



The Fort Union National Monument Viewshed

A Preliminary Assessment of its Scenic and Historic Integrity

Natural Resource Report NPS/SOPN/NRR—2015/924



ON THE COVER

Historic reenactment at Fort Union makes the monument come alive (NPS Photo).

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Executive Summary

Natural landscapes and scenic beauty are an expectation of many park visitors. Visits to national parks can be greatly enhanced, or diminished, by the views that visitors experience. Human intrusions such as cell towers, roads, and housing development can disrupt from the enjoyment of the natural setting.

Likewise for historic parks, when visitors experience a historic place and find the features of the surrounding landscape in a similar condition to that time period in history, this greatly enhances their sense of place and encourages further understanding of the historical events associated with the park.

Often, small parks cannot tell their story without the “borrowed landscape” of the scenes viewed from the park, but not administered by the National Park Service. The borrowed landscape of Fort Union National Monument comprises the majority of the monument’s viewshed and consists entirely of private ranchlands.

The landscape, land use, and historic views remain largely intact, although technology has changed, roads have been improved, and wagons and horses no longer have significant presence on the land. In a general sense, the current state of historic integrity for the Fort Union viewshed is in good condition. Major landmarks within the valley, the surrounding mountains, and vegetation patterns remain largely unchanged.

Although the once-bustling military post of Fort Union is now a much quieter physical remnant with a much-decreased human presence, visual connections between key historic viewpoints have been maintained. Adjacent private land is still in pastoral ranchlands and the integrity of historic views has been retained.

Over the years, park staff and community members have worked together to maintain the integrity of resources within and the landscape outside the park. These views are valued by visitors at Fort Union and create a backdrop that allows visitors to imagine a time when the Santa Fe Trail was an international road, and when the fort, its soldiers, and its adjacent communities played an important role in the region. This spectacular, historically important and intact scenery plays a critical role in providing an accurate landscape within which to tell the stories of Fort Union and the surrounding communities.

Historic visual integrity was assessed from the perspective of an observer on the ground, and whether or not the contributing or non-contributing features of the landscape enabled that observer to have a sense of the history of Fort Union. Non-contributing features were classified as to how conspicuous they are on the landscape based on size, color, shape, noise, and movement.

The intent of this assessment is to provide some guidance for current and future management and protection of these important historic values.

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Background and Importance

The conservation of scenery is established in the National Park Service (NPS) Organic Act, (“...to *conserve the scenery and the wildlife therein...*”) and reaffirmed by the General Authorities Act, as amended, and generally addressed in NPS Management Policies (Section 1.4.6 and 4.0; Johnson et al. 2008). Although no management policy currently exists exclusively for scenic or viewshed management and preservation, parks are still required to protect, and advocate for, one of their most fundamental resources—scenic or viewshed quality. According to Biel (2005), aesthetic conservation, interchangeably used with scenic preservation, has been practiced in the NPS, at least in some form, since the early twentieth century. Aesthetic conservation strove to protect the resources, including the scenic beauty, for park visitors. Certain aspects of the original aesthetic conservation approach have changed, such as feeding bears near park hotels or corralling buffalo to provide viewing platforms for park visitors, but the fundamental essence of the original aesthetic conservation value, and in many ways a park visitor’s desire to be surrounded by and to “see” the unique beauty and settings that are actively preserved throughout national parks, have remained unchanged.

Consequently, the need for scenic preservation and management is still relevant today, perhaps even more than ever given the pervasive development pressures that present challenges for park stewards responsible for conserving scenery for present-day visitors and future generations.

On April 4, 1956, the Secretary of the Interior signed the order to establish Fort Union National Monument (monument) with the purpose of preserving and protecting (but not reconstructing) the military fort ruins that still existed, some 50+ years after the fort was abandoned in 1891 (USDI 1956). The monument is located in Mora County, New Mexico, approximately 100 miles northeast of Santa Fe (Figure 1) and the forts comprising the monument were strategically built between the junction of the Cimarron and Mountain branches of the Santa Fe Trail, which became a National Historic Trail on May 8, 1987 (Zhu 1992).

Three different forts were built between 1851 and 1862, all with the same purpose of protecting U.S. interests in the New Mexico Territory—that is, commerce and travel along the Santa Fe Trail. The forts served as a hub for the delivery of supplies and equipment



Figure 1. The former hospital building at Fort Union National Monument.

to other new military posts established throughout the Southwest (NPS 2005). The time periods and purpose for each fort’s establishment is outlined in Table 1.

