevation / LiDAR			2.5 hours	2.5								
Larry Mata	Clark County	mata@clarkcountynv.gov	S. Nevada Workshop - Elevation / LiDAR			2.5 hours	2.5								
Lynn Fenstermaker	DRI	lynn.fenstermaker@dri.edu	S. Nevada Workshop - Elevation / LiDAR			2.5 hours	2.5								
Bruce Jones	DRI	bruce.jones@dri.edu	S. Nevada Workshop - Elevation / LiDAR			2.5 hours	2.5								
Matthew Krok	City of Henderson		NGIS 2013 Workshop #1			1.5 hours	1.5								
Adam Johnson	Gnomon, Inc.		NGIS 2013 Workshop #1			1.5 hours	1.5								
Ryan Goodner-Belli	Cadastral Mapper, Mono, Calif.		NGIS 2013 Workshop #1			1.5 hours	1.5								
Mark Morrison	Michael Baker Corp.		NGIS 2013 Workshop #1			1.5 hours	1.5								
Bob Paterski	Nevada Legislative Counsel Bureau		NGIS 2013 Workshop #1			1.5 hours	1.5								
Linda Wimberly	Desert Research Institute		NGIS 2013 Workshop #1			1.5 hours	1.5								
Jo A. Moore	U.S. Bureau of Reclamation		NGIS 2013 Workshop #1			1.5 hours	1.5	1.5							
Jeff Hardcastle	Nevada State Demographer		NGIS 2013 Workshop #1			1.5 hours	1.5								
Bonnie Duke	Nevada Department of Taxation		NGIS 2013 Workshop #1			1.5 hours	1.5								
Richard Wells	City of Las Vegas		NGIS 2013 Workshop #1			1.5 hours	1.5								
Eric Schmidt	Douglas County, Nevada		NGIS 2013 Workshop #1			1.5 hours	1.5								
Michael Johnson	Churchill County, Nevada		NGIS 2013 Workshop #1			1.5 hours	1.5								
Preston Denney	Churchill County, Nevada		NGIS 2013 Workshop #1			1.5 hours	1.5								
Ryan Aglietti	Nevada DOT		NGIS 2013 Workshop #1			1.5 hours	1.5								
Stephanie Snider	Nevada DOT		NGIS 2013 Workshop #1			1.5 hours	1.5								
Holly Smith	Nevada DOT		NGIS 2013 Workshop #1			1.5 hours	1.5								
Mike Zierten	Nevada Division of Water Resources		NGIS 2013 Workshop #1			1.5 hours	1.5								
Cindy Deeds Wirick	NAS Fallon		NGIS 2013 Workshop #1			1.5 hours	1.5	1.5							
Michelle Lewis	Nevada Department of Public Safety		NGIS 2013 Workshop #1			1.5 hours	1.5								
Mark O'Brien	GIS consultant		NGIS 2013 Workshop #1			1.5 hours	1.5								
Jennifer Mauldin	Nevada Bureau of Mines and Geology		NGIS 2013 Workshop #2			1.5 hours	1.5								
Luke Opperman	Nevada Division of Water Resources		NGIS 2013 Workshop #2			1.5 hours	1.5								
Thomas Dilts	University of Nevada Reno		NGIS 2013 Workshop #2			1.5 hours	1.5								
Jay Johnson	Western Cultural Resource Management		NGIS 2013 Workshop #2			1.5 hours	1.5								
Eric Ford	Wood Rodgers, Inc.		NGIS 2013 Workshop #2			1.5 hours	1.5								
Carol Buonanoma	Washoe County		NGIS 2013 Workshop #2			1.5 hours	1.5								
Bonnie Duke	Nevada Department of Taxation		NGIS 2013 Workshop #2			1.5 hours	1.5								
Joe Laravie	Great Basin GIS		NGIS 2013 Workshop #2			1.5 hours	1.5								
Doug Carriger	Sunrise Enginerring		NGIS 2013 Workshop #2			1.5 hours	1.5								
Rob Ghiglieri	Nevada Division of Minerals		NGIS 2013 Workshop #2			1.5 hours	1.5								
Racheal Wearne	Nevada Division of Minerals		NGIS 2013 Workshop #2			1.5 hours	1.5								
Holly Smith	Nevada Division of Transportation		NGIS 2013 Workshop #2			1.5 hours	1.5								
Jeff Hardcastle	Nevada State Demographer		NGIS 2013 Workshop #2			1.5 hours	1.5								
Dan Deegan	TMG Consulting		NGIS 2013 Workshop #2			1.5 hours	1.5								
Ross Weckesser	City of Henderson		NGIS 2013 Workshop #2			1.5 hours	1.5								
Nathan Tolbert	Beneficial Designs		NGIS 2013 Workshop #2			1.5 hours	1.5								
Marsha Cardinal	Washoe County		NGIS 2013 Workshop #2			1.5 hours	1.5								
Kobe Harkins	Washoe County		NGIS 2013 Workshop #2			1.5 hours	1.5								
Mark O'Brien	GIS consultant		NGIS 2013 Workshop #2			1.5 hours	1.5								
Craig Hale	Southern Nevada Water Authority		S. Nevada Workshop - Parcels			2.0 hours	2								
David Gundlach	National Park Service		S. Nevada Workshop - Parcels			2.0 hours	2	2							
Brad Gone	US Fish and Wildlife Service		S. Nevada Workshop - Parcels			2.0 hours	2	2							
Don Harper	US Fish and Wildlife Service		S. Nevada Workshop - Parcels			2.0 hours	2	2							
Robert Vega	Clark County		S. Nevada Workshop - Parcels			2.0 hours	2								
Ken Masden	Clark County		S. Nevada Workshop - Parcels			2.0 hours	2								
Michael Kinney	City of Las Vegas		S. Nevada Workshop - Parcels			2.0 hours	2								
Craig Hale	Southern Nevada Water Authority		S. Nevada Workshop - Elevation / LiDAR			2.0 hours	2								
Art Ehrenberg	Southern Nevada Water Authority		S. Nevada Workshop - Elevation / LiDAR			2.0 hours	2								
Devin Kelley	Photo Science		S. Nevada Workshop - Elevation / LiDAR			2.0 hours	2								
Judy Brandt	Southern Nevada Water Authority		S. Nevada Workshop - Elevation / LiDAR			2.0 hours	2								
David Gundlach	National Park Service		S. Nevada Workshop - Elevation / LiDAR			2.0 hours	2	2							
Robert Vega	Clark County		S. Nevada Workshop - Elevation / LiDAR			2.0 hours	2								
Ken Masden	Clark County		S. Nevada Workshop - Elevation / LiDAR			2.0 hours	2								
Toby Wellborn	USGS		N. Nevada Workshop - Elevation (a.m.)			2.5 hours	2.5	2.5							
Marvin Boyd	National Weather Service		N. Nevada Workshop - Elevation (a.m.)			2.5 hours	2.5	2.5							
Todd Hopkins	US Fish and Wildlife Service, Great Basin Landscape Coalition		N. Nevada Workshop - Elevation			2.5 hours	2.5	2.5							
Jeremy Hall	Gnomon, Inc.		N. Nevada Workshop - Elevation (a.m.)			2.5 hours	2.5								
Thomas Dilts	University of Nevada Reno		N. Nevada Workshop - Elevation (a.m.)			2.5 hours	2.5								
Carol Ostergren	USGS		N. Nevada Workshop - Elevation (a.m.)			2.5 hours	2.5	2.5							
Craig dePolo	Nevada Bureau of Mines and Geology		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Chris Henry	Nevada Bureau of Mines and Geology		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Matthew Richardson	Nevada Bureau of Mines and Geology		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Wendy Calvin	University of Nevada Reno, DGSE/GBCGE		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Valerie Johnson	City of Reno		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Gary Beekman	Washoe County		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Moni Fox	Washoe County		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Graham Kent	University of Nevada Reno, Nevada Seismological Center		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Jim Faulds	Nevada Bureau of Mines and Geology		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Nick Hinz	Nevada Bureau of Mines and Geology		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Betsy Littlefield	University of Nevada Reno, Nevada Seismological Center		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
John Louie	Nevada Bureau of Mines and Geology		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
John Bell	Nevada Bureau of Mines and Geology		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Ken Smith	University of Nevada Reno, Nevada Seismological Center		N. Nevada Workshop - Elevation (p.m.)			2.5 hours	2.5								
Bob Paterski	Legislative Counsel Bureau		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Beau Parker	Nevada Division of Water Resources		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Ryan Aglietti	Nevada DOT		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Rob Ghiglieri	Nevada Division of Minerals		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Rachel Wearne	Nevada Division of Minerals		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Marvin Boyd	National Weather Service		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5	2.5							
Holly Smith	Nevada Division of State Lands		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Mike Randall	Nevada Division of Water Resources		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Matt Dillon	Nevada Division of Water Resources		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Kristin Sherve	Nevada Division of Emergency Management		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Linda Martinez	Nevada DOT		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Preston Denney	Churchill County		N. Nevada Workshop - Parcels (a.m.)			2.5 hours	2.5								
Gary Beekman	Washoe County		N. Nevada Workshop - Parcels (p.m.)			2.0 hours	2								
Kiersten Beck	Washoe County		N. Nevada Workshop - Parcels (p.m.)			2.0 hours	2								
Moni Fox	Washoe County		N. Nevada Workshop - Parcels (p.m.)			2.0 hours	2								
Carol Buonanoma	Washoe County Assessor's Office		N. Nevada Workshop - Parcels (p.m.)			2.0 hours	2								
Aaron Smith	Michael Baker, Jr. Corp.		N. Nevada Workshop - Parcels (p.m.)			2.0 hours	2								
Richard Wells	City of Las Vegas		N. Nevada Workshop - Parcels (p.m.)			2.0 hours	2								
Don Harper	U.S. Fish and Wildlife Service		N. Nevada Workshop - Parcels (p.m.)			2.0 hours	2	2							
Kathy Wilson	U.S. Fish and Wildlife Service		N. Nevada Workshop - Parcels (p.m.)			2.0 hours	2	2							
Ken Masden	Clark County Assessor's Office		N. Nevada Workshop - Parcels (p.m.)			2.0 hours	2								
					Workshops, TOTAL		**202**	32.5		HOURLY RATE					
					w/out Feds		**169.5**			60	10,170.00				
Nevada Assessors Association Spring Meeting, Douglas County, approximately 45 attendees						0.75 hours	**33.75**			60	2,025.00				
Keck Library, UNR, 3 attendees						1.5 hours	**4.5**			60	270.00				
s (14 months, 1.0 hours / meeting, average 8 attendees)							**224**			60	13,440.00				
t Plans							**40**			60	2,400.00				
bar)							**160**			108	17,280.00				
planning meetings held at NGIS in May 2012 with roughly 75 attendees for 1.5 hours							**631.75**				**$45,585.00**	DONATED TIME MATCH			

APPENDIX B. DRAFT BUSINESS PLANS

Statewide Business Plan
For
Nevada
Geospatial Enhanced Elevation Data

December 2013

produced by

AppGeo

This document was produced by Applied Geographics, Inc. (AppGeo) under contract with the Nevada Geographic Information Society, funded by a Cooperative Agreements Program (CAP) Grant from the Federal Geographic Data Committee (FGDC): NSDI Category 4 Cooperative Agreement G12AC20139

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FOREWORD

In the mid-1990's the United States outlined a conceptual framework for geospatial integration. The National Spatial Data Infrastructure, more commonly known as the NSDI, set both process and content targets for federal agencies and their collaborators. In the years since the establishment of the NSDI, spatial information has become faster and cheaper to acquire. Geospatial information has also exploded in to personal, business, and government spheres. The demand for geospatial information that is accurate, timely, and useful for individuals and organizations has never been greater.

The elevation of the earth's surface is one of the fundamental pieces of information about our planet. The shape of the earth, topography, defines our experience and interaction with it. Latitude, longitude, and elevation at each point on the earth's surface – elevation data – describe that shape. As this business plan document points out, elevation data has a myriad of uses every day. Some are obvious, such as determining possible flood areas or providing a hiker's mobile device with a trail's elevation profile. Other uses are less in the public eye, but equally pervasive and important: finding geologic faults, refining weather forecasts at local and global scales, studying planetary changes in shape.

Few states have more topography than Nevada, which has more than three hundred named mountain ranges. In advance of topographic data other than that collected by direct observations on the earths surface, and at a time when an observation balloon was the only means to see the earth from above, Clarence Dutton said of the Great Basin that from the air it must seem an "army of caterpillars marching toward Mexico". Because of the importance of topography in Nevada, geospatial data on elevation has a large body of interested parties. Some seek just to consume data, others to both generate and consume it. Regardless, because of Nevada's size and diverse interests (mining, land management, recreation, development, etc.), gathering high accuracy elevation data can become a patchwork of needlessly expensive , duplicative efforts.

Recognizing the importance of high resolution elevation data, the Nevada Geographic Information Society – the only statewide professional GIS organization – applied for a business plan development grant from the Federal Geographic Data Committee. This grant funded the business plan presented here.

This work could not have succeeded without the help of many individuals and organizations. The participants in surveys, workshops, and meetings are foremost among these. We were impressed with the geospatial community's articulation of their needs and thoughtfulness in representing the needs of others not present to speak for themselves. Rich Grady and Michael Terner of AppGeo were in no small measure responsible for this, using their experience and wide range of knowledge to draw out Nevada's needs and possible solutions to them. So, to all who assisted in the development of this plan, a hearty "thank you" from the Nevada Geographic Information Society board and the people of Nevada.

- Eric Ingbar, Project Manager for the Nevada Geographic Information Society Board

1 EXECUTIVE SUMMARY

The impetus for this Business Plan is the recognized need in Nevada for better elevation data to support public safety and economic development, as well as a multitude of other applications, such as crucial habitat assessment for species, for example the sage grouse. Around the state, there has been successful project-level activity to use Light Detection and Ranging, i.e. LiDAR, for capturing high-resolution elevation data to support various project needs. Clearly, it's a proven technology for getting elevation datasets that are vastly superior to today's generally available data and products, which are mostly old and coarse. With better data come better decisions, cost savings, and more effective spending.

Currently, the project-level activity to capture better elevation data around the state is not coordinated, and therefore, lacks consistency for statewide needs and non-project purposes. Furthermore, it risks duplication of effort and missed opportunities for pooled-funding and cost-sharing. Also, because the project-level data is captured in a piecemeal fashion, there are no economies-of-scale in terms of cost. Nevada can do better, and this plan proposes a way forward, including:

- *Short-term:* Designate a state agency to coordinate elevation data
- *Long-term:* Develop a statewide approach to coordinating *all* geospatial data

Leveraging state resources to benefit all Nevadans when it comes to elevation data would be a practical, useful approach. For example, consistent technical specifications, mechanisms and infrastructure to share data, and ways to pool funds and coordinate procurement when sensible would be a big help to all levels of government and the private sector. To get these things done, an entity needs to be made responsible and held accountable. So far, this effort has been led by the volunteer-based Nevada Geographic Information Society (NGIS), which will continue to play an important role, both in advance of a state agency being designated to coordinate elevation data and afterwards. NGIS is a diverse cross-section of professionals in geospatial technology, for both the private and public sectors; and therefore, it is a voice for statewide needs and interests.

