Designating Energy Corridors on Federal Land: Avoiding Sensitive Landscapes

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ABSTRACT

In order to comply with the Energy Policy Act of 2005, federal agencies have been working over the past two years to designate energy corridors on federal lands in the West. Developing energy transport corridors in an 11-state region, while minimizing impacts to sensitive resources, presented significant siting and location challenges. Meeting these challenges required the use of large spatial databases and Geographic Information System (GIS) technology. This paper focuses on methods and approaches used to place corridors on federal lands with minimal impacts to sensitive resources and communicating these spatially important issues to decision-makers and the public. While federal lands in the West are managed by many agencies, each with unique missions and management requirements, a GIS-based approach provided a common template to evaluate sensitive resources across the entire region. While the GIS technology helped unify the project, issues of data availability, quality, and scale posed unique challenges for the project team.

THE ENERGY POLICY ACT OF 2005

The Energy Policy Act of 2005 (EPAct) was signed into law on August 8, 2005. Section 368 of EPAct directs the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior (the Agencies) to designate west-wide energy corridors (corridors) on the federal lands they manage in 11 Western states. The states included are Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Once these corridors are established, the Agencies will amend their respective land use plans to streamline the process of siting and permitting use of the land for oil, gas, and hydrogen pipelines, and electricity transmission and distribution facilities.

The Agencies determined that designating corridors constitutes a major federal action that may have a significant impact upon the environment within the meaning of the National Environmental Policy Act of 1969. For this reason, the Agencies prepared a Programmatic Environmental Impact Statement (PEIS) to address the environmental impacts from the Proposed Action and the range of reasonable alternatives. The Department of Energy and the Bureau of Land Management were co-lead Agencies for this effort, with the U.S. Department of Agriculture's (USDA’s) Forest Service (USFS) participating as a cooperating Agency.

ENERGY CORRIDORS

At a minimum, energy corridors specify a width based on a previously established centerline and compatible uses. In effect, this makes them parcels of land that have been identified through the land use planning process as being preferred locations for future utility rights-of-way (ROWs) that can accommodate one or more new or upgraded energy transport facilities.

Depending on corridor width and the environmental setting, energy corridors may accommodate multiple pipeline and electric transmission projects, and related infrastructure such as maintenance roads, compressors, or pumping stations.

The benefits of designating energy corridors include:

- Encouraging project siting that avoids environmentally sensitive areas,
- Streamlining and expediting the processing of energy-related permits and projects,
- Facilitating west-wide inter- and intra-agency collaboration and planning of corridors that cross jurisdictional boundaries, and
- Encouraging project collocation to reduce the proliferation of individual project ROWs throughout the West.

SENSITIVE LANDSCAPES

Despite the potential benefits of corridors, energy transmission land uses can be incompatible with land uses necessary to protecting sensitive landscapes. In this project, sensitive landscapes that required special consideration during the siting of corridors included:

- Areas designated specifically to protect valued natural areas and prohibit development, such as Designated Wilderness or Wilderness Study Areas;
- Areas where the siting of a corridor might detract from a visual resource such as Designated Wild and Scenic Rivers, National Scenic and Historic Trails, or National Monuments; and
- Areas where the siting of a corridor might be detrimental to the habitat of a threatened or endangered species.

Although not all sensitive landscapes were categorically excluded from the corridor designation process, accurate knowledge of their locations was essential to the decision-making process.

SCOPE

The combined area administered by the Agencies in the project area is over 587,000 square miles, almost fifty percent of the total area of the 11 Western states. It would take over three hundred 1:250,000-scale and over nineteen thousand 1:24,000-scale United States Geological Survey (USGS) topographic maps to encompass the federal land involved. The proposed corridors stretch over six thousand miles and cover over three million acres of federally administered land, requiring amendments to over one hundred and sixty land use plans.

With such a broad scope it was obvious from the beginning that spatial analysis using Geographic Information System (GIS) technology would be essential to the decision-making process.

SENSITIVE LANDSCAPES AND THE NATIONAL SPATIAL DATA INFRASTRUCTURE

In 1994, Executive Order 12906 called for the establishment of the National Spatial Data Infrastructure (NSDI), to include development of a National Geospatial Data Clearinghouse, spatial data standards, a National Digital Geospatial Data Framework, and partnerships for data acquisition. Today, NSDI is a reality even though it remains a work-in-progress.

The biggest challenge to the NSDI effort has been the conversion from paper maps and textual forms of spatial descriptions to digital geospatial data appropriate for use in a GIS. Nowhere is this challenge more apparent than in the geospatial data available to projects with such broad scopes as those required by EPAct.