Any national park has an inherent responsibility, as stated in the NPS Organic Act, to preserve its scenic quality. One of the major challenges in preserving scenic views, especially in smaller parks, is that most of the scenes viewed from the park are located on lands not administered by the NPS. Johnson et al. (2008) refer to such lands as a “borrowed landscape.” It is these “borrowed landscapes” that comprise the majority of the monument’s viewshed.

The following excerpt from the monument’s Cultural Landscape Inventory (NPS 2005) eloquently describes the vastness of what one can see from the monument:

From within the park [monument], the views are vast and uninterrupted: the Turkey Mountains to the east, Sangre de Cristo Mountains to the west, Black Mesa and Cerro Pelon to the north, and the Mora Valley to the south. The view to the south is uninterrupted except for a minor distraction by the employee housing, although this is mostly hidden behind a ridge as the ground gently slopes southward (NPS 2005:52).

The views at Fort Union National Monument are not just about spectacular scenery, but are also historically important. The monument is essentially an archaeological landscape of earthworks, archaeological deposits, and stabilized adobe ruins set in an isolated arm of the Mora Valley and surrounded by wild and vast vistas (NPS 2005). The views, both from the fort looking out across the landscape, or of the fort from the approach along the Santa Fe Trail, are essential elements of the historical landscape of the monument, and in which the forts were developed. As travelers made their way along the Santa Fe Trail toward Fort Union, they could see it from a long distance. In her memoirs along the Santa Fe Trail, Marian Russell (in Brayer 1981:27) writes:

Biting winds gnawed at the open prairies, frenzied snow had begun to surge up the dry arroyos before we came to where Fort Union lay patterned in black against a snowy background. How glad we were to see its tall stockade before us [here they are speaking of high walls at log-built First Fort]. It looked like a great black city. . .

The sweeping view surrounding the fort provided safety and security for the military personnel stationed there. We have coined this historically relevant view as “strategic visibility.”

Table 1. Time periods and purposes for Fort Union and Santa Fe Trail.

Feature	Time Period	Purpose
Santa Fe Trail	Established 1821	Became a major trade highway between the United States and Mexico’s northern frontier. Public Law 10035 established the Santa Fe Trail as a National Historic Trail on May 8, 1987.
Fort Union’s First Fort	Built and Operational 1851-1861	First Fort Union was established to protect commerce and travel on the Santa Fe Trail and provided a military base for personnel who fought with the Apache, Kiowa, and Comanche. Abandoned in 1861 due to Confederate invasion.
Fort Union’s Second Fort (Star Earthworks)	Built and Operational 1861-1863	Defensive earthworks built to protect Federal interests. The Battle of Glorietta Pass in 1862 ended the need for this fort.
Fort Union’s Third Fort	Built and Operational 1863-1891	The third fort was built of adobe brick. Arsenal is separated from main fort at the first fort location. This was the largest fort in the Southwest and provided supplies to surrounding military posts. The fort was abandoned in 1891, and the ruins became part of the NPS as Fort Union National Monument on April 15, 1956.
Fort Union National Monument	Congressionally Authorized in 1954	Fort Union became the first NPS monument developed entirely under Mission 66 development. It was established to protect and preserve the forts’ historic ruins.

Visitor Experience

Inherent in virtually every aspect of this assessment is how features on the visible landscape influence the enjoyment, appreciation, and understanding of the monument's visitors. The indicators we use for assessing the condition of the viewshed are based on a vast wealth of studies related to perceptions by humans toward various features and attributes of viewsheds. The additional focus in this report on historic integrity acknowledges that the viewshed enhances the opportunity for visitors to better understand the setting of Fort Union, the Santa Fe Trail, and the historical significance that the monument had on

shaping the early history of the New Mexico Territory.

In 2010, a visitor study was conducted at the monument in which 253 visitor groups were asked to identify their primary activity. Ninety-four percent said that scenery/sightseeing was one of their main activities. In addition, the groups rated scenic views without development as the most important natural resource within the monument (Blotkamp et al. 2010). Viewshed quality and condition is a combination of scenic integrity and historic integrity.



The fort comes to life for visitors when they can envision how the fort looked during its prime.

Data and Methods

Viewsheds are considered in this assessment within two interrelated contexts: *natural scenic integrity* and *historic integrity*. Impacts that degrade one aspect likely degrade the other. For example, modern structures or roadways visible on the landscape may detract from the natural scenic integrity of the viewshed as well as the sense of place that a historically authentic landscape evokes.