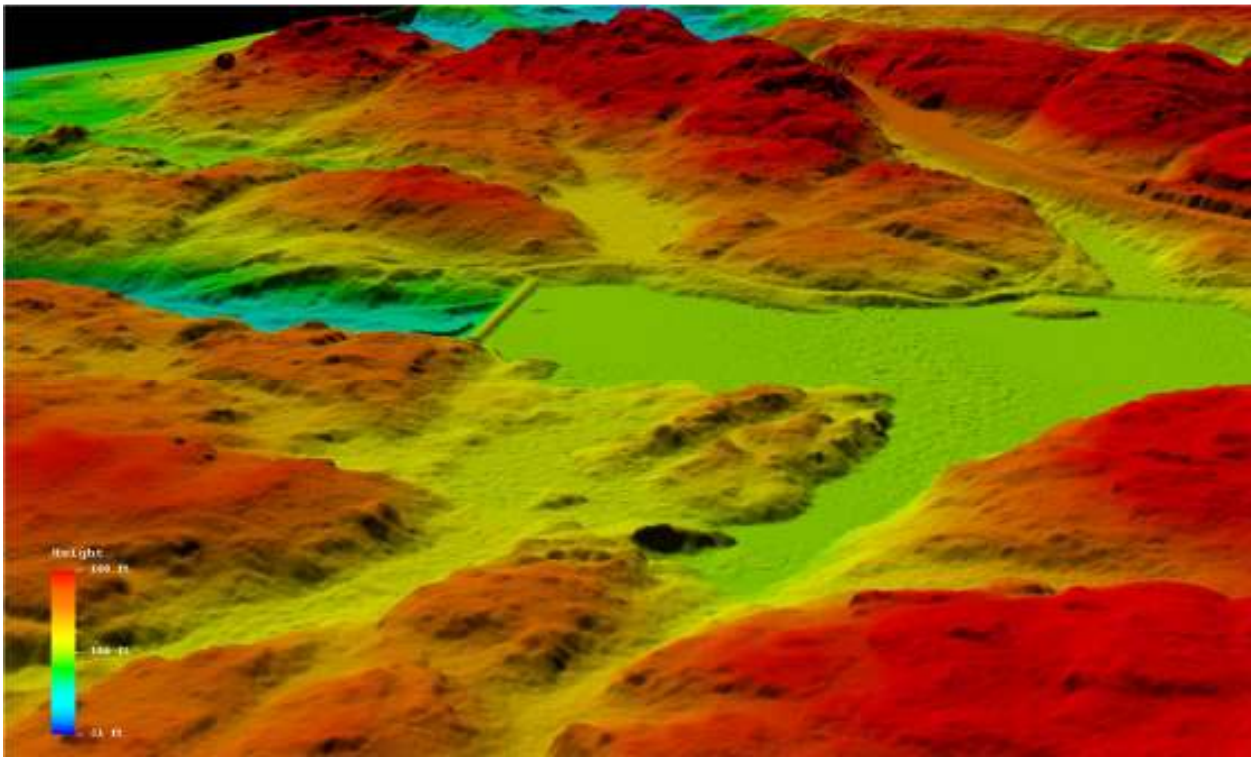
Once a state agency is designated and underway on elevation data, the job is not done. Long-term, the need for an enterprise approach to all geospatial data is needed at the state-level -- moving ahead incrementally should not ignore the ultimate end-state that is envisioned in this plan for maximum advantage to be achieved.

2 INTRODUCTION

2.1 BACKGROUND ON THE CURRENT SITUATION

2.1.1 Existing Conditions of Elevation Data

Nevada currently has no coordinated program for collecting, creating, and sharing digital terrain information to map its topography and meet requirements for high-resolution elevation data. There is good experience around the State in applying modern technology (such as **Light Detection and Ranging**, i.e. LiDAR) to project-specific needs and limited geographic areas, so the expertise is out there. But the data is not captured to a consistent specification or shared in a systematic way.



Digital Terrain Model from Airborne LiDAR, Color-Coded by Elevation Height
Image Source: AppGeo c/o Gloucester, MA

Key Findings

- Existing statewide information on Nevada's topography is inaccurate for many current needs
  - Best available statewide data is the 10-meter resolution Digital Elevation Model (DEM) data from US Geological Survey (USGS), some of the state has only 30-meter data
  - The available 10-meter DEM resolution is sufficient for basic cartographic purposes, such as shaded relief maps, but is inadequate for tasks requiring higher resolution, such as finding obscure geologic features for risk mapping or mineral development

- Higher resolution project-specific data for limited geographic areas is better than statewide data
    - Existing LiDAR data covers a number of "project areas" [see inventory in Appendix B]
    - Individual project needs drive collection and data processing specifications
    - Data may not fit larger state needs -- since the data is collected based on specs for one project, the data cannot necessarily be utilized for other projects where geographic overlaps exists
- Projects are not coordinated
    - Projects may duplicate efforts, in whole or in part
    - Project-specific procurement may miss cost-sharing opportunities and economies of scale
    - No specific state agency is responsible for coordinating state efforts
- No standards have been agreed upon
    - Data collection methods may be non-standardized, limiting the value and multiple use potential of the terrain information
    - Procurement may "over-buy" due to uncertainty about specifications
    - Sharing terrain information and integrating information from projects is challenging and more expensive
- The Bureau of Mines and Geology is interested in assuming the responsibility for elevation data, but not necessarily for other geospatial layers, and not without funding support
- There seems to be a general consensus that a statewide program should be a coordinated effort, but most likely it would need to proceed on an incremental basis based on funding constraints
- Crucial habitat assessment (e.g. for the sage grouse) has the Governor's attention, along with many others in the State
    - This is an important issue with ramifications for economic development
    - Enhanced elevation data for better characterization would help the Governor's Task Force on Sage Grouse
- The "North (High Desert/Reno)/South (Mojave Desert/Las Vegas) Divide" – politically and ecologically – may suggest a bifurcated strategy to collect enhanced elevation data; for example, the Mojave is the locus of solar development potential, which could be an economic priority
- Of the "Functional Use Cases and Activities" cataloged in the National Enhanced Elevation Assessment (NEEA)[1], the following were reported by Nevada stakeholders:
    - Homeland security scenario

[1] The National Enhanced Elevation Assessment (NEEA), to document national requirements and benefits for improved elevation data in the United States, was completed in December 2011; the study was sponsored by member agencies of the National Digital Elevation Program (NDEP), and developed by Dewberry under contract to the USGS; participants included 34 federal agencies, 50 states, and selected local governments and tribes, as well as private and not-for-profit organizations; an analysis of the results showed that an improved national program has the potential to generate $1.2-billion to $13-billion in new benefits each year once fully operational; the findings build on similar results documented by the National Research Council (NRC), federal agencies, and numerous state reports.

- Transportation mapping
- Determination of watershed characteristics
- Measuring earthquake deformation
- Power transmission line mapping (energy development)
- Monitoring geomorphic processes
- Identification of small hydrologic features (ditches, tile drain)
- Characterizing wildlife habitat
- High-resolution floodplain mapping
- Fault-rupture mapping

Creating topographic maps

2.1.2 Nevada Geographic Information Society (NGIS) Survey of Stakeholders

NGIS conducted an online survey of Elevation Data Stakeholders in the fall of 2012. Survey results indicate a broad-based need for **elevation data** across stakeholder communities. Complete results are available on the NGIS website. *See:* http://www.ngis.org/ .

Highlights are as follows:

- There were 77 respondents, from the following sectors:

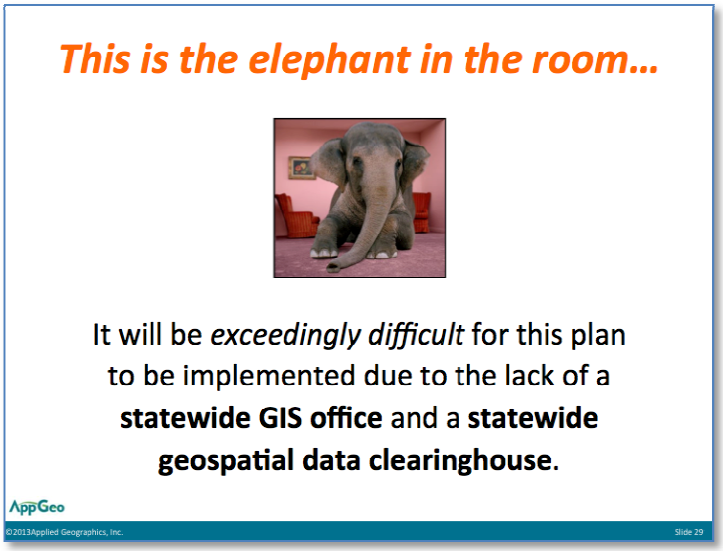
Sector	No. of Respondents	Percent of Total
Private Business	25	33%
State Government	21	27%
Local Government	14	18%
Federal Government	10	13%
Regional Entity	3	4%
Education Institution	2	3%
Non-Profit	1	1%
Other	1	1%
TOTAL	**77**	**100%**

- Almost all (97%) use digital elevation data, currently
  - Most use whatever is available
  - 43% have an essential need for the data and are willing to pay for it
- More than half (52%) want better elevation data, as follows:
  - More resolution (64%)
  - More up to date or current (49%)

    - More area of coverage (51%)
- 60% of the private sector respondents do not share elevation products that they pay for themselves: For example, mineral exploration data can provide a competitive advantage
- 80% of State or Local government respondents either do not share or are unsure about sharing elevation products: For example, bandwidth issues, liability concerns, contract restrictions, etc.

2.2 OVERARCHING CHALLENGE TO PROGRESS ON STATEWIDE DATA DEVELOPMENT

The following observations apply for both **parcels** *and* **elevation** data sets. These observations are based on analysis conducted in association with Nevada Geographic Information Society (NGIS). Simply put: current practices for collecting and sharing geospatial data are somewhat challenging in Nevada.



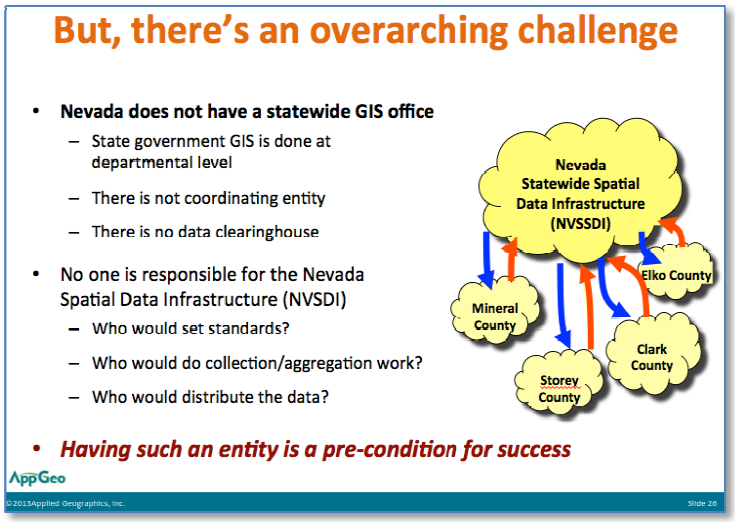
High-level Findings on the Current Situation

- All stakeholders interviewed shared a common understanding of the need for such data, as well as other geospatial datasets, and observed that there is **no common statewide approach** for meeting the need through agreed upon actions
- Collecting these datasets in a consistent way and sharing them with all stakeholders are not coordinated activities in alignment with economies of scale and efficiency, as stakeholder activities are **focused on their specific jurisdictional mission requirements** rather than coordination
- Communications between stakeholders are mostly voluntary, largely based on personal relationships of trust and professional respect around common interests, but **statewide coordination mechanisms are constrained to narrow-purposes,** for example the SB400 legislation narrowly aimed at parcel data for economic development. Ultimately, formal statewide coordination mechanisms are lacking.
- There is duplication of effort and inefficient spending when viewed from a statewide perspective, with **no common geospatial data strategy for Nevada**, nor resources for managing coordination across state government as well other participating stakeholders like local and county governments and federal agencies.

- Common needs are not coordinated, and there is **no accountability for a statewide plan of action** that would be mutually beneficial
- Leadership, communication and coordination is crucial for these kinds of statewide data initiatives. Ultimately, the data producers - Nevada's counties for parcels and a variety of agencies from multiple levels of government for elevation - may have little incentive to collaborate in creating statewide geospatial data, depending on their jurisdictional mandate. Similarly, entities that may be asked to "co-fund" efforts (e.g., parcel data maintenance, new LiDAR collections) will have questions and collaborative funding requires administrative support.

Overarching Recommendations on Role of Statewide Geospatial Office

The vast majority of states have dedicated, statewide geospatial offices that are most often located within the "information technology" agency. Increasingly, such offices are led by a Geospatial Information Officer (GIO) and the size of these offices and their budgets varies greatly from state to state, with fulltime staff ranging from one to as many as twenty. The main functions that these offices fulfill include:



- Leadership and coordination of statewide initiatives (including the kinds of statewide data layer development covered in this study)
- Management and maintenance of a statewide data clearinghouse to facilitate data distribution and data sharing
- Development and management of shared statewide geospatial infrastructure such as a web-services platform and/or enterprise licensing for commercial software
- Center of geospatial expertise to assist agencies that are getting started with geospatial and/or agencies that are tackling new, challenging efforts
- Active coordination with partners - both state agencies and external partners such as counties - on data layer stewardship and data update and maintenance

What should the state do?

A. The existing geospatial stakeholder community needs to activate and begin to advocate for a change in statewide geospatial management and governance

1. The NGIS community, and other existing stakeholder groups can help to articulate the challenges that Nevada is facing and the mechanisms other states have used to address these challenges
2. Advocate for the start of more detailed planning for a statewide geospatial coordination entity within state government

B. Establish a "Governor's Council on Statewide Mapping Excellence"

1. Set measurable goals for achieving excellence in statewide mapping in support of the state's needs and mandates, including the Governor's priorities (e.g. sage grouse and economic development)
2. Advise the Governor's Office on statewide mapping investments and ROI
3. Coordinate with the existing State Mapping Advisory Committee (SMAC) to establish a clear governance model that can assist the state in moving forward
4. Set priorities for the state's mapping agenda and monitor progress
5. Leverage departmental geospatial assets and investments in state geospatial data infrastructure
6. Assess and streamline state agency processes to collect and utilize geospatial parcel data , enhanced elevation data and other geospatial data such as roads, historic sites, or wildlife habitat

C. Designate a state agency to serve as, or house the "Statewide Geospatial Office"

1. Said agency to **appoint a full-time statewide Geospatial Information Officer** reporting to the agency director, with job responsibilities to **develop a coordination and technology strategy** with input from stakeholder agencies, that includes the following elements that are particularly germane to the development of statewide parcel and elevation data sets:
    i. Document current state agency processes and tools for collecting and utilizing geospatial data
    ii. Identify gaps in layers and data sets and potential process improvements
    iii. Work with local governments who do not have staff and resources to identify alternatives
    iv. Identify and address barriers to local government participation in statewide data initiatives such as data liability concerns
    v. Identify data that can be shared
    vi. Identify and develop appropriate standards that can be readily met by data partners
    vii. Identify planned projects to collect geospatial data

viii. Identify appropriate incentives and motivators for partner participation and standards compliance such as linking data sharing as condition for accepting state grant money (e.g., technology grant funds that are distributed to assessors)

ix. Identify and develop technologies that facilitate data sharing (e.g. , standards-based data sharing portal)

x. Identify opportunities for reducing duplication of effort

xi. Identify opportunities to pool funding and streamline procurement toward achieving prioritized statewide goals

3. Support and fund the **goals and priorities set by the Governor's Council on Statewide Mapping Excellence**

How can this be done?

A. **Short-term:** Governor's Executive Order could establish the council

1. Appointment criteria for Council would need to be set
2. Council responsibilities and governance rules for Council would need to be identified and detailed
3. Appropriate planning to identify the agency that will be designated as the statewide geospatial office and outlining of their responsibilities for statewide mapping coordination

B. **Long-term:** Legislation to solidify and sustain the Council and statewide mapping coordination program

3 PROGRAM BENEFITS & JUSTIFICATION

3.1 THE BUSINESS CASE FOR STATE **ELEVATION DATA**

3.1.1 High Profile Examples of How Elevation Data is Beneficial

- In 1997, the New Year's flood due to the "Pineapple Express" storm event caused nearly $650 million in damage in western and northern Nevada. Major flooding also occurred in 1986, and 2005 – and it will happen again. Enhanced elevation data can't prevent the inevitability of storm events, but it can certainly help to better prepare the state for such storms, and mitigate the potential damage. Subtle and dramatic changes in elevation and surface type are indicators of where water will flow. Better elevation data can significantly improve flood inundation modeling and estimating, which can improve site selection for economic development and reduce losses from damaged property when exceptionally wet weather hits. Better data can also contribute to wise protection

strategies for vulnerable areas, while identifying areas of high growth potential. This is an example where better **elevation data can support the objective of *cost avoidance* associated with emergency preparedness and damage mitigation**.

About 53.2 square miles of the Carson River Basin were flooded during the 1997 flood. West and north of State Route 88, floodwater from the East Fork spread laterally over an extensive area of central Carson Valley and joined floodwater that was spreading northward and eastward from the nearby West Fork. The combined floodwater formed a lake across the valley floor 2 to 3 feet deep, overflowing Muller Lane. (***Source:*** USGS Nevada Water Science Center, Carson City, NV)

- By some estimates, the Clark County area could easily sustain a billion dollars in damages from severe flooding. For official damage estimates from the 1997 flooding and related risks, see the "Carson River Watershed Regional Floodplain Management Plan (2008)" at the following link: http://cwsd.org/newcms/Admin/ProjectFile/Final%20Draft%20floodplain%20plan%207-08.pdf

- In 2012, plans were announced by Apple to build an iCloud Data Center east of Reno. More recently, an announcement was made of their plans to work with Nevada Energy and SunPower on a solar panel farm to provide 18-20 megawatts of electricity for their data center. These are parts of Apple's plan to invest billions of dollars in northern Nevada over the next 10 years. Not only is Nevada's favorable tax climate a positive factor, but also the availability of land and energy. In the future, better elevation data to support site selection and reduce construction costs can be an incentive to other firms investing in the state. This is an example where better **elevation data can contribute to *revenue generation* from economic development** and can help avoid costs from poor siting decisions.