Land use issues on federally administered lands are complex and so are the geospatial data used to define those lands. Federal agencies have developed unique and agency-specific land use categories that they maintain themselves, such as the BLM's Areas of Critical Environmental Concern and the USFS's Roadless Areas, which are consistent with each agency's mission. Other land use categories are defined across federal agencies, such as National Monuments.

Although much is available from the National Geospatial Data Clearinghouse, the "best available" geospatial data for entities like Wilderness Study Areas, for example, are still only available from a certain federal agency at a local or regional level and may represent the Wilderness Study Areas only for that individual agency and only at that level. This obviously allows for the disparity in naming conventions, data structure, and other data standards that prompted the call for the NSDI in the first place. Table 1 provides insight into the complexity of designations that make up sensitive landscapes on federal land.

AVOIDANCE OF SENSITIVE LANDSCAPES: PHASE 1

From a purely GIS standpoint, the siting of corridors while avoiding sensitive landscapes proceeded in three broad phases.

Phase 1 was largely a data acquisition activity. Initially, a master database was built using small-scale data available from major federal data portals such as The National Atlas (http://www.nationalatlas.gov/), The National Map (http://nationalmap.gov/), GeoCommunicator (http://www.geocommunicator.gov/GeoComm/index.shtm), The

		Administering Agency			
Sensitive Landscape	**Sources**	BLM	USFWS	USFS	NPS
Area of Critical Environmental Concern	BLM Field Offices	X			
Cooperative Management and Protection Area	USFS			X	
EPA Class I Air Quality Restriction Area	NPS		X	X	X
Forest Reserve	USFS			X	
Memorial Parkway	BLM				X
Migratory Bird Refuge	BLM		X		
National Antelope Refuge	BLM		X		
National Battlefield	BLM				X
National Bison Range	BLM		X		
National Conservation Area	BLM	X			
National Elk Refuge	BLM		X		
National Game Refuge and Wildlife Preserve	USFS			X	
National Historic Area	USFS		X		
National Historic Landmark	NPS	X	X	X	X
National Historic Park	BLM				X
National Historic Site	BLM				X
National Historical Park	BLM				X
National Historical Reserve	BLM				X
National Memorial	BLM				X
National Monument	BLM, USFS*	X		X	X
National Natural Landmark	NPS	X	X	X	X
National Park	BLM				X
National Preserve	BLM				X
National Primitive Area	USFS			X	
National Recreation Area	BLM, USFS*			X	X
National Reserve	BLM				X
National Scenic & Historic Trail	NPS, USFS*			X	X
National Scenic Area	USFS			X	
National Scenic Highway	USFS	X		X	X
National Scenic Research Area	USFS			X	
National Seashore	BLM				X
National Volcanic Monument	USFS			X	
National Wildlife Range	BLM		X		
National Wildlife Refuge	BLM		X		
Other Congressionally Designated Area	USFS			X	
Outstanding Natural Area	USFS			X	
Research Natural Area	USFS			X	
Roadless Area	USFS			X	
Special Management Area	BLM	X			
Special Resource Management Area	BLM	X			
Wild & Scenic River	USGS, BLM	X		X	X
Wilderness Area	BLM*, USFS*, USGS	X		X	
Wilderness Character Review Area	BLM	X			
Wilderness Study Area	BLM*, USFS*, USGS	X		X	
Wildlife Management Area	BLM		X		

* Collects or maintains data only in the area it administers

Table 1. Sensitive Landscape Categories with Data Sources and Administering Agencies

National Park Service Data Clearinghouse (http://www.nps.gov/gis/data_info/), and geodata.gov (http://gos2.geodata.gov/wps/portal/gos).

The most important dataset received in Phase 1 was the Surface Management Agency (SMA) database maintained by the BLM's Land Resources Project Office (LRPO). As lead agency for federal land ownership status in the NSDI, the LRPO is charged with maintaining a database of all federal lands in the United States.

From these major data sources, a master database was developed and visually represented by a master ArcMap project. This master ArcMap project was presented to decision makers from the participating agencies during initial workshops held at Argonne National Laboratory (Figure 1).

Figure 1. Workshop for Conceptual Corridor Planning

From the outset, data layers containing sensitive landscapes were presented on the GIS display in red or other bright colors, or unique symbols to highlight their significance. While decision makers had information on where corridors were needed, it was imperative from the beginning that they also knew where sensitive landscapes precluded or affected corridor siting.

After the workshops, it was clear that more accurate data and more types of data were required. A data call went out to the agencies, a key part of which was the request for geospatial data on sensitive landscapes that were not available from any other source.

AVOIDANCE OF SENSITIVE LANDSCAPES: PHASE 2

Phase 2 of the project involved focusing on sensitive landscapes with local data at the local level.