Depending on the context, scenic and historic integrity may be distinct, or there may be so little practical difference that they are the same. For example, the long views out into the landscape from within the monument are both scenic and historic. We will assess qualitatively how features on the landscape contribute (or not) to the scenic and historic integrity of the monument.

Scenic and Historic Integrity

Scenic integrity is defined as the state of naturalness or, conversely, the state of disturbance created by human activities or alteration (USFS 1995). This focuses on the degree to which features of the landscape have been altered, or regarded as non-contributing to the natural scenery.

Historic integrity is the authenticity of a site's historic identity evidenced by the survival of physical characteristics that existed during its historic period. Historic integrity is based on those features of the cultural and natural landscape, from the perspective of an observer, that contribute to the sense of place and enhance the visitor experience. In this assessment, we focus on those features that have a visual impact and contribute to the story of Fort Union National Monument.

We evaluate features as contributing (i.e., enhancing the scenic and historic features of the landscape) or non-contributing (i.e., detracting from the scenic and historic integrity).

We assess scenic and historic integrity by evaluating specific human-made features that can be seen from key vantage points and whether or not those features are

contributing or *non-contributing* to the scenic and historic integrity of the view. For non-contributing features, we further assess the characteristics that make them more or less conspicuous, which influence their level of impact. We then supplement this assessment with a landscape perspective using GIS-based maps that indicate those areas visible from key vantage points. The GIS analysis provides spatial orientation of key features.

Our overall approach to assess the *historic integrity* of the monument's viewshed was based on distinguishing between features of the landscape that either contribute to, or detract from (non-contributing), the "sense of place" in an historic context. Features that contribute to the historic integrity were identified in the Cultural Landscape Inventory for the monument (NPS 2005). We incorporated this inventory into our assessment to provide a framework for considering the historic features of the cultural landscape from the perspective of an observer viewing this landscape from a particular vantage point. The landscape features that detract from historic integrity are the same features that affect scenic integrity. Thus, the component of the scenic assessment that focused on extent of development (e.g., the classes presented in Table 2) apply to both the context of scenic integrity as well as the historic visual integrity.

The primary basis for our assessment of historic visual integrity is made from the perspective of an observer on the ground, and whether or not the contributing or non-contributing features of the landscape enable that observer to have a sense of history of Fort Union. From these features, we assigned the view from each vantage point to one of three classes (Table 2) for how well historic integrity of the view was preserved.

Although we focus on features that contribute to the historic integrity of Fort Union, we do not focus on detailed archaeological artifacts that might be important in another context, such as a museum. Rather, we focus on features that

Table 2. Classes for the scenic and historic integrity of Fort Union’s viewsheds.

Class	Description
High Integrity	Some non-contributing features or developments may be visible, but the vast majority of the landscape is dominated by natural or historic features. The integrity of the historic context is well preserved such that an observer can easily visualize the historic aspect of the viewshed. As such, the features that contribute to the historic integrity are well preserved (even as ruins) and the noncontributing features are generally absent or are sufficiently inconspicuous so as to not detract from the historic sense of place.
Moderate Integrity	Non-contributing features or developments occupy a moderate portion of the landscape and/or are moderately conspicuous, but sufficient intactness retains much of its integrity. The integrity of the historic context is also largely preserved such that an observer can visualize what the landscape looked like during the historic period.
Low Integrity	The vast majority of the landscape is dominated by non-contributing features or developments that are conspicuous enough that little integrity or “sense of place” remains. The integrity of the historic context is essentially lost either from the contributing factors not being well preserved or the non-contributing features overwhelming the potential to visualize the historic aspect of the viewshed.

have a visual impact and contribute to the story of Fort Union as one looks upon the landscape from a given vantage point (Figure 2).

Historical Time Periods

There are six main time periods (NPS 2005) in Fort Union’s history. For the purposes of this assessment, two main reference periods will be considered: the Historic Period, which includes the Santa Fe Trail and the Historic Fort Union (1816-1891); and the more recent history of Mission 66 and its contributions to the monument.

Establishment of Hispanic Culture in the Mora Valley and the Santa Fe Trail (1816-1851)

Beginning in 1816, Spanish settlers began to colonize the Mora Valley, farming and raising sheep. The Spanish were the only European power in the area occupied by the Jicarilla Apache and Mouache Ute. Spanish rule ended with Mexican independence in 1821. This opened trade with Americans in Missouri and resulted in the development of the Santa Fe Trail. The period ended with the Mexican-American War (1846-1848) and the Treaty of Guadalupe Hidalgo (1848), which transfers the territory to the United States.