- Currently, Governor Sandoval's Task Force on Sage Grouse is analyzing the best practices for addressing the issues surrounding this species, to keep it off the U.S. Fish & Wildlife Endangered and Threatened Species List. Historically a game species in the state, it is now being closely studied for impacts to its habitat, such as cheat grass (drooping brome) and pinyon juniper encroachment, as well as man-made developments. Better elevation data would help in the determination of both natural and man-made factors on the habitat of this species, thereby improving input to potential management strategies. If the state and its neighbors are not successful in this endeavor, the opportunity cost will be very high on future economic development. Better **elevation data can contribute to an *enhanced understanding* of sage grouse habitat and the factors that impact it.**

3.1.2 Statewide Approaches Yield Economies-of-Scale

In addition to the benefits mentioned above, there are the tangible economies from a coordinated statewide approach to getting better elevation data. In particular, lower costs of procuring elevation data can be realized, including:

- Fewer isolated parties paying premium prices and redundant procurement costs, when multiple parties consolidate their procurement efforts
- Lower cost per square mile for data capture when project areas are combined for greater economies-of-scale; a large region of multiple counties might enjoy the same economies-of-scale as the entire state, potentially, depending on its size
- Greater multi-use potential and ROI when specifications are coordinated – i.e., the more such data is used, the greater the cumulative benefits

3.1.3 The Value of Elevation Data to Multiple Applications

Technological advances (i.e. LiDAR) make measuring elevation easier, faster, and less costly than previously possible. While not a replacement for terrestrial survey on the ground, it is significantly less expensive for capturing elevation data for large areas. The value of LiDAR data is perceived to be greater than just enhanced elevation alone, since it can capture other useful data above the bare earth, such as objects on the earth's surface (e.g. trees, buildings, towers, transmission lines, etc.). Nationally, the trend in cost has been very favorable for LiDAR projects, with competition in the marketplace working to the consumer's advantage, and increased volume of work allowing providers to lower prices due to greater economies-of-scale.

Safety and economic benefits from enhanced elevation data are expected to accrue from its use in county assessing and appraisals, insurance, geothermal development, natural resources, and transportation, to name several examples. Others include siting and monitoring pipelines and transmission lines, and solar and wind energy siting. Based on actual projects to collect and utilize high-resolution elevation data [see Appendix B listing and map of LiDAR projects], the value of enhanced digital elevation data has been tested and proven in Nevada for a range of beneficial applications, broadly grouped into the following categories:

1. Geology, including energy development and mineral extraction

2. Natural resources, wildlife conservation, habitat restoration
3. Flood mapping, seismic hazards, and emergency response
4. Transportation projects, such as road and bridge construction and repair
5. Economic development and regional planning, such as site-selection for industrial plants

1. <u>Geology, including energy development and mineral extraction</u>
    - Geothermal energy has big commercial applications in Nevada, and is viable in certain areas with really hot water and related geologic features that could be more easily located with better elevation data – e.g. LiDAR can be used to find features such as the location of wellhead structures, pits, fault scarps, bevels, and erosion that can be indicators of sites suitable for geothermal projects
    - Every county has active faults, and could benefit from enhanced elevation data for both hazardous risk assessment and economic development opportunities
    - Mining claims and lease management can leverage both elevation data and parcel data for better delineation
    - The big international gold mining companies, such as such as Newmont Mining, Goldcorp and Barrick Gold Corporation, use high-resolution elevation data for measuring the topography of their open pit mines, and reclamation projects
    - Geologic mapping performed by the Nevada Bureau and Mines and Geology and Nevada Division of Minerals directly supports this exploration and economic development activity, and LiDAR supports geologic mapping by both state agencies and the exploration companies

3D Immersive Model of a Canyon in Idaho from Ground LiDAR
Image Source: AppGeo c/o Virtual Reality Lab, University of Wyoming, Laramie, WY

2. Natural resources, wildlife conservation, habitat restoration
    - Elevation data is used for habitat studies, including slope and aspect analyses; for example, some species are restricted to certain elevation characteristics, and knowing elevation, slope, and aspect helps to predict where certain species can be found, including some rare species of plants and animals, and others that are candidates for protection
    - In addition to the sage grouse, other species of interest in Nevada include the desert tortoise, pygmy rabbits, bats, butterflies, and certain flowers, such as the southern Nevada bear poppy
    - Elevation data helps to identify ground disturbances, such as earth removal, which can occur when new projects are built, such as solar power transmission or new mining operations; the federal NEPA process requires assessment of such impacts
    - Enhanced topography and landform data from LiDAR can help find landforms and/or other subtle harder-to- terrain features that are potentially be important indicators of where species habitat can be found
    - For certain targeted studies, better elevation data would be helpful, such as "on-the-ground" habitat restoration projects
    - Conservation easement management can benefit from LiDAR for encroachment studies, monitoring, and discovering disturbances
    - Finding features such as wet meadows is easier with LiDAR; such meadows can be an indicator of restricted drainage, or important habitat
3. Flood mapping, seismic hazards, and emergency response
    - Hazard risk assessment
        - Flood preparedness and damage mitigation
            - Federal Emergency Management Agency (FEMA) flood mapping
            - Flood inundation modeling and estimating potential damages (see Hazus-MH, below)
            - Smart growth
        - Fire preparedness and damage mitigation
            - Estimating fuel on forest floor
            - Real property risk assessment
            - Predicative modeling – e.g. what are the characteristics of "islands" that don't burn?
        - Earthquake preparedness and damage mitigation – LiDAR can be used to find geologic features such as young fault ruptures that might indicate potential earthquake risk, and can be used to detect earth movement along faults
        - Predicting landslides
        - Measuring groundwater withdrawal effects (e.g. subsidence)
        - Identifying areas of potential liquefaction, and swelling clay
        - Identifying abandoned mine dangers (e.g. cave-ins)
    - Establishing warning and evacuation areas based on population, property, and elevation
    - Planning setbacks from faults and flood prone areas
    - Change detection, such as slope erosion and dam deformation

- Running Hazus-MH[2] models

The general range of historical damaging earthquakes in Nevada is from 6.5 to 7.5 magnitude on the Richter scale. Possible economic losses ranged from about $280,000 in Goldfield to $8.8 billion in Las Vegas. These are only crude, order-of-magnitude estimates. That is, any given number may be off by a factor of as much as 10, although HAZUS model runs for real earthquakes in recent years have been within a factor of two. Significant potential economic losses, on the order of tens of millions of dollars, are indicated for most communities in Nevada. Potential major building damage per event ranges from four buildings (in the Goldfield region) to 30,000 buildings (in the Las Vegas area). Unfortunately, an accurate inventory of building stock is not available and therefore statistical estimates were used.

Sources:
https://www.hsdl.org/?view&did=682492
http://www.nbmg.unr.edu/dox/of061/of061.htm

4. Transportation projects
   - Proven potential to expedite the planning and location design stages of transportation projects with time and cost savings through faster, less costly data collection on large corridors
     - Construction project planning benefits from enhanced elevation data
     - Design and evaluation of alternative alignments and grades for potential corridors is less costly with LiDAR than traditional ground surveys for initial terrain models
   - Drainage and erosion studies benefit from enhanced elevation data
   - Shoulder and slope retention
     - Identifying landslide and rockslide risk
     - Developing mitigation plans
   - Off-road vehicle management
   - A study done by the Washington State DOT and Oak Ridge National Laboratory on an Environmental Impact Study (EIS) for the I-405 Corridor determined that a 2-year project using traditional methods could be reduced to 8 months using LiDAR, as reported by the National Consortium for Remote Sensing in Transportation – Environment (NCRST-E)
5. Economic development and regional planning
   - Making good site selection decisions
     - Finding sites suitable for renewable energy, such as wind and solar
     - Siting transmission lines for renewable energy
     - Finding sites with no flooding or seismic hazards

[2] Hazus-MH (Multi-Hazards), from the Federal Emergency Management Agency (FEMA), is a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. Hazus-MH uses Geographic Information Systems (GIS) technology to estimate physical, economic, and social impacts of disasters. It graphically illustrates the limits of identified high-risk locations due to earthquake, hurricane, and floods.

- Delineating impervious surfaces for run-off calculations and heat effects
- Cultural resource management, such as discovering historic earthworks or other evidence of early inhabitants, to enhance interest in Nevada for additional tourism
- Livestock ranching and grazing interests relative to elevation sensitive species

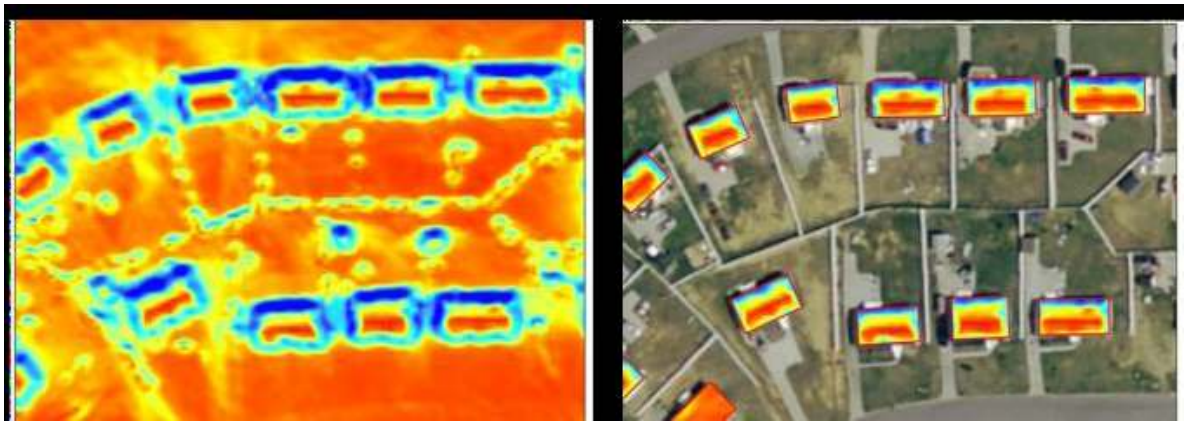


Image showing solar radiation on rooftops derived from LiDAR
(Source: Oak Ridge National Laboratory)

3.1.4 Economic Benefits

When compared to traditionally available elevation models and contours – most of which are over a decade old and coarse – **enhanced elevation data captured with modern technology will be an economic asset**. There are both direct and indirect economic benefits from enhanced elevation data, such as:

- The successful siting of a new facility will generate tax revenues and create jobs
- Improved public safety from smarter development in landslide or flood prone areas can save lives and avoid the high cost of damage to property
- Avoiding damage from hazardous seismic events can also save money and lives

The experience of other states across the country indicate a very positive return on investments made in the acquisition of enhanced elevation data. While an exhaustive study of how other states are funding and managing their programs is beyond the scope of this study, here are some **examples of states with statewide coordinated programs for acquiring enhanced elevation data with LiDAR** -- including Kansas and Tennessee, whose programs were initiated with an FGDC-funded business plan, not unlike Nevada's approach:

- Iowa
- Kansas
- North Carolina
- Pennsylvania
- Tennessee

- Utah

All claim a positive return on investment (ROI) on spending for high-resolution LiDAR data, and a cost savings when compared to traditional methods of acquiring enhanced elevation data. The **ROI multipliers range from a conservative 2.4 times on the low-end (NC), to a bullish 22 times on the high-end (PA).** In all cases, better flood modeling was a key driver.

4 REQUIREMENTS FOR SUCCESS

4.1 REQUIREMENTS FOR CREATING & DISSEMINATING STATEWIDE ELEVATION DATA

Various perspectives on requirements were voiced during the interviews and workshops. There was not a consensus that there should be central repository for managing and disseminating data, but there was **common interest in streamlining procurement, specifications, and sharing**. Infrastructure, governance, coordination, and interoperable products – i.e. the business considerations for producing enhanced elevation data, statewide -- need to be addressed for there to be success.

4.1.1 Procurement Streamlining

- Achieve efficiencies from economies-of-scale
- Identify and/or establish "blanket" procurement vehicles
- Be prepared to be opportunistic – e.g. "piggybacking procurements"
- Open lines of communication above and beyond word of mouth and email contact lists
    - Establish a "Trading Post" of some sort, like a "Craig's List" for LiDAR data for communicating opportunities to participate in projects for enhanced elevation data, through cost-sharing and requirements pooling -- more than just emails or word of mouth is needed (e.g. forming a "Google Circle" for communication on this topic, or some other kind of "LiDAR coalition")
    - Leverage existing LiDAR-focused clearinghouses such as OpenTopograhy.org and Lidardata.com to reach beyond the local level

4.1.2 Data storage requirements

- LiDAR data requires lots of storage!
    - Large, continuous datasets
    - Tile based storage requirements
- For a typical "5 deliverables" project (i.e. raw point cloud, classified point cloud, bare earth DEM, hydro flattening breaklines, and an intensity image) for QL 3 point density, the storage requirement is about **500MB/sq. mi. – around 20% of which is for the raw point cloud, approximately**

- For statewide LiDAR coverage at QL 3, **Nevada would require approximately 10-15 TB of storage** (rough order of magnitude), depending on final specifications and project area

4.1.3 Data dissemination requirements

- Nevada would need to decide on a tiling and dissemination scheme (e.g. Municipal, County or Watershed based)
- Requirements were expressed for web viewing, downloading actual datasets from a website, and shipping on physical media
- Depending on methods of dissemination, substantial bandwidth could be needed for disseminating LiDAR point clouds via Internet
- Some derivative products require very little bandwidth (e.g. contours, DEMs), and are within the capacity of existing infrastructure
- Multiple components of IT infrastructure would be needed (i.e. hardware, software, and network capacity) to support centralized warehousing and dissemination

4.1.4 Data capture requirements[3]

- For certain requirements, such as large-scale geologic mapping, a higher resolution of elevation data (i.e. Quality Level 1 or 2 is desired); and for some purposes, a relatively coarse resolution was said to be adequate (e.g. QL4 for small-scale cartography)
- For the goal of statewide LiDAR-based data, USGS Quality Level 3 (QL 3) -- i.e. capable of supporting 2-foot contour derivation – is a reasonable compromise between some of the higher resolution requirements and cost, if a compromise is needed; however the national 3DEP program (see below) calls for QL2, and may be a source of partial funding and contracting support
- From an historic perspective, the National Digital Elevation Program (NDEP) was established to promote the exchange of accurate digital land elevation data among government, private, and non-profit sectors and the academic community and to establish standards and guidance that will benefit all users. In May 2004, it published "Guidelines for Digital Elevation Data (Version 1.0)" – the link is below: http://www.ndep.gov/NDEP_Elevation_Guidelines_Ver1_10May2004.pdf
- NDEP is being superseded by the national **3D Elevation Program (3DEP)**, which is explained,

> The national 3D Elevation Program (3DEP) initiative is being developed to respond to growing needs for high-quality topographic data and for a wide range of other three-dimensional representations of the Nation's natural and constructed features. The primary goal of 3DEP is to systematically collect enhanced elevation data in the form of high-quality light detection and ranging (LiDAR) data over the conterminous United States, Hawaii, and the U.S. territories, with data acquired over an 8-year period. Interferometric synthetic aperture radar (IFSAR) data will be collected over Alaska, where cloud cover and remote locations preclude the use of LiDAR over much of the State. The 3DEP initiative is based on the results of the National Enhanced Elevation Assessment (NEEA).