A huge amount of geospatial data were received from the agencies through various data calls and were used to make adjustments—sometimes major—to the corridor configuration. During this process, the knowledge and guidance of federal managers at the local offices was instrumental to corridor refinements

At one time, it was thought that Argonne staff would need to attend meetings throughout the western states to present the master ArcMap project in order to bring local decision makers into the process. Before the Internet, this method would have been the only solution and would have necessitated a huge travel budget, not to mention the logistics of getting the necessary people to the meetings.

Instead, it was decided to use a web-conferencing solution so that anyone who could get to the Internet could participate in the meetings. With one moderator and one GIS analyst operating the master ArcMap project, local managers and subject matter experts were able to participate almost as effectively as if they were looking over the shoulder of the GIS analyst. Many changes were made on the fly during these "webcasts." Others required the incorporation of new data into the master ArcMap project before deciding on corridor configuration in a follow-up meeting.

From time to time, GIS methods—such as layer intersects and buffering—were used to determine which sensitive landscapes might still be affected by the corridor configuration. Further refinements to corridors to avoid sensitive landscapes were again facilitated by local managers via webcasts.

AVOIDANCE OF SENSITIVE LANDSCAPES: PHASE 3

Phase 3 of the project disseminated information on the proposed corridors to the public and provided several ways to submit comments. Input received through a formal comment response process provided more information that was used to avoid sensitive landscapes.

GIS methods were used to calculate tables for the PEIS. One of the most detailed sets of tables generated listing the possible effects of corridor siting on selected visual resources comprised a subset of the sensitive landscapes listed previously. These visual resources were analyzed using GIS methods to determine if they were intersected by a corridor segment, or were within five miles of a corridor segment. (Five miles is the maximum extent of the specified foreground/midground distance in BLM's Visual Resource Management system.) The sensitive landscapes considered to be visual resources for the purpose of the PEIS included:

- National Parks,
- National Monuments,
- National Recreation Areas,
- Other National Park Service Resources,
- National Natural Landmarks,
- National Historic Landmarks,
- National Scenic and Historic Trails,
- National Scenic Highways,
- National Scenic Areas,
- National Scenic Research Areas,
- National Wild & Scenic Rivers, and
- National Wildlife Refuges.

The analysis approach used for visual resources was also followed for many other types of sensitive landscapes and natural features.

The master ArcMap project was used as the basis for all the maps that went into the document, including the five-part, 132-page map atlas that made up Volume III of the Draft PEIS. The atlas was designed with the knowledge that it would probably be one of the most viewed parts of the three-volume document.

The maps and geospatial data were so important to the dissemination of information to the public that it was decided to present it in several different ways to reach the widest possible audience. Some of the technologies considered included Google Maps, NASA's World Wind, ESRI ArcGIS Server, and ESRI ArcIMS. Some of these required significant development, hardware, and/or software investments for the expected volume of users. The following technologies were chosen based on their simplicity of deployment, lower server loads, and maximum usability by the public:

- An Adobe Portable Document Format (PDF) version of the map atlas,
- An ArcReader project to view a select portion of the project's master database,
- Keyhole Markup Language (KML) files of the corridors for use in Google Earth and similar software, and
- Personal Geodatabase files selected from the project's master database for use by GIS professionals.

All of these were offered when the electronic version of the Draft PEIS was released on the public web site. Soon afterward, this innovative approach to PEIS publication was noticed and received favorable reviews from the "All Points Blog" of Directions Magazine (http://www.directionsmag.com/). After the 90-day public comment period closed, the material received was organized and the project team was tasked with reviewing and responding to all comments, and revising the corridors and PEIS

document accordingly. This process was still underway at the time this paper was written.

Public comments and agency guidance that affect corridor siting continue to be addressed through consultation with federal managers ranging from local to national levels, and in some cases, new geospatial data depicting sensitive lands has been identified and used.

CONCLUSIONS

Determining the west-wide energy corridors proposed in the Draft PEIS succeeded because of an extensive collaborative planning process facilitated by the availability of geospatial data, the use of GIS software, and Internet-based collaborative tools. This approach enabled corridors to be sited in the context of avoiding impacts to a complex set of sensitive land designations. After release of the Draft PEIS, the public comment process provided further guidance from a broader audience, which continues to help refine corridor locations and procedures for mitigating potential impacts within the corridors.

In the future, we expect that the corridor locations will be finalized and then used to update the many maps and tables presented in the PEIS. Final stages include release of the Final PEIS and execution of a Record of Decision (ROD). Unless the no-action alternative is selected, the land use plan amendments needed to designate the corridors would be made and the corridors selected in the ROD will be available for energy infrastructure project applicants. Any projects proposed in the corridors will still require project-specific NEPA compliance and environmental evaluation; however, the West-wide PEIS will provide a broad planning foundation and many of the benefits listed earlier in this paper. The land use plan amendment process and EPAct will also provide for future west-wide corridor refinements and designation of new corridors if necessary.

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