[3]

below; the desired Quality Level being promoted by 3DEP is QL2

Quality Level	Elevation Source	Point Density	Nominal Pulse Spacing	DEM Post Spacing	RMSEz in Open Terrain	Equivalent Contour Accuracy
QL 1	LiDAR	8 pts/m^2	0.35 m	1/27 arc-sec (~1 m)	9.25 cm	1-ft
QL 2	LiDAR	2 pts/m^2	0.7 m	1/27 arc-sec (~1 m)	9.25 cm	1-ft
QL 3	**LiDAR**	**1 – 0.25 pts/m^2**	**1 – 2 m**	**1/9 arc-sec (~3 m)**	**≤18.5 cm**	**2-ft**
QL 4	Imagery	1 – 0.04 pts/m^2	1 – 5 m	1/3 arc-sec (~10 m)	46.3 cm – 139 cm	5 – 15 ft
QL 5	IFSAR	0.04 pts/m^2	5 m	1/3 arc-sec (~10 m)	92.7 cm – 185 cm	10 – 20 ft

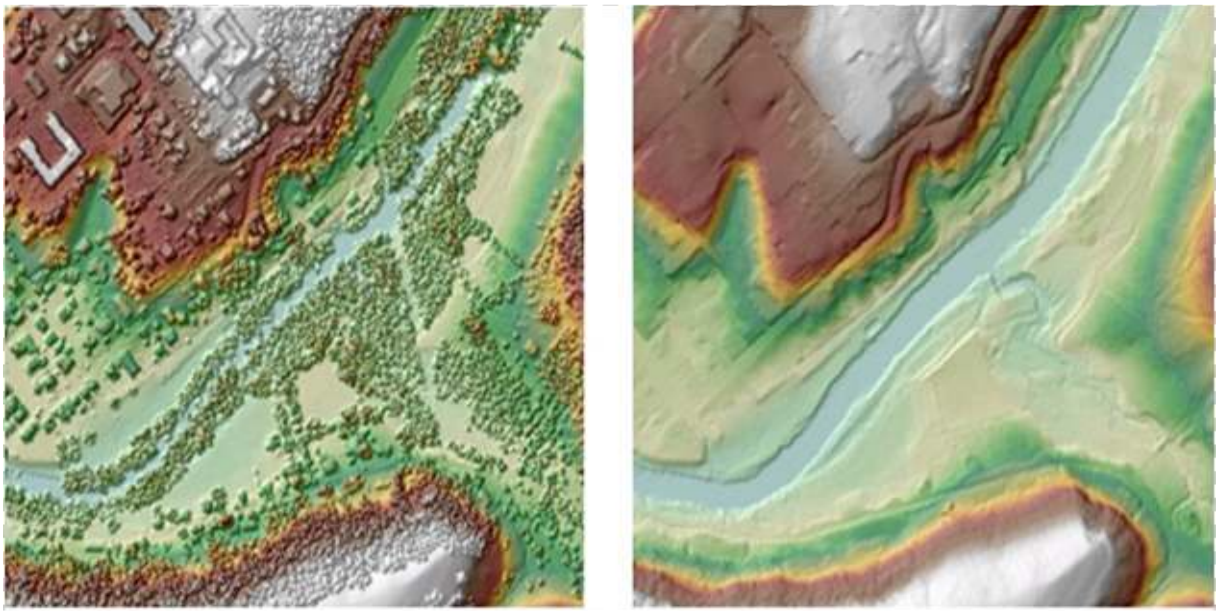
- Based on input from stakeholders, a combination of specifications is desired, including:
  - FEMA's high quality topographic specifications
  - United States Geological Survey (USGS) LiDAR Base Specification v1.0 – see: http://lidar.cr.usgs.gov/
- For reference, the State of Tennessee produced a technical specification document for enhanced elevation data with LiDAR, as a precursor to bid documents, with potential applicability to Nevada – *see:* https://www.google.com/webhp?hl=en&tab=mw#hl=en&q=Tennessee+LiDAR+specification

4.1.5 Potential Data Products and Derivatives

This is dependent on the type of elevation data collected. It is not the purpose of this study to prescribe specific products. Derivative products such as intensity, normalized heights, slopes, and aspects could

be specified if needed for certain purposes. The raw data (LAS[4] files, stereo pairs, discrete image return points) could be specified, too.

- Point Clouds
- Digital Elevation Models (DEMs) and Surfaces
  - First Return
  - Last Return
  - Bare Earth
- Intensity Images
- Contours
- Shaded Relief
- Extracted Features
  - Tree Canopy
  - Buildings and Structures
  - Impervious Surfaces



Hill-*shaded representations of a first return surface on the left, and a bare earth model on the right*
Image Source: AppGeo c/o Gloucester, MA

4.1.6 Other Requirements and Considerations

- Feature extraction priorities
- Historical, change detection potential

[4] The LAS file format is a public file format for the interchange of LIDAR data between vendors and customers, defined by the American Society of Photogrammetry and Remote Sensing (ASPRS).

- Casual users vs. in-depth users, in terms of application requirements
- Geomorphic metrics and visualization requirements
- Need to consider the software and workstation limitations when creating larger aggregated datasets that may include LiDAR data
- NDOT needs high resolution elevation data in both MicroStation and Esri formats; both read TIFFs and IMG, and LAS files can be used or imported in both software packages
- NDOT would prioritize data capture along state ROWs for roadway projects
- The Department of Conservation & Natural Resources expressed a requirement for applying better elevation models to geo-rectify historical aerial photos, or to improve ortho-rectification of current imagery with higher resolution DEM from LiDAR data
- Geodetic control is an important consideration in elevation projects; mixing geodetic systems or using poor control can severely affect the precision and accuracy of the data -- this is very important in a tectonically active area such as Nevada

4.1.7 Hosting Alternatives

- Host at NDOT
  - *Pros:* Major stakeholder and subject matter expert
  - *Cons:* Primarily interested in transportation corridors
- Host at Bureau of Mines & Geology
  - *Pros:* Major stakeholder and subject matter expert
  - *Cons:* Resource constraints
- Host at Keck Library
  - *Pros:* The current de facto Clearinghouse for statewide geospatial data
  - *Cons:* Resource constraints
- OpenTopography facility at the San Diego Supercomputer Center (SDSC), funded by the National Science Foundation (NSF) – their website URL follows: [http://opentopo.sdsc.edu/gridsphere/gridsphere?cid=datasets]
  - *Pros:* Existing infrastructure and expertise is in place
  - *Cons:* Outside of state control
- Federal agency, i.e. on the "Geospatial Platform"[5]
  - *Pros:* Potential to leverage Federal investments in infrastructure
  - *Cons:* Outside of state control
- Infrastructure as a Service (IaaS) on the Cloud
  - *Pros:* "Pay for what you use" with scalability, performance, and reliability
  - *Cons:* Someone has to stage the service, unless it is already set-up by the Cloud vendor

[5] The "Geospatial Platform" is a managed portfolio of common geospatial data, services, and applications contributed and administered by trusted sources and hosted on a shared infrastructure, for use by government agencies and partners to meet their mission needs and the broader needs of the Nation. See: https://www.fgdc.gov/initiatives/geospatial-platform

4.2 ORGANIZATIONAL APPROACH

Without a single focal point for coordinating a statewide procurement of enhanced elevation data, each agency that requires LiDAR data and enhanced elevation products will likely budget to fulfill their own mission requirements, and not achieve economies of scale or non-redundant investments across agencies. For the time being, both **the current planning effort and next steps are being coordinated by the volunteer-based Nevada Geographic Information Society (NGIS)**, which serves as a "coalition of the willing" as far as voluntarily working toward shared goals that support a multitude of needs. The greatest need is to **establish a sponsor and custodian for a statewide geospatial program**, and the options are:

- ***Long-term:*** Establish a **State Geospatial Information Office** (or the equivalent) as a new statewide function for coordinating all geospatial data, including elevation data
- ***Short-term:*** Give the responsibility and funding to an **existing agency** as an additional function **to provide administrative staff, technical staff, and infrastructure** for handling elevation data (unless the Geospatial Information Office is put under such a designated agency, with responsibility for more than just elevation data) -- candidates who expressed potential interest in a custodial role for elevation data include:
    - Bureau of Mines & Geology: State Geologist
    - Department of Transportation: Geodesy Division
    - The Keck Library, University of Nevada at Reno (UNR)

Many states have a GIS office for coordinating statewide geospatial data, including elevation data. For example the Utah Automated Geographic Reference Center (AGRC) has a long and successful history in this role, supporting state agencies and the public by collecting, archiving, and distributing geospatial data. Many state agencies in Utah have strong GIS programs, too, focused on their own mission requirements. *See:* http://gis.utah.gov/data/

An example of the latter approach, where a specific department is responsible for LiDAR data, but not all geospatial data, would be the Oregon Department of Geologic and Mineral Industries (DOGAMI), which is responsible for LiDAR data collection, archiving, and distribution for public domain LiDAR data in Oregon – *see:* http://www.oregongeology.org/sub/projects/olc/ . Outside of DOGAMI, the State of Oregon has a Geospatial Enterprise Office (GEO) that hosts a Geospatial Data Clearinghouse, which is an electronic library for geospatial data – *see:* http://www.oregon.gov/DAS/CIO/GEO/pages/index.aspx .

4.2.1 Budget Requirements

The good news is that the cost of LiDAR data capture has significantly dropped in recent years, to about half of what it was just a few years ago. This trend is not expected to continue at a steep slope, but there continue to be advances in the technology that lower the cost of raw data acquisition. Some recent pricing "rules of thumb" from conversations with the vendor community are as follows:

Data Acquisition and Product Generation:

- Vendor estimates range between **$95 and $125 per square mile for "bare earth"** terrain model data capture at USGS QL 3 (i.e. suitable for deriving a 2-foot contour interval), for areas that exceed 10,000 square miles
- Nevada is 110,567 square miles, so using the numbers above, **the cost (rough order of magnitude) of QL 3 LiDAR for the entire state would be about $10-$13 million (**as much as 3 times more estimated for QL2)
- The cost is more per square mile for smaller areas, up to 2X for areas less than 5000 square miles (i.e. up to $250 per square mile)
- Products derived from this terrain model, depending on the **specifications for additional products, can increase the cost per square mile by a factor of 3 to 5**; while these costs have not been trending down as fast as raw data capture costs, people's perception of what they need is changing with products from LiDAR – for example, with an accurate and versatile terrain model, the need for contours (which are a generalized view of such a model) has diminished
- Cost-sharing on statewide elevation is viable, according to most stakeholders interviewed
- To economize on a statewide program, there could be some differentiation in the specifications, depending on needs (e.g. rural vs. urban, or mountainous vs. flat)
- Higher accuracy QL **buy-up options can be made available where the need for better data is strongest**
- An incremental approach can be taken, to spread-out spending (e.g. Kansas and Tennessee are both taking this approach)

Hardware and Software Infrastructure Costs:

- Any assumption that the volume of data associated with LiDAR and enhanced elevation data can be easily handled on existing infrastructure is risky, unless there is considerable unused or underutilized capacity readily available and suitable for the data volume, processing, and bandwidth requirements, including **back-end storage and computational resources**
- Assuming that there is not considerable unused or underutilized capacity, the State needs to determine whether or not to make capital investments in such capacity, or treat it as an operating expense and pay for capacity, such as subscribing to **Infrastructure as a Service (IaaS)** on the Cloud, to establish a production-quality online portal to serve all user communities – typical components include:
    - *Infrastructure Tier:* Server resources with large disk capacity, software, and data management system, including data archiving and back-up
    - *Services Tier:* Web services to provide access to software components and data, including point cloud access
    - *Application Tier:* Browser-based graphical user interface (GUI) to workflow-oriented functionality for data manipulation and visualization
- For reference, there is a public cloud hosting contract with the Western States Contracting Alliance (WSCA); it is a cooperative contract, whereby participating states are looking to

leverage cloud solutions for cost efficiencies, flexibility, and scalability -- *see:* http://www.govapps.us/WSCA.html

- Costs will vary depending on the alternative(s) chosen, but a rough order of magnitude budget recommendation would likely be in the range of **$150-250,000 for start-up costs, and annual recurring costs of 25-75% of the start-up investment**, depending on the alternative
    - If capital investments are made, then a technology refreshment budget would be needed, comparable to the start-up investment, at least for hardware components
    - If the IaaS subscription approach is taken, the annual operating costs will be comparable to the periodic capital investments when averaged-out over the same period of time, but with the highly-valued advantages of scalability, higher performance and reliability
- Investments in desktop computers and software may be considered desirable by various departmental users, but are viewed in this plan as independent of a statewide approach

Human Resources:

There would be organizational economies-of-scale if resources were concentrated in a Geospatial Information Office, whereby certain functions such as leadership and administrative support could be shared, rather than duplicated for individual data layers. **People could be reassigned from other jobs** if coordinating statewide elevation data is deemed to have a higher priority than their current duties. If existing people were reassigned to serve these roles, there would not necessarily be new costs, other than the trade-off of dropping other duties. **If reassignments are not practical, then there would be a need for additional staff and investment in salaries and benefits, or contractor support**. The following roles need to be served, to one degree or another:

- *Leadership:* A functional manager to lead, coordinate, plan, control, and provide resources for the effort
- *Technical Staff:* Geospatial professional(s) knowledgeable in hands-on operation of hardware and software specific to handling LiDAR data
    - Data base management and infrastructure support (e.g. data storage and access services)
    - Application development (e.g. workflow-oriented solutions to solve business problems)
    - Elevation product generation (e.g. geomorphic metrics and visualizations)
    - Product dissemination an website management to share elevation data and derivative products
- *Administrative Staff:* To support leadership and technical staff on procurement matters and other administrative functions

4.3 ASSESSING RISK

In general, the lack of coordinated geospatial programs for Nevada is risky business from the standpoint of the increased likelihood of:

- Unnecessary spending on duplicate efforts and higher costs for geospatial data and products
- Poor development decisions based on inadequate maps, and related property loss and/or higher insurance costs that citizens end-up paying

- Missed opportunities that might have been discovered if better data was readily available

In terms of enhanced elevation data and products, specifically, the following risks are currently absorbed by the State and its citizens:

- The accuracy of flood models and seismic hazard models are limited to the quality of the available elevation input data
    - The opportunity to reduce losses from future damages from flooding or seismic events is much smaller when depending on old, coarse data
    - The risk to public safety and property remain higher than necessary without more accurate data and predictive models
- The quality of available elevation data increasingly varies across the State from uncoordinated projects, and the opportunity to achieve economies of scale and standardization is lost, resulting in more spending on duplicate efforts and higher per square mile prices for smaller areas, in lieu of a coordinated statewide approach

5 IMPLEMENTATION PHASING & MILESTONES

5.1 PHASING

In the absence of a state-level program being in place, decisions still need to be made on an incremental approach, and this is currently being coordinated by the volunteer-based Nevada Geographic Information Society (NGIS). Soon, a **state agency should be designated to take the lead on coordinating** statewide elevation data. A coordinated approach to enhanced elevation data in the short-term should include a **prioritization scheme for data development**, such as:

- County-by-county
- Watershed-by watershed
- Sector-by-sector
- Region-by-region
- Risk factors, such as seismically active areas or areas where the combination of seismic activity and population was a consideration

Once the prioritization scheme is decided, start with **pooled-funding for a pilot project as a test-run for technical specifications, products, and other project parameters and deliverables**. The following high-level timeline is suggested:

- **Short-term:** Leverage the NGIS "coalition of the willing" and designate a state agency to take the lead on coordinating statewide elevation data
    - Create a federation of experts to **design and build a web-based project clearinghouse** to enhance communication in the short-term on who is doing what in terms of LiDAR data, leveraging existing communication forums as feasible
    - Clearinghouse components should include a repository for contributed data, data footprints, mission planning and pooled-funding pages

- **Long-term:** Legislation to **solidify and sustain a statewide mapping coordination** program, and work toward the creation of a State Geospatial Information Office when practical and opportune

5.2 MILESTONES

The phasing described above carries with it some implications for milestones. These milestones are recommendations, but as they are refined and achieved, they will show progress toward the implementation of this plan:

- **Promulgate the business plan and educate officials as to its importance.** So far, the plan has been developed by geospatial experts. The benefits of enhanced elevation data lie in its use, not in simply having it. Consequently, an important milestone is to create an education plan and materials for policy makers, so that they understand clearly the importance of coordinated efforts for geospatial data. Policy makers should include state government staff, legislators, and local government officials.
- **Define a pilot project and execute it.** As described above, a successful coalition pilot project will highlight the value of a common strategy and method for data acquisition and sharing. It will also find areas that need improvement in order for shared data projects to succeed.
- **Design and create an initial data-exchange and shared acquisition planning clearinghouse.** By creating an on-line mechanism for data sharing of existing geospatial information, Nevada as a whole can eliminate data redundancy. It also builds relationships between providers and consumers. The same on-line location should provide organizations with a place to advertise proposed data missions and seek partners for them.
- **Craft a model mechanism for governance and coordination of elevation data at the statewide level**. A model plan for coordination needs to be designed with policy makers. This may become a blueprint for legislation, for agency policy, or for both. The model mechanism should state the means, tools, methods, and governance needed to have a coordinated elevation data program within Nevada, including how the program will be overseen, funded, and housed. This may take the form of a State Geographic Information Office, a designated agency, or some other arrangement.
- **Report annually on achievements.** This is an important, yearly, milestone. Each year, the governance "group" – whoever it may be – needs to publish achievements during the prior year and goals for the coming year(s).

APPENDIX A: BUSINESS PLANNING METHODOLOGY

The AppGeo Project Team were working on the business plans for Elevation and Parcel Data in parallel. The following activities pertain to the Elevation business planning conference.

NGIS Survey of Elevation Stakeholders

- This was conducted by NGIS in the early fall of 2012, independent from this project, as an input to the planning process

Teleconferences with the NGIS Steering Committee

- A series of teleconference were conducted between October 2012 and March 2013 on project approach and discussion of the situation in Nevada for Elevation and Parcel Data

Interviews with Stakeholders and Subject Matter Experts (SMEs) on Elevation Data

- Interview notes were provided to the NGIS Steering Committee, separately

TELEPHONE INTERVIEWS			
Person	**Organization**	**Contact Info**	**Date of Interview**
Carter, Chas	Dept. of Transportation	775-888-7482	2/15/13
Hinz, Nick	Bur. of Mines & Geology	nhinz@unr.edu 775-784-1446	
Johnson, Janel	Dept. of Cons. & Nat. Res. Natural Heritage Program	jdjohnson@heritage.nv 775-684-2911	2/12/13
Mauldin, Jennifer	State Mapping Advisory Council	maudlin@unr.edu 775-682-8759	2/12/13
Opperman, Luke	Dept. of Cons. & Nat. Res. Division of Water Resources	775-684-2826	12/13/12
Snider, Stephanie	Dept. of Cons. & Nat. Res. Div. of Enviro. Protection	775-687-9328	2/13/13
Van Dellen, Chet	Dept. of Wildlife	775-688-1565	2/12/13
Watermolen, John	Dept. of Cons. & Nat. Res. Div. of Forestry	jwatermo@forestry.nv.gov 775-684-2530	2/15/13

Workshops with Stakeholders and SMEs

- Invitations and sign-in sheets coordinated by NGIS representative(s)
    - Elevation Forums in Reno and Carson City, NV, April 12, 2013
    - Elevation Forum in Las Vegas, NV, May 2013

NGIS Conference

- Presentation on initial Findings & Recommendations at NGIS Annual GIS Symposium in Reno, NV, May 2013

APPENDIX B: INVENTORY OF EXISTING LIDAR DATA

LiDAR Projects in Nevada with Publicly Available Data as of May 2012
(Interagency Elevation Inventory c/o USGS Geospatial Liaison)

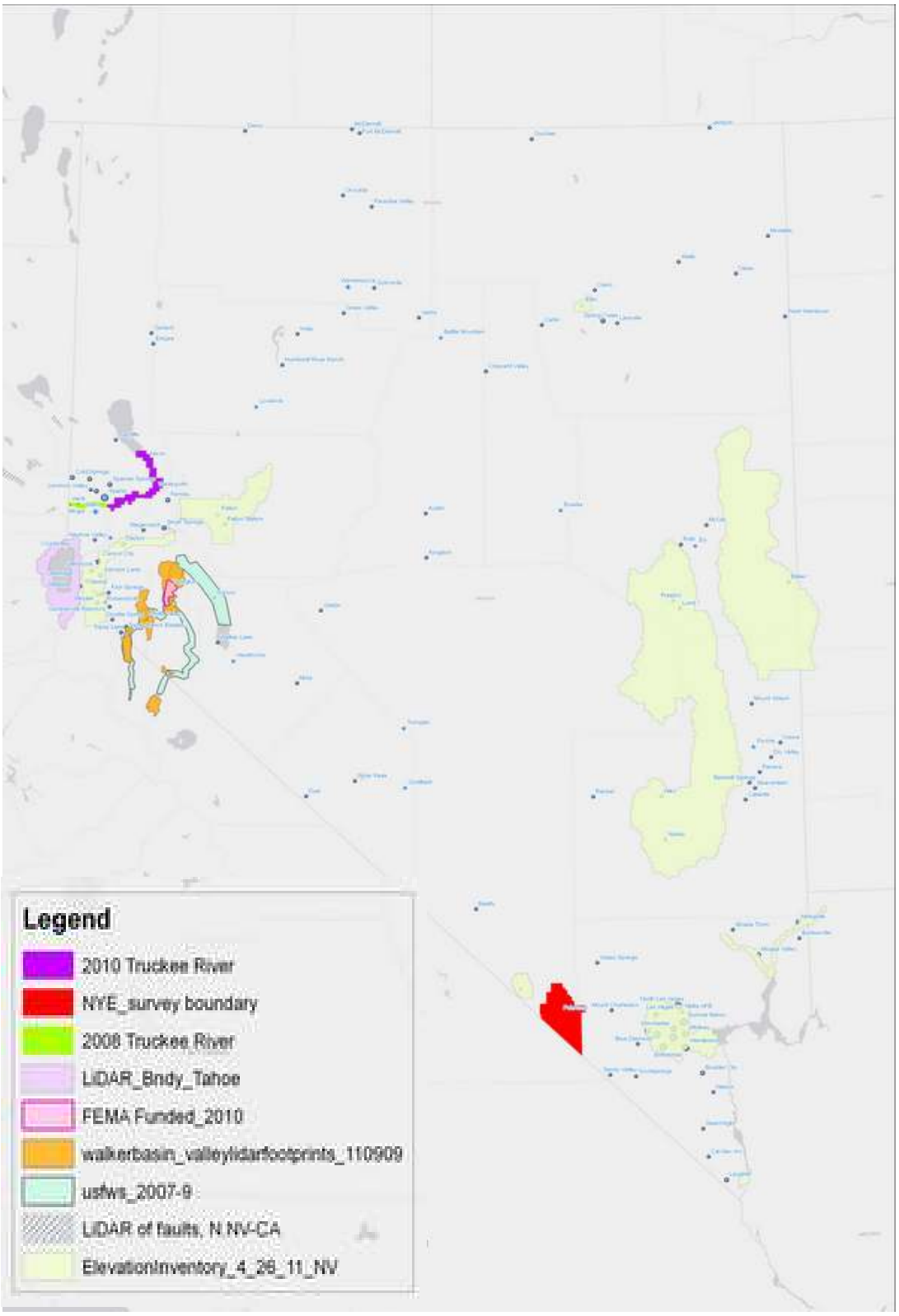
Project Name	Data Type	Collection Year	Project Status	Point Of Contact
Spring Valley	Lidar-Topo	2007	Complete	Southern Nevada Water Authority, (702)862-3400; Craig Hale
White River	Lidar-Topo	2008	Complete	Southern Nevada Water Authority, (702)862-3400
Ash Meadows National Wildlife Refuge	Lidar-Topo	2008	Complete	US Fish and Wildlife Service Las Vegas Field Office, (702)515-5230
Muddy and Virgin Rivers	Lidar-Topo	2008	Complete	Southern Nevada Water Authority, 702-862-3400
Las Vegas	Lidar-Topo	2010	Complete	Southern Nevada Water Authority, (702)862-3400
Laughlin	Lidar-Topo	2008	Complete	Southern Nevada Water Authority, 702-862-3400
Tahoe Basin SMPLA	Lidar-Topo	2010	Complete	Toby Wellborn, USGS, 775-887-7671
Newlands/Stillwater	Lidar-Topo	2011	Complete	Bureau of Reclamation Lahontan Basin Area Office, (775)882-3436, Fish and Wildlife Service Las Vegas Field Office, (702)515-5230
Floodplain Areas of entire Carson River Watershed above the Lahontan Reservoir (Alpine, Carson City, Douglas, and Lyon Counties)	Lidar-Topo	2004	Complete	Carson Valley Conservation District, (775)782-3661, x 112 Paul
Sierra Valley	Lidar-Topo	2010	Complete	Ryan Gold, USGS, Golden (303) 273-8633

Project Name	Data Type	Collection Year	Project Status	Point Of Contact
Lake Mead NV- AZ	Lidar-Topo	2009	Complete	Bureau of Reclamation; 702.293.8150; Steve Belew
Quinn River: NW Nevada: Modeling of Meander Channel Evolution	Lidar-Topo	2010	Complete	University of Virgina, Charlottesville
Truckee River 2008	Lidar-Topo	2008	Complete	USACE--JALBTCX (Joint Airborne Lidar Bathymetry Technical Center of eXpertise)
Truckee River 2010	Lidar-Topo	2010	Complete	US Army Corps of Engineers (USACE), Sacramento District
Yerington	Lidar-Topo	2010	Complete	FEMA, miphelp@riskmapcds.com
Walker to Walker Lake 2009	Lidar-Topo	2009	Complete	Tom Dilts, University of Nevada-Reno 775-784-1447
Walker River 2011	Lidar-Topo	2011	Complete	Tim Minor, Desert Research Institute, 775-673-7477
Walker River 2006	Lidar-Topo	2006	Complete	Tom Dilts, University of Nevada-Reno 775-784-1447

See map that follows for geographic distribution of these projects.

Map of LiDAR Projects in Nevada with Publicly Available Data as of May 2012, Courtesy of Nevada Geographic Information Society

(***Note:*** The purpose of this map is ONLY to show the relative location of the LiDAR projects)



APPENDIX C: ACKNOWLEDGEMENTS

This plan was produced by Applied Geographics, Inc. (AppGeo) of Boston, Massachusetts under contract to the Nevada Geographic Information Society, with funding from a Cooperative Agreements Partnership (CAP) Grant courtesy of the Federal Geographic Data Committee. Eric Ingbar of Gnomon, Inc, served as the volunteer project leader on behalf of the Nevada Geographic Information Society.

Gita Urban-Mathieux and Arista Maher at the Federal Geographic Data Committee provided gracious assistance and direction throughout the lengthy course of this work.

Carol Ostergren, USGS Liason for Nevada was immensely important in the development of this plan. She first highlighted its value, then suggested NGIS be the grant applicant. Carol was then coach and promoter of the grant application process. Throughout the study, Carol made herself available to assist in meetings, workshops, and document reviews. This study would not have happened without her.

The Steering Committee was a volunteer group – a coalition of the willing – dedicated to making this plan a reality. From conception to completion, these professionals made the business plan a reality.

Jeff Hardcastle, Nevada State Demographer
Carol Ostergren, USGS Liason, Nevada
Craig Palmer, University of Nevada, Las Vegas
Haroon Stephen, University of Nevada, Las Vegas
Jennifer Mauldin, Nevada Bureau of Mines and Geology
Holly Smith, Nevada State Lands
Moni Fox, Washoe County and Nevada Geographic Information Society
Luke Opperman, Nevada Division of Water Resources
Richard Wells, City of Las Vegas
Monica Lewis, Nevada Department of Public Safety
Toby Welborn, U.S. Geological Survey
Craig Hale, Southern Nevada Water Authority
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Eric Schmidt, Douglas County
Karen Michael, Nevada Secretary of State's Office
Matthew Krok, City of Henderson
Allison Maffei, Nevada Department of Administration
Jan Gould, City of Reno
Jonathan Price, Nevada Bureau of Mines and Geology
Gary Beekman, Washoe County
Mark Sappington, National Park Service
William Cadwallader, Nellis Air Force Base

The Nevada Geographic Information Society Board assisted in many ways, especially its presidents and treasurer during the completion of these plans. Moni Fox, Matthew Krok, and Gary Johnson of NGIS, along with the rest of the board, fully supported this work in many ways.

Last, but far from least, the many participants in meetings, workshops, and reviews of documents truly made this plan tangible. The faults are ours, but the inspiration and ideas come from them.

APPENDIX D: DOCUMENT HISTORY

Version	Brief Description	Date	Responsible Party
First Draft	Preliminary draft for team review and comment, with placeholders for additional content	8/3/13	AppGeo (Contractor)
Final Draft	Final draft for NGIS review and comment	9/30/13	AppGeo (Contractor)
Revisions	Marked-up version from NGIS for AppGeo revisions	12/03/13	NGIS
Revised Final Draft	Addresses the NGIS comments and edits	12/07/13	AppGeo
Final Deliverable	Addresses additional NGIS comments	12/11/13	AppGeo
Final Version To FGDC	Addressed comments by FGDC, added foreword acknowledgments	8/11/2014	NGIS (Ingbar)

Statewide Business Plan
For
Nevada
Geospatial Parcel Data

December 2013

produced by

AppGeo

This document was produced by Applied Geographics, Inc. (AppGeo) under contract with the Nevada Geographic Information Society, funded by a Cooperative Agreements Program (CAP) Grant from the Federal Geographic Data Committee (FGDC): NSDI Category 4 Cooperative Agreement G12AC20139

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FOREWORD

In the mid-1990's the United States outlined a conceptual framework for geospatial integration. The National Spatial Data Infrastructure, more commonly known as the NSDI, set both process and content targets for federal agencies and their collaborators. In the years since the establishment of the NSDI, spatial information has become faster and cheaper to acquire. Geospatial information has also exploded in to personal, business, and government spheres. The demand for geospatial information that is accurate, timely, and useful for individuals and organizations has never been greater.

Land ownership boundaries – parcel boundaries – are of interest and value to almost all of us. Although Nevada has less than twenty percent of its land area in private ownership, and thus may seem an unlikely place for property boundaries to be of keen interest, the very paucity of private land makes interest in its ownership all the greater. Nevada's rapid development, beginning in the early 1980's, has juxtaposed new land boundaries alongside 19th century property lines of uncertain spatial accuracy. As the state continues to court new residents and businesses, the ability for potential migrants to find appropriate property relies on digital means. Nevada's parcel maps – created and maintained by the County Assessor's Office in each of its 17 counties, have been translated (in some form) to digital data.

Parcel data has such a broad group of uses that one cannot characterize a single most important use. Suffice it to say that parcel geospatial data has many uses. However, in Nevada, it has just seventeen primary suppliers: Nevada's county governments. Each of Nevada's counties has approached digitization in a different way. Some counties have created digital parcel bases in multiple ways. Nevada's counties have a tradition of helping each other. This applies to technology change too. Yet, without a road map as to how each county benefits from creating digital parcel data, including who its consumers are and the forms in which they might like to use it, Nevada's county governments may not be able to produce datasets efficiently, to share them, or to maintain them after creation.

This business plan, sponsored by the Nevada Geographic Information Society, is our state's first attempt to lay out the concerns and needs of parcel data creators and consumers in a single document. The Nevada Geographic Information Society (NGIS) funded the plan through a grant from the Federal Geographic Data Committee.

- Eric Ingbar, Project Manager for the Nevada Geographic Information Society Board

EXECUTIVE SUMMARY

Parcel data are among the most versatile geospatial data sets. Not only are parcel data required for the efficient assessment and appraisal of property and the equitable administration of property taxes, but also they are critical to support issues such as economic development, public safety, public lands management and environmental protection. As such, there is tremendous demand for parcel information both from the public and government agencies. However, parcel data are created and managed at the county level and in order to obtain full parcel coverage for Nevada, it would be necessary to contact all 17 counties and navigate a variety of data sharing mechanisms and multiple fee structures. This Business Plan examines the premise and potential of creating a single, statewide parcel data resource that can serve both public and governmental needs.

Recognizing the importance of parcels the 76th Nevada Legislature enacted SB400 which mandates parcel data sharing between counties and the State Demographer to support Economic Growth and Employment. While SB400 has helped validate the importance of parcel data and has opened the door to greater data sharing it remains imperfect. This study identifies some of the existing shortcomings in SB400's early implementation and suggests corrective measures. The plan also documents the benefits that would accrue to Nevada from the availability statewide parcels including several use cases covering:

- Population and demographic studies
- Public safety and emergency response
- Natural resource management
- Regional planning and economic development

In spite of the potential, Nevada is somewhat hampered in its ability to pursue a statewide initiative involving large amounts of coordination with counties and other stakeholders. Unlike the large majority of other states (including all neighboring states), Nevada does not have a statewide geospatial coordination office. Such an office would be a logical partner to the State Demographer for pursuing this kind of activity. As such, this plan strongly recommends that Nevada establish such an office to help pursue this initiative as well as to help coordinate and implement other geospatial data and technology projects and activities.

The recommendations contained in this plan are split into two scenarios. The first scenario unfolds over a four year time horizon and represents the "ideal case" whereby a statewide geospatial coordination office can be established and will help manage this effort. The initiative is expected to require: standards setting, legislative changes (e.g., to SB400), initial collection and aggregation of statewide parcels from county contributions and the development of technology to support the maintenance, ongoing sharing and distribution of parcel data. The second scenario unfolds over a two year time horizon and represents "immediate, incremental next steps" that can move the state forward. Highlights of the second scenario include:

- Policy and implementation clarifications to SB400
- Linking the acceptance of Assessor Technology Fund grants to parcel data sharing with the state
- Development of a prototype parcel data sharing portal to demonstrate the feasibility and promise of broader parcel data sharing

1 INTRODUCTION

1.1 BACKGROUND ON GEOSPATIAL ACTIVITY IN NEVADA

1.1.1 Existing Conditions of **Parcel Data**

Nevada has no coordinated means for creating and sharing electronic map data for property parcels. While these data are available from most counties, and are supplied to the State Demographer under the 76th Legislature's SB400 on Economic Growth and Employment [hereafter "SB400", see Appendix C: Legislative References], these data are not used to their full potential in a systematic way.

From the perspective of Nevada's counties, parcel geospatial data is an important tool for managing property, for taxation, and for planning. However, each county's needs stop at its borders. From a county perspective, parcel geospatial information from other counties or at a statewide scale is not important for most needs. For many counties, especially Nevada's rural counties, maintaining parcel geospatial data is a significant challenge.

Challenges at the county level are an important part of the existing conditions of parcel data within Nevada and it is fully acknowledged that county information is an essential component of any larger (statewide, regional) data compilation. Some of the overall existing conditions at the statewide level include:

- Each of the seventeen counties creates and manages this information to serve day to day local needs
    - Not all counties have electronic parcel maps, but the large majority do
        - The funding support available for parcel maintenance varies and as mentioned above, rural counties have challenges with parcel data maintenance
    - There are no shared standards for geospatial parcel data
        - Quality and content vary from county-to-county
        - There are some discrepancies when edge-matching across boundaries
    - Nevada statute allows county-based cost-recovery for geospatial data under NRS239 [see Appendix C: Legislative References], but generally the amount of revenue collected from this is minimal, and most counties do not do it; notable exceptions are Washoe County (Reno) and Clark County (Las Vegas)
        - While Clark County still charges for *some* data requests, including parcels, they are increasingly distributing other data sets at no charge and foresee a time when they will cease the practice of charging for parcel data.
        - Washoe County has expressed a similar opinion regarding charging for parcel data

- Under SB400, each county with electronic maps provides this information to the State Demographer on an annual basis

    - Other agencies may request this data from the State Demographer
    - Under SB400, this information can *only* be used for **population research** and **economic development**
    - Information must be collected and aggregated from individual counties each time it is received and parcel data ages swiftly due to continual land transactions and sub-division
    - Once data are received by the state from the counties they become "confidential"
    - There is no easy access nor self-service nor automated data dissemination method
    - There is no easy method for counties to contribute data to the SB400 annual collection. Additionally, since the export is only annual, staff in some county offices have to re-learn the export process each year.
    - At present, no one is actively engaged in advocating for further citizen access to these data. Many counties provide access to their individual county's parcel records through map viewers, but there is often not a mechanism to obtain the data themselves, and it can be cumbersome to have to access multiple sites with different user interfaces. Ultimately, it is less likely that SB400 would be modified without active efforts and advocacy from those who need/want the data.

- As a result of the role created by SB400, the State Demographer is considered the *de facto* geospatial parcel coordinator by most state agencies, and the point person for coordinating with Counties; however:
    - While there is some state agency awareness of SB400 and the State Demographer's role, this awareness is not universal across all state agencies.
    - Many state agencies are still contacting the counties, directly
        - Based on existing relationships and old habits
        - Based on lack of awareness of SB400
        - Based on the need for getting parcel updates more often than once per year as is the case under SB400

- There remains some lack of clarity and consensus on the following elements of SB400:
    - Given that "economic development" is an extremely broad term, **what can state agencies legitimately do with parcel** data provided by counties under SB400? Almost all state activities can be linked to the notion of "economic development" in some way (e.g., improved public safety is a factor in promoting economic development; environmental protection is an element of managing economic development; etc.)
    - What does the term "**confidential**" mean in the context of SB400? Is it simply to preclude the state from distributing the county data to other parties? Or, does it imply a need to not reveal *any* of the data in public documents and/or maps?

- Computer Aided Mass Appraisal (CAMA) data (i.e., the attributes of parcels that include ownership and valuation information) is provided to Department of Taxation by counties and/or Advanced Data Systems, Inc. (ADS) of Carson City. ADS provides or supports the CAMA systems for 15 of the 17 counties in Nevada. The two counties that do not use ADS are:

    - Washoe County uses Manatron, Inc. for CAMA software
    - Clark County developed its own CAMA software

- A good example of state government requirements for parcel data comes from the Nevada Division of State Lands (within the Department of Conservation and & Natural Resources) which obtained raw parcel data from the State Demographer under SB400 and then aggregated and standardized the county parcel data using the FME tool set from Safe Software. This aggregation exercise did not do any edge-matching or fitting to control points. This work was driven by Federal support for Wild Land Fire strategy. The risk to real property from wild fires is a factor in response and mitigation strategy and parcel data helps to reveal the distinction between urban and rural real property.

- Another example of the importance of parcels in a state government setting is the large extent to which the Federal government, and also the state government own land in Nevada. As reported by the New York Times in March of 2012, the USGS 2004 Federal Property report identifies that 84.5% the land in Nevada is owned by the Federal government[1]. In spite of these types of reports, there is no precise tally of all governmental ownership in the state. A comprehensive, statewide parcel data set would enable this type of reporting, as well as mapping to identify *which* lands are under federal, state, or local government ownership.

- Consolidated parcel data are also important at scales less than statewide. For instance, the various conservation and irrigation districts throughout the state often straddle multiple counties. Conservation districts rely upon maps of land use, floodplain ownership, and places where water is withdrawn, used, and stored. Almost all of these characteristics can be attached to parcel data as attributes. Similarly, insect abatement and invasive species programs depend upon parcels across many counties in order to plan and stage projects.

- In general, Assessor's are amenable to working towards higher levels of consistency with their data, but "don't like anyone telling them what to do" by implementing strict standards. As one Assessor stated at the Assessor 2013 Spring Business meeting in Gardnerville : "don't poke us in the eye with standards, but *conventions* to iron-out data discrepancies are more palatable."

- There is no official "clearinghouse" for parcel data (or any other geospatial data) in the state. Historically, the Keck Library at University of Nevada, Reno has been a *de facto*, unofficial geospatial data clearinghouse, however, their activities have been limited by funding. The Keck Library at UNR has indicated they would have the *capability* and interest to house a statewide parcels data set, however, they would need financial support to take on this activity.

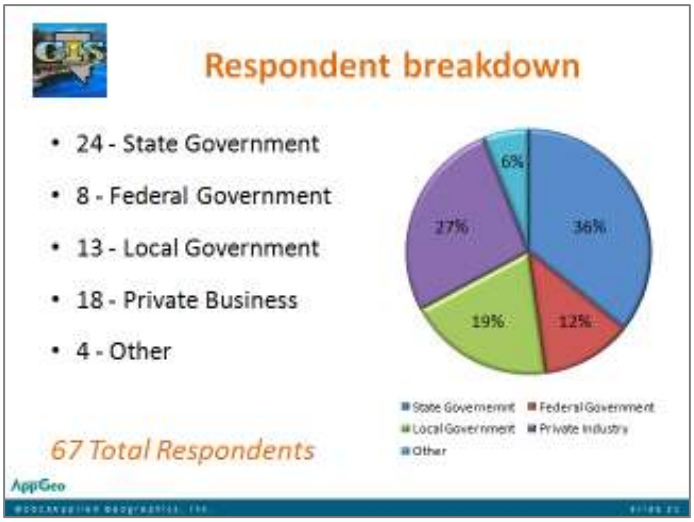
- There seems to be a general consensus among the participating stakeholders that Enterprise Information Technology Services department (EITS, formerly known as DOIT) is not part of the statewide parcel solution. This office is run on a cost-recovery basis and there is concern that their fees would be too high.

[1] See: http://www.nytimes.com/interactive/2012/03/23/us/western-land-owned-by-the-federal-government.html

- Statewide parcel data have also been collected and aggregated and are available from Michael Baker Corporation under license. These data are collected by Baker and are maintained on behalf of their customer AT&T. Direct inquiries on the availability of these data and the appropriate costs and licensing can be made to Baker's Reno office. At least one local government in Nevada has successfully negotiated a data use license via Baker and AT&T.

1.1.2 Nevada Geographic Information Survey (NGIS) Survey of Stakeholders

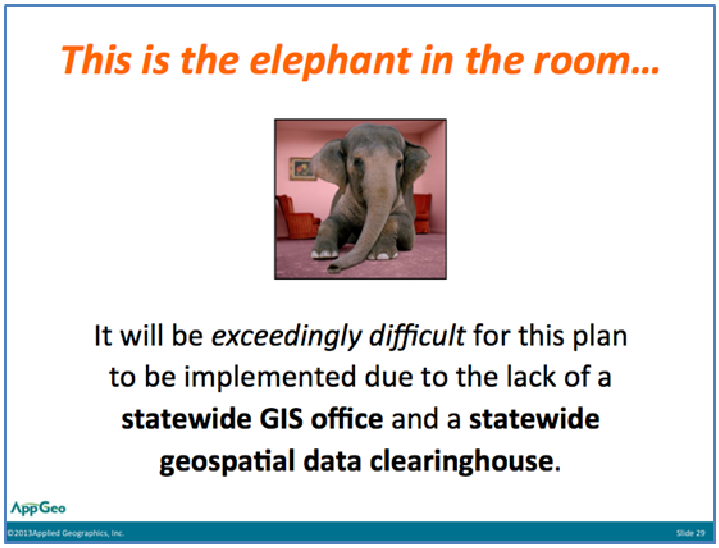
The parcel survey conducted by NGIS and shared with the project team indicated a broad-based need for **parcels** across stakeholder communities. This survey got a strong response and represented a variety of stakeholders (see image to the right). The following provides some key highlights from that survey:



- **There is demand for parcel *data***
  - A standardized parcel product is desired by 61.5% of respondents
  - >50% are "unsure" or do not desire online parcel services over getting parcel data directly
- **General observations on current parcel data dissemination**
  - 57% of respondents get parcel data for free
  - 27% have paid between $1,000 - $10,000 for parcel data
  - 15% of respondents are unsure about parcel dataset costs
- **State government experiences with obtaining parcel data**
  - Locating good parcel data can be a challenge
  - State respondents are not maintaining parcel datasets
  - A standardized parcel data product is highly desired by state respondents
  - State experiences sharing data with local agencies vary greatly pre and post SB400; SB400 has made a difference
  - Parcel data is now free for certain state projects due to SB400
- **Private sector experiences with obtaining parcel data**
  - A variety of parcel data extents are required ranging from just a neighborhood to multi-state projects
  - There are barriers to data use
    - 53.8% cannot afford the data
      - 40% pay between $1,000 - $10,000 for data
    - 38.5% complain the data doesn't exist or is to inaccurate or outdated
  - 89% have an ongoing need for current data and will continue to need data in the future

1.2 OVERARCHING CHALLENGE TO PROGRESS ON STATEWIDE DATA DEVELOPMENT

The following observations apply for both **parcels** *and* **elevation** data sets. These observations are based on analysis conducted in association with Nevada Geographic Information Society (NGIS). Simply put: current practices for collecting and sharing geospatial data are somewhat challenging in Nevada.

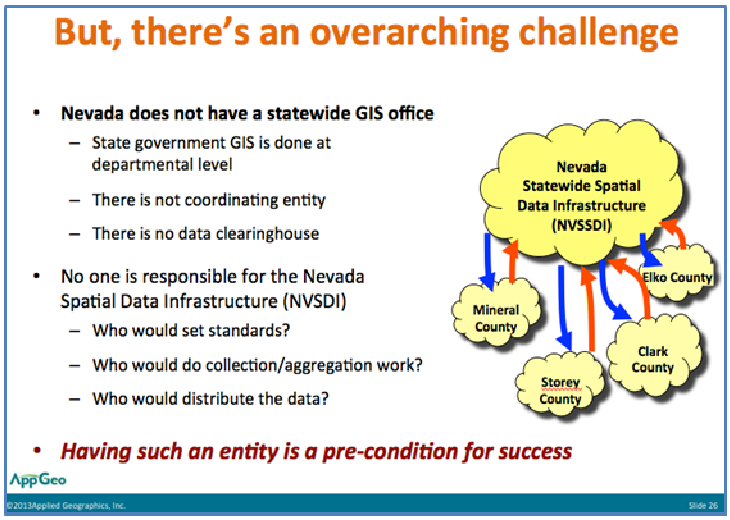


High-level Findings on the Current Situation

- All stakeholders interviewed shared a common understanding of the need for such data, as well as other geospatial datasets, and observed that there is **no common statewide approach** for meeting the need through agreed upon actions
- Collecting these datasets in a consistent way and sharing them with all stakeholders are not coordinated activities in alignment with economies of scale and efficiency, as stakeholder activities are **focused on their specific jurisdictional mission requirements** rather than coordination
- Communications between stakeholders are mostly voluntary, largely based on personal relationships of trust and professional respect around common interests, but **statewide coordination mechanisms are constrained to narrow-purposes,** for example the SB400 legislation narrowly aimed at parcel data for economic development. Ultimately, formal statewide coordination mechanisms are lacking.
- There is duplication of effort and inefficient spending when viewed from a statewide perspective, with **no common geospatial data strategy for Nevada**, nor resources for managing coordination across the producers of parcel data – Nevada's seventeen counties – or for consumers of parcel data in state government and other organizations and individuals.
- Common needs are not coordinated, and there is **no accountability for a statewide plan of action** that would be mutually beneficial to both the producers and consumers of the data.
- Leadership, communication and coordination is crucial for these kinds statewide data initiatives. Ultimately, the data producers - Nevada's counties -- may have little incentive to collaborate in creating statewide geospatial data, depending on their jurisdictional mandate. Similarly, entities that may be asked to "co-fund" efforts (e.g., parcel data maintenance) will have questions and collaborative funding requires administrative support.

Overarching Recommendations on Role of Statewide Geospatial Office

The vast majority of states have dedicated, statewide geospatial offices that are most often located within the "information technology" agency. Increasingly, such offices are led by a Geospatial Information Officer (GIO) and the size of these offices and their budgets varies greatly from state to state, with fulltime staff ranging from one to as many as twenty. The main functions that these offices fulfill include:



- Leadership and coordination of statewide initiatives (including the kinds of statewide data layer development covered in this study)
- Management and maintenance of a statewide data clearinghouse to facilitate data distribution and data sharing
- Development and management of shared statewide geospatial infrastructure such as a web-services platform and/or enterprise licensing for commercial software
- Center of geospatial expertise to assist agencies that are getting started with geospatial and/or agencies that are tackling new, challenging efforts
- Active coordination with partners - both state agencies and external partners such as counties - on data layer stewardship and data update and maintenance
- A technical resource for local governments and other state agencies

What should the state do?

A. The existing geospatial stakeholder community needs to activate and begin to advocate for a change in statewide geospatial management and governance

1. The NGIS community, and other existing stakeholder groups can help to articulate the challenges that Nevada is facing and the mechanisms other states have used to address these challenges
2. Advocate for the start of more detailed planning for a statewide geospatial coordination entity within state government
3. Make certain that local government needs and concerns ar part of the statewide geospatial management and governance discussion

4. Identify areas where stronger guidelines can help in the near-term and devise voluntary groups to draft them

B. Establish a "Governor's Council on Statewide Mapping Excellence"

1. Set measurable goals for achieving excellence in statewide mapping in support of the state's needs and mandates, including the Governor's priorities (e.g. sage grouse and economic development)
2. Include Nevada's local governments as full members of the council, including their mapping concerns and needs as part of the standard of excellence
3. Advise the Governor's Office on statewide mapping investments and ROI
4. Coordinate with the existing State Mapping Advisory Committee (SMAC) to establish a clear governance model that can assist the state in moving forward
5. Set priorities for the state's mapping agenda and monitor progress
6. Leverage departmental geospatial assets and investments in state geospatial data infrastructure
7. Assess and streamline state agency processes to collect and utilize geospatial parcel data , enhanced elevation data and other geospatial data such as roads, historic sites, or wildlife habitat

C. Designate a state agency to serve as, or house the "Statewide Geospatial Office"

1. Said agency to **appoint a full-time statewide Geospatial Information Officer** reporting to the agency director, with job responsibilities to **develop a coordination and technology strategy** with input from stakeholder agencies, that includes the following elements that are particularly germane to the development of statewide parcel and elevation data sets:
    i. Document current state agency processes and tools for collecting and utilizing geospatial data
    ii. Identify gaps in layers and data sets and potential process improvements
    iii. Work with local governments who do not have staff and resources to identify alternatives
    iv. Identify and address barriers to local government participation in statewide data initiatives such as data liability concerns
    v. Identify data that can be shared
    vi. Identify and develop appropriate standards that can be readily met by data partners
    vii. Identify planned projects to collect geospatial data
    viii. Identify appropriate incentives and motivators for partner participation and standards compliance such as linking data sharing as condition for accepting state grant money (e.g., technology grant funds that are distributed to assessors)

ix. Identify and develop technologies that facilitate data sharing (e.g. , standards-based data sharing portal)

x. Identify opportunities for reducing duplication of effort

xi. Identify opportunities to pool funding and streamline procurement toward achieving prioritized statewide goals

5. Support and fund the **goals and priorities set by the Governor's Council on Statewide Mapping Excellence**

6. Report annually on progress toward the goals and priorities set by the Governor's Council on Statewide Mapping Excellence

How can this be done?

A. **Short-term:** Governor's Executive Order could establish the council

1. Appointment criteria for Council would need to be set
2. Council responsibilities and governance rules for Council would need to be identified and detailed
3. Appropriate planning to identify the agency that will be designated as the statewide geospatial office and outlining of their responsibilities for statewide mapping coordination

B. **Long-term:** Legislation to solidify and sustain the Council and statewide mapping coordination program

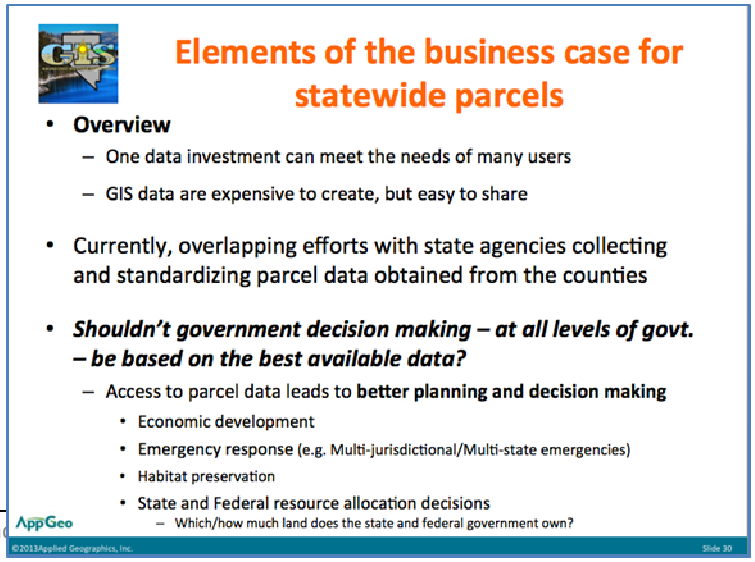
2 PROGRAM BENEFITS & JUSTIFICATION

2.1 THE BUSINESS CASE FOR STATEWIDE **PARCEL DATA**

2.1.1 High Profile Examples of How Geospatial Parcel Data is Beneficial

Local Assessors have a clear perception of the value of geospatial parcel data, and the counties are the authoritative source of such data. However, although local governments contribute data to larger collations of geospatial information (e.g., statewide) their needs for data that extends beyond the county is relatively rare.

The state mandate for counties to provide parcels to the State Demographer as a function of SB400 is not entirely viewed by



the counties as mutually beneficial, since it is not explicitly funded and they gain no new revenues. Nevertheless, they are cooperating, because they have a culture of government-to-government sharing, even when they are feeling "slammed" by multiple requests for their data from different levels of government, the private sector, and citizens.

Nevada has been one of the top five states hit the hardest by foreclosure and delinquencies since 2007, as a percent of total owner occupied housing units. The state needs parcel data from the counties for state-level policy support and economic development, and successful economic development should theoretically provide indirect benefits to the counties.

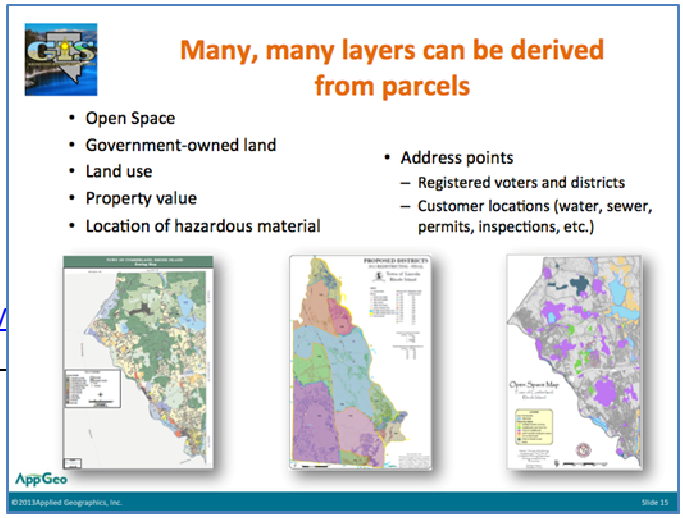
Consistent geospatial parcel data collected directly from local government is the most detailed source of property map information, and an excellent resource for understanding and detecting changes in population, housing patterns, and land use. When combined with parcel attribution for ownership, property value, and land use, these data become useful for a wide variety of state level activities such as economic development or public safety and emergency response.

Current and accurate parcel data can help measure the precise amount of **federal land within counties for the Payment in Lieu of Taxes (PILT) program**, whereby federal payments to local governments are made based on how much non-taxable federal land is within each county. The state does not have its own precise measurement of this federal land, however, the USGS reported in 2004 that the Federal government owned approximately 84.5% of the land in Nevada[2]. The BLM, the steward for federal data steward for parcels, coordinates with other federal agencies (e.g., National Parks; Bureau of Reclamation; Dept of Defense; etc.) on their respective boundaries. Similarly, although there has been a moratorium on mineral patents for mining claims since 1994, a precise tally of existing patents is important, since such privately owned land is taxable by the counties. Having precise geospatial records for both federal lands and mining patents would help ensure that state and local governments get a full accounting of revenues from these two sources.

In the wildland-urban interface, substantial property values may be threatened by **wild fires**. Surprisingly, on a per capita basis, Nevada is the most urbanized state in the country (as a very large proportion of Nevadans live in the cities). Geospatial parcel data are an important aid to wildland fire suppression strategies, showing high-priority, high-risk parcels. The Division of State Lands was able to take parcel data from the counties and utilize them in support of wildland fire planning.

2.1.2 The Value of Statewide Parcel Data to Multiple Applications

Parcel data are among the most versatile of any GIS data layer. As the image to the right illustrates, a single set of parcel line geometry can be visualized in numerous ways. By shading



[2] As reported by the New York Times, see: http://www.nytimes.com/interactive/2012/03/23/us/

parcels based on the assessed value, parcels become a property value data layer. By selecting the subset of parcels that are protected for open space, parcels become the protected open space data layer.

This versatility makes parcels an important element of a very large number of projects and activities that go beyond the raw efficiencies gained in parcel assessment, valuation and tax administration. These additional beneficial uses include but are not limited to:

- Refinement of **population estimates** for more accurate demographics (i.e., part of the basis for the SB400 legislation and the State Demographer's role in it). This may include reviews of the US Census tabulations which can be extremely important as many Federal programs allocate their funding based on the population. In fact, the State Demographer participated in the 2010 Count Review program using parcel data and was able to help with quality control for the 2010 Census that resulted in $28 million annually coming to Nevada.
- **Public safety and emergency response** for a wide variety of issues that include emergency dispatch, missing person searches, emergency preparedness planning and damage assessment after a disaster.
- A variety of **infrastructure** related issues that include:
    - Utilities (electrical grid, water conveyance, energy development)
    - Transportation (rights-of-way, rail corridors, roadway improvement planning)
    - Communications (broadband, telecommunications)
- **Natural resource** and public lands management, including:
    - Lease management and mining claims
    - Resolving disputes, for example with local ranchers over boundaries and water rights
    - Land management planning (e.g., development of plans for specific forests or reserves)
    - Critical habitat preservation and understanding the ownership of various habitats
- **Regional planning** and **economic development**
    - Improved zoning based on parcels
    - Nevada Energy has a site selector website[3] that could be improved by providing access to parcel data (e.g., to help understand the abutters to a target property).

2.1.3 Benefits

While doing a rigorous cost/benefit calculation is beyond the scope of this project, as per above there are numerous examples that illustrate the types of *direct* economic benefits that parcel data can be

[3] See: http://www.fastfacility.com/nvenergy/

expected to deliver above and beyond the core improved property valuation and property tax administration activities that have largely driven county-based parcel data development. Other examples from above illustrate the more *indirect* benefits parcel data may deliver and that are difficult to quantify such as increased development and state tax revenues derived from more successful economic development efforts.

Nevada is not alone in pursuing statewide parcels to support a variety governmental needs and indeed there is a large amount of existing work that describes the benefits of statewide parcel data development. Notable among these are three other statewide parcel business plans that were funded through the same Cooperative Assistance Program (CAP) grant that Nevada received for this study.

- **Business Plan for Statewide Parcel Data Development & Maintenance for the Commonwealth of Massachusetts** (June, 2011)
  http://www.fgdc.gov/grants/2010CAP/InterimFinalReports/174-10-3-MA-BusinessPlan.pdf

- **New York State Business Plan for Centralized Access to Consistent Cadastral Data** (October, 2011)
  http://gis.ny.gov/coordinationprogram/parcelplan/documents/NY_BusinessPlanStatewideParcels_FINAL.pdf

- **Minnesota Geospatial Information Office, Business Plan for Statewide Parcel Data Integration** (September, 2012)
  http://www.mngeo.state.mn.us/coord/parcel_business_plan/MN_Parcel_Business_Plan_Final.pdf

Three other statewide geospatial strategic plans have sections that call out the benefits of statewide parcel data in particular:

- **State of Arkansas Geospatial Strategic Business Plan** (March 2010) - This plan addressed four priority "framework" data sets for the state, including parcels, and contained a specific discussion of the benefits that would be expected from parcel/cadastral data component.
  http://www.gis.arkansas.gov/Docs/LAW/2010_StrategicBizPlan.pdf

- **Michigan Statewide GIS Business Plan** (August, 2010) - This plan addressed all "framework data" for the state but it included a specific discussion of the benefits that would be expected from parcel/cadastral data component.
  http://www.fgdc.gov/grants/2009CAP/InterimFinalReports/065-09-3-MI-StatewideGISBusinessPlanFINAL08-17-10.pdf

- **Alaska Geospatial Business Plan** (February, 2012) - This plan discussed, and performed a return on investment assessment based on "framework data" which included, but was not limited to parcel/cadastral data sets.
  http://www.alaskamapped.org/public_docs/AKGeospatialBusinessPlanFINAL.pdf

These studies provide a wealth of information on the value and benefits of statewide parcels and should be consulted directly for details. The following provides a high-level overview of where the major benefits lie as gleaned from these report:

Geospatial Activity Benefits:

- Improved data availability and standardization of parcel data sets
- Streamlined data distribution for parcel data
- Elimination of duplicative data collection efforts from multiple state agencies

Valuation and Tax Administration Benefits:

- Identifying real property that leads to higher valuations and increased revenues
- Reducing improperly claimed primary residence tax reductions
- Improved equity of valuations across the state
- Automation of agricultural land assessments based on soils
- Automation of property abutter determination, including across county boundaries
- Facilitating and optimizing the property inspection process

Other Governmental Benefits:

- State government property management: re-use of state owned lands; disposal of surplus properties
- Identifying real property damage in support of Federal Disaster declarations
- Economic development: supporting site selector web-sites; corridor and right-of-way identification (e.g., for pipelines)
- Natural resource protection: identifying protected lands; understanding which lands house important habitats and/or natural resources (e.g., wetlands)
- Automating permitting determination (e.g., Is parcel within a historic district? Does it house a wetland? Etc.)

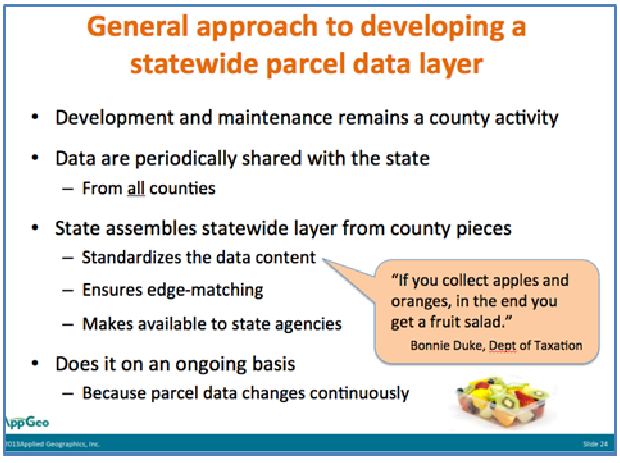
3 REQUIREMENTS FOR SUCCESS

3.1 REQUIREMENTS FOR CREATING & DISSEMINATING STATEWIDE **PARCEL DATA**

3.1.1 Overview

The general game plan for creating statewide parcels is straight forward and consistent to approaches that are being followed in other states:

1. Parcel data origination and maintenance remains a county activity. Any success hinges upon the active involvement of the counties. Ensuring that the counties benefit from a statewide parcel collation process and product is a necessary condition for success.
2. The state performs a **collection**, **standardization** and **aggregation** exercise to create statewide data. Key efforts and decisions include:



a. Establishing appropriate standards

b. Determining whether the standards are applied at data origination at the county level or whether they are applied after the fact as part of the aggregation exercise at the state level

c. Determining which agency (and funding source) achieves the aggregation

3. The state shares the "statewide" data set across all state agencies

   a. If SB400 can be altered, the state can share the data more broadly

   b. Data should be shared in a variety of formats including data download and consumable web services

4. The state repeats the collection, standardization and aggregation exercise on a repeating basis (e.g., at least annually)

3.1.2 Organizational Approach

Two key state government actors anchor the recommended approach:

1. Department of Taxation
2. State Demographer

In addition, it is critical that Nevada's county governments be considered essential anchors for a successful program.

Role of the Department of Taxation

- Provides guidance and oversight of county assessing practices
- These activities include the ***authority*** to influence the **standards** and **practices** of county assessors
  - Provides an opportunity to expand and enumerate digital parcel data practices
  - Enabling legislation for the Nevada Tax Commission potentially supports this "authority":
    - "Powers and duties of Nevada Tax Commission **concerning assessment of property and collection of taxes; sharing information;** certificate of compliance with regulations; ... The Nevada Tax Commission shall adopt general and 1. **uniform regulations governing the assessment of property** by the county assessors of the various counties, county boards of equalization, ... The **regulations must include**, without limitation, **standards** for the appraisal and reappraisal of land to determine its taxable value." (**Emphasis** added)
    - "2. Confer with, **advise and direct county assessors**, (a) sheriffs as ex officio collectors of licenses and all other county officers having to do with the **preparation of the assessment roll** or collection of taxes or other revenues as to their duties. Prescribe the **form and manner** in which assessment (b) rolls or tax lists must be kept by county assessors... " (**Emphasis** added)

- This study's interpretation of the enabling legislation highlights the importance of ***digital tax parcel mapping*** in conducting appraisals and reappraisals; and, the importance of ***sharing*** the digital data with State government, beginning with the Department of Taxation. It would be reasonable to observe that since digital tax parcel mapping is integral to preparing an accurate assessment role, the "form and manner" of the tax roll shall be through digital tax parcel mapping.

- After making these interpretations, the Department of Taxation could go one step further and use its "authority" to establish ***standards*** for digital tax parcel mapping that the county assessors should/must follow. Such standards would serve to ensure that digital tax parcel mapping was of a consistent quality, content and in a format that could be readily shared allowing the Department of Taxation to perform comparisons.

Role of the State Demographer

- The State Demographer has been identified as the key office involved in the implementation of SB400. The office has two key roles:
  - Receives parcel data from counties
  - Distributes those data to other state agencies
- However, language in SB400 limits use of the data to "demographic" and "economic development" purposes
  - Since economic development is a very broad term, there are reasonable opportunities to interpret this language fairly broadly. For example, use of the data to "improve public safety" or "protect the environment" could be construed to be "aiding economic development" (i.e., cleaner, safer locations attract people and businesses)
  - The State Demographer can also serve a key role in working with the legislature to identify clarifications and refinements to the law that may improve its implementation.
  - However, it must be noted that the State Demographer does <u>not</u> have the staff to do the following activities that are part of a sustainable and ongoing statewide parcel initiative:
    - Performing the **technical work to standardize and aggregate the county-based parcel data** collected by the State Demographer
    - **Distributing the data to state agencies**, and potentially more broadly, via a variety of technologies that may include:
      - Data download
      - Web-based data viewers
      - Consumable web-services

As described above in Section 2.2, a third state actor would be very beneficial, but is absent from the Nevada geospatial landscape: the ***statewide GIS office.*** This office could facilitate or complement the

State Demographer and Department of Taxation by fulfilling the **data aggregation** and **data distribution** functions described above.

3.1.3 Inventory of Existing Infrastructure & Suitability Assessment

Given the lack of a statewide GIS office and the non-existent active management of statewide data layers, the main "existing infrastructure" in Nevada is existing ***legislation*** that is specifically aimed at parcel data. Indeed, this is atypical compared to other states and provides an opportunity to establish a legal basis for a statewide parcel initiative. These pieces of legislation help to amplify the *already known* importance of parcel data. In addition, it can be easier to modify an existing piece of legislation to fulfill broader goals than it can be to create an entirely new piece of legislation.

Key pieces of legislation and potential modifications that could help in achieving a statewide parcel data set include:

- **SB400** - Mandates county sharing of parcels with state government via the State Demographer
    - ***Desirable modification***: broaden allowable uses of parcel data collected under SB400 beyond "demographics" and "economic development"
- **NRS239** - Enables counties to charge "cost recovery" fees for geospatial data
    - This legislation has a dampening effect on the free flow of data sharing within the state, including for parcel data
    - ***Desirable modification***: exempt parcel data from cost recovery under NRS239
- **NRS 360.250**: Enabling legislation for the Nevada Tax Commission
    - Work with the Department of Taxation to clarify guidance, regulations and standards to recognize the increasing importance of digital parcel data in the operations of county assessors
    - Have the regulations move county assessors towards a more standard approach to creating and managing parcel data. Include requirements to have parcel data shared with state government, and potentially the general public.

3.1.4 Human Resource Requirements

One of the most important elements of a successful statewide parcel program is having strong state and county collaboration. As such, active liaison with counties will be essential for success and this will take purposeful effort. Ideally, there would be a data layer manager who would have two responsibilities:

1. Liaison and communication with Counties to ensure that the data is flowing, and that technical questions from the county are answered
2. Working with county data submittals to ensure standardization and/or validate conformance with standards and/or to "harmonize" as-is data submittals into a standard format for assembly into a statewide data layer. This includes working to make the county puzzle pieces fit together by resolving boundary and edgematching issues.

Ideally, this "data layer manager" might be situated within the Nevada Statewide GIS Office as envisioned in Section 2.2 of this document.

3.1.5 Budget Requirements

Budget will be required for the following activities:

1. Staffing for one fulltime equivalent to serve as the "parcel data layer manager" (as described above in 4.1.4)
2. Absent an existing statewide "GIS office" and data clearinghouse (as described in Section 2.2), resources to publish and otherwise share the statewide data. Two principal options exist:
    a. Contract with a third party entity, such as the Keck Library at UNR, who has these capabilities
    b. Purchase/rental of appropriate server and web infrastructure, whether as hardware, or via cloud-based, virtual equipment via infrastructure as a service (IaaS)

3.1.6 Assessing Risk

As described in Section 2.2, the largest risk to this initiative is **Nevada's current lack of a statewide GIS office that can oversee and help implement this multi-agency effort**. Without any entity charged with coordinating state government-wide efforts, nor any infrastructure devoted to publishing statewide data sets there is a very large risk that this effort will never get off of the ground. Assuming that this initiative does commence, the following represent additional programmatic risks that must be managed:

- Good, **clear communication between the state and counties** is essential. Without good communication and collaboration there will be potential conflicts between the state and counties that could undermine the effort. For instance, counties need to understand that freely available statewide parcel data may have the potential to impact their "cost recovery" revenues. Similarly, the statewide program will need to have ongoing communication with counties to ensure that the parcel data are refreshed on at least an annual basis.
- Currently, **SB400 limits state government use of parcel data to a narrow band of two topic areas**: demographics and economic development. In order for the state to obtain maximum utility and return on investment, statewide parcel data should be available to be used for *any legitimate state government purpose.* If SB400 cannot be broadened there is a risk that the overall benefits of this initiative will be unnecessarily limited. These types of limits could constrain support for the effort.
- The most difficult technical part of this initiative will be the standardization and aggregation process of converting disparate county-based data into a homogenous statewide resource. This can be overcome in one of two ways. First, the state (e.g., via the Department of Taxation) could issue standards that must be met by the counties. Second, and alternatively, the state could elect to receive parcel data from the counties "as-is" and in a variety of formats and then take on the work of "harmonizing" the contributions into a "state standard". In either case, the development of the standard is necessary. Creating standards can be time consuming, and the best standards development efforts include a participatory process. Thus, there is some risk that making

developing the appropriate standards and then determining how they will be implemented will take considerable time and this could bog down the overall effort. This risk is amplified with the absence of a state GIS Office that might lead and guide the standard making process.

3.1.7 Summary of Recommendations

Given the challenges outlined in Section 2.2 that emanate from the lack of a central, state government geospatial office, the recommendations presented below are divided into two scenarios. The first, **Plan A: ideal scenario**, assumes that a statewide geospatial program office can come into being within the next 2-3 years. The second, **Plan B: immediate next steps**, assumes that the ideal scenario will be more elusive and identifies tangible next steps for moving forward that will catalyze the actions that may over time mid-term lead to something resembling the ideal scenario.

3.1.7.1 Plan A: The Ideal Scenario

1. The state should **establish a statewide geospatial program office**. This office would oversee the development and maintenance of a statewide parcel data layer (among many others)
    a. The program office should work in close collaboration with both the State Demographer and the Department of Taxation to implement the parcel program
2. **Development of a statewide parcel data layer** should proceed as soon as possible. The statewide data layer should include the following elements:
    a. An articulated data standard
    b. The geometry of all parcels in the state
    c. A set of common, basic attributes of all parcels (e.g., area, address, property value, etc.)
    d. A review of funding and organizational structures for the local production of the data
    e. An ongoing program to update the data on, at a minimum, an annual basis
    f. An infrastructure for sharing the data both within state government, and to the extent allowable with other partners and the public
3. Concerted effort should be devoted **to leveraging, and as possible and practical adapting and/or amending key existing legislation that pertains to parcels** including SB400, NRS239 and NRS360.250.

3.1.7.2 Plan B: Immediate Next Steps

1. Clarify and create a specific policy for the implementation of SB400, including:
    a. Clarification of the policy for how to disseminate the SB400 parcel data (e.g., who can receive the data; what the data can be used for; can the data be redistributed; etc.)
    b. Clarification on the process for how to make requests for SB400 parcel data from the State Demographer

c. Assemble a "working group" to work with the State Demographer and Department of Taxation on planning for, and establishing appropriate standards for parcel data

2. Work with appropriate state agencies (e.g., Department of Taxation) and the counties on appropriate mechanisms for leveraging the Assessor Technology Fund to make investments in county geospatial parcel data. Such activity might also consider linking the acceptance of Assessor Technology Funds to conforming to standards and to parcel data sharing with state government.
3. Commence the design of a prototype "parcel data sharing portal" that can be developed to facilitate and streamline parcel data sharing between counties and the state. The portal's features may include, but are not limited to:
    a. User authentication and access controls
    b. Upload/download of data sets between the state and counties
    c. Mechanisms to test uploaded data for compliance with standards
    d. Mechanisms to allow counties to provide data updates on a regular basis
4. Establish a project and obtain funding (e.g., via grants; state appropriation) to create the prototype "parcel data sharing portal" which may be housed by state government, or via a geospatial stakeholder organization such as NGIS (potentially on an interim basis).
5. Evaluate the performance of the prototype parcel data sharing portal after 1-2 years of operation. Identify the costs for constructing and operating the portal as well as the benefits it has added. At this point there should be a clearer sense of if/how the portal may fit into state government operations and the prospects for improving the portal and moving it into state government as part of a broader statewide geospatial coordination effort. Ultimately, the prototype *parcel portal* could potentially be expanded to house other data sets as well.

4 IMPLEMENTATION PHASING & MILESTONES

4.1 PHASING & MILESTONES

The following sections provide a high-level timeline for both the Plan A and Plan B implementation scenarios described in the recommendations from Section 4.1.7.

4.1.1.1 PLAN A: THE IDEAL SCENARIO

Realistically, **until there is a state-level coordinated program, detailed implementation planning is difficult** and somewhat of a moot point. When a state-level program is in place, more detailed planning can proceed and specific decisions on the implementation approach can be made. The following provides a high-level timeline for how an "ideal implementation" that includes the creation of a statewide GIS office might reasonably proceed across key activities:

Activity	2014				2015				2016				2017			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pursue establishment of a statewide GIS office**																
Establish statewide GIS office							*									
Identify parcel data layer manager																
Convene parcel standard setting work group																
Approve standard										*						
Advocate for appropriate legislative changes to SB400 & NRS239																
Obtain desired legislative changes											*					
Commence initial collection/aggregation of statewide parcels																
Publish first statewide parcel data layer													*			
Transition to parcel data layer maintenance regime																

** As mentioned in Section 2 on "Overarching Challenges," the following high-level timeline was described for establishing a statewide GIS office:

- **Short-term:** Seek a Governor's Executive Order
  - Appointment criteria for proposed Governor's Council on Statewide Mapping Excellence
  - Council responsibilities and governance rules for Council
  - Agency designation and responsibilities for statewide mapping coordination
- **Long-term:** Legislation to solidify and sustain the Council and statewide mapping coordination program

4.1.1.2 Plan B: Immediate Next Steps

In the absence of clear progress on creating a statewide GIS office, there remain some productive activities that Nevada stakeholders can pursue. Indeed, "Plan B" represents an alternative path where small, incremental steps can begin the process of creating a sustainable and readily shareable statewide parcel data layer. Such an "alternative path" could, over time, evolve into a more comprehensive and formal statewide parcel program that resembles the "Plan A" ideal scenario.

Activity	2014				2015				
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Clarify and develop specific & detailed SB400 implementation policy									
Work to create linkage between Assessor Technology Fund & parcel data sharing									
Implement linkage of Assessor Technology Fund & parcel data sharing			*						
Assessor Technology Fund grant recipients actively share parcel data with state									→
NGIS catalyzes effort to design a prototype parcel data sharing portal									
Prototype parcel data sharing portal is designed									
Advocate for funding to develop prototype parcel data sharing portal									
Develop prototype parcel data sharing portal									
Launch of prototype parcel data sharing portal						*			
Ongoing evaluation of usage & success of the prototype parcel data sharing portal									→
Improvements/expansion of parcel data sharing portal									→

APPENDIX A: ACKNOWLEDGMENTS

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The Steering Committee was a volunteer group – a coalition of the willing – dedicated to making this plan a reality. From conception to completion, these professionals made the business plan a reality.

Jeff Hardcastle, Nevada State Demographer
Carol Ostergren, USGS Liason, Nevada
Craig Palmer, University of Nevada, Las Vegas
Haroon Stephen, University of Nevada, Las Vegas
Jennifer Mauldin, Nevada Bureau of Mines and Geology
Holly Smith, Nevada State Lands
Moni Fox, Washoe County and Nevada Geographic Information Society
Luke Opperman, Nevada Division of Water Resources
Richard Wells, City of Las Vegas
Monica Lewis, Nevada Department of Public Safety
Toby Welborn, U.S. Geological Survey
Craig Hale, Southern Nevada Water Authority
Mark O'Brien, Bureau of Land Management
Eric Schmidt, Douglas County
Karen Michael, Nevada Secretary of State's Office
Matthew Krok, City of Henderson
Allison Maffei, Nevada Department of Administration
Jan Gould, City of Reno
Jonathan Price, Nevada Bureau of Mines and Geology
Gary Beekman, Washoe County
Mark Sappington, National Park Service
William Cadwallader, Nellis Air Force Base

The Nevada Geographic Information Society Board assisted in many ways, especially its presidents and treasurer during the completion of these plans. Moni Fox, Matthew Krok, and Gary Johnson of NGIS, along with the rest of the board, fully supported this work in many ways.

Last, but far from least, the many participants in meetings, workshops, and reviews of documents truly made this plan tangible. The faults are ours, but the inspiration and ideas come from them.

APPENDIX B: BUSINESS PLANNING METHODOLOGY

The following activities supported the development of the Parcel Business Plan.

NGIS Survey of Parcel Stakeholders

- This was conducted by NGIS in the early fall of 2012, independent from this project, as an input to the planning process

Teleconferences with the NGIS Steering Committee

- A series of teleconference were conducted between October 2012 and March 2013 on project approach and discussion of the situation in Nevada for Elevation and Parcel Data

Interviews with Stakeholders and Subject Matter Experts (SMEs) on Parcel Data

INTERVIEWS ON GEOSPATIAL PARCEL DATA

Person	Organization	Contact Info	Date of Interview	Type
Michael Mears	Eureka County Assessor	775-237-5270	1/18/13	Phone
Eric Schmidt	Douglas County GIS Supervisor	eschmidt@co.douglas.nv.us 775-782-9045	4/3/13	Phone
Holly Smith	State Lands (subsequently transferred to NDOT)	hsmith@lands.nv.gov 775-684-2720 (State Lands contact info)	4/10/13	In-person
Mark Carter	Advanced Data Systems	775-883-4007	4/10/13	In-person
Bryon Johnson	BLM Chief Cadastral Surveyor	bjohnson@blm.gov 775-861-6543, 6549	4/12/13	In-person
Linda Martinez	NDOT Geodesy Section	lmartinez@dot.state.nv.us 775-888-7167	4/30/13	Phone
Jeff Hardcastle	State Demographer	jhardcas@unr.edu 775-784-6353	5/1/13	Phone
Bonnie Duke, Terry Rubald, & Bruce Bartolowits	Dept. of Taxation	bduke@tax.state.nv.us 775-684-2158 trubald@tax.state.nv.us	5/8/13	Phone
Duncan Aldrich	Keck Library, UNR	duncan@unr.edu	5/14/13	In-person

Workshops with Stakeholders and SMEs

- Invitations and sign-in sheets coordinated by NGIS representative(s)
    - Parcel Forum in Carson City, NV, April 10, 2013
    - Parcel Forum at Washoe County, April 11, 2013
    - Parcel Forum in Las Vegas, NV, May 15, 2013

Assessor's 2013 Spring Conference

- Presentation and Discussion at Assessor's Conference, Douglas County, NV, April 11, 2013

NGIS Conference

- Presentation on initial Findings & Recommendations at NGIS Annual GIS Symposium in Reno, NV, May 16, 2013

APPENDIX C: LEGISLATION REFERENCES

76th Legislature's Senate Bill No. 400 (SB400) - June 2011
Select Committee on Economic Growth and Employment

CHAPTER 508
AN ACT relating to records; establishing a process by which a state agency may obtain certain county records at no charge for the purpose of economic development and population estimate research; prohibiting certain uses of confidential information contained in such county records; providing civil and criminal penalties; and providing other matters properly relating thereto.

Legislative Counsel's Digest:
This bill establishes a process by which a state agency engaged in activities related to economic development and population research may obtain at no charge information on each parcel in a county, known as the parcel dataset, and the digital parcel base map of a county. **Section 1** of this bill requires a county assessor to provide each year to the State Demographer employed by the Department of Taxation, at no charge, the fiscal year-end parcel dataset of the county. **Section 5** of this bill requires a county which maintains or possesses a digital parcel base map of the county to provide the fiscal year-end digital parcel base map to the State Demographer each year at no charge. Under **sections 1 and 5**, the State Demographer may not require a county to provide a parcel dataset or a digital parcel base map in any particular digital or electronic format or to use any specific software to provide such information. Not more than once each year, the State Demographer must provide the parcel dataset and digital parcel base map at no charge to a state agency engaged in economic development and population research that submits a written request for the information. The state agency receiving the parcel dataset or digital parcel base map must provide a summary of the research produced from the information to the county providing the information and the Commission on Economic Development at no charge. Under **sections 1 and 5**, a state agency receiving a parcel dataset or a digital parcel base map for a county must keep such information confidential and must not knowingly redistribute the information to any other person or governmental agency. Under existing law, the personal information of certain persons which is contained in the records of a county assessor is deemed confidential, except that a county assessor is authorized to release this confidential information for certain limited purposes. (NRS 250.100-250.230) Existing law provides criminal and civil penalties for improper acts related to obtaining or disclosing these confidential records. (NRS 250.210-250.230) **Section 1** of this bill makes these civil and criminal penalties applicable to an employee or agent of a state agency obtaining confidential information in parcel datasets from the State Demographer.

CHAPTER 239 - PUBLIC RECORDS

NRS 239.001 IN GENERAL
Legislative findings and declaration.

The Legislature hereby finds and declares that:

1. *The purpose of this chapter is to foster democratic principles by providing members of the public with access to inspect and copy public books and records to the extent permitted by law;*
2. *The provisions of this chapter must be construed liberally to carry out this important purpose;*
3. *Any exemption, exception or balancing of interests which limits or restricts access to public books and records by members of the public must be construed narrowly; and*
4. *The use of private entities in the provision of public services must not deprive members of the public access to inspect and copy books and records relating to the provision of those services.*

NRS 239.054 Additional fee for information from geographic information system.

1. A fee for the provision of information from a geographic information system may include, in addition to the actual cost of the medium in which the information is provided, the reasonable costs related to:

   (a) The gathering and entry of data into the system;
   (b) Maintenance and updating of the database of the system;
   (c) Hardware;
   (d) Software;
   (e) Quality control; and
   (f) Consultation with personnel of the governmental entity.

2. As used in this section, "geographic information system" means a system of hardware, software and data files on which spatially oriented geographical information is digitally collected, stored, managed, manipulated, analyzed and displayed.

(Added to NRS by 1997, 2385)

APPENDIX D: DOCUMENT HISTORY

Version	Brief Description	Date	Responsible Party
First Draft	Preliminary draft for NGIS review/comment, with placeholders for additional content	8/3/13	AppGeo (Contractor)
Final Draft	Final draft for NGIS review/comment	10/15/13	AppGeo (Contractor)
Final	Delivered to NGIS	12/11/13	AppGeo (Contractor)