First Fort Union (1851-1861)

In 1851, the first Fort Union was established to protect U.S. interests in the New Mexico Territory and along the Santa Fe Trail. This



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included protecting commerce and providing military protection for the region against Indian attacks. The first fort was poorly built and soon deteriorated and was abandoned.

Second Fort Union, The Star Fort (1862-1863)

In 1862, invasion of New Mexico by Confederate forces resulted in the construction of the Star Fort fortification. The Battle of Glorieta Pass (1862) secured the region for Union forces. The Star Fort earthworks were poorly built and were mostly abandoned by 1863, when construction on the third fort began.

Third Fort Union (1863-1891)

Built to be permanent, using local technologies, Fort Union developed into a

Figure 2. Subtle contributing features on the landscape, such as ruts from the Santa Fe Trail, help bring to life the story of Fort Union NM and contribute to its historic integrity.

small city, including a depot, arsenal, post, and hospital. The Arsenal is located at the site of the first fort. With the coming of the railroad and the demise of overland trade over the Santa Fe Trail by 1879, the fort was closed in 1891.

Union Land and Grazing Company, and the Fight to Save Fort Union (1891-1954)
With the abandonment by the military in 1891, the Union Land and Grazing Company asserted its ownership over the fort's lands for grazing cattle. The fort's buildings were scavenged for building material by locals, and it began to badly deteriorate. Local interests led by the Masons began a long fight in 1929 to preserve the historic site. The NPS engaged in 1935 with the inspection and report of Roger Toll. After years of negotiations with the Union Land and Grazing Company, a highway right-of-way was purchased, and 720 acres including the ruins were then granted to the federal government by the Union Land and Grazing Company.

Establishment and Development of Fort Union National Monument (1954-2005)
Established in 1954, Fort Union National Monument underwent development of highway access, stabilization of adobe ruins of fort buildings, and construction of visitor facilities and employee housing during 1956-1966 as one of the first parks within the NPS "Mission 66" development program. Gradual improvements for telecommunications and disability access improved visitor and employee facilities and today Fort Union remains an example of a well-designed and executed Mission 66 project.

The Vantage-Point Perspective Using Ground Observations and Panoramic Images

A visitor's perception of what he/she can see from a given vantage point informs our assessment of scenic and historic integrity. How a given visitor perceives an altered landscape is highly subjective, and there may be no way to be completely objective in how we define or measure perceptions. Research has shown that there are certain landscape types and characteristics that people tend to prefer over others. In general, people

tend to prefer natural over human-modified landscapes (Zube et al. 1982, Kaplan and Kaplan 1989, Sheppard 2001, Kearney et al. 2008, Han 2010). This may be especially true of national park visitors. We focused primarily on what appears to be a natural or rural setting and where obvious human-altered components (e.g., roads, buildings, power lines) detract from the scenic or historic character of the landscape.

Despite the preference of natural landscapes, studies have shown that not all human-made structures or features have the same impact on visitor preference. Visitor preferences can be influenced by a variety of factors, including cultural background, familiarity with the landscape, and environmental values (Kaplan and Kaplan 1989, Virden and Walker 1999, Kaltenborn and Bjerke 2002, Kearney et al. 2008). This is particularly true in the case of Fort Union, since many of the human-made features were related to historic activities and events, and contribute to the historic integrity and sense of place.

Viewshed Vantage Points

A viewshed represents the area visible from a particular vantage point. Consequently, the first step in the viewshed assessment was to determine the most appropriate vantage point(s) to use as the basis for viewshed analyses. Two sites were chosen—the Parade Grounds and the Arsenal/First Fort (Figure 3).

Parade Grounds: The first and probably the most visited viewshed vantage point location is the Parade Grounds, located within the approximate center of the monument's third fort. Located among the historic adobe ruins originally constructed from 1863-1868, most are remnants of larger structures, but remain in their original context to paths and each other, and provide sweeping views of the surrounding countryside.

Arsenal: The second location is located within the first fort, which later became the Arsenal for the third fort. This area has restricted public access from New Mexico Highway 161, which is provided by guided ranger tour only (NPS 2005). This site is surrounded by mesa ridges on the west

and southwest. Adobe remnants are fewer, however context and sense of place is intact. Sweeping views of the surrounding landscape and the third fort structures can be seen from this location.

These locations were chosen as representative views of both the monument resources and the landscape important to them.

Panoramic Images

From each of the vantage points, a series of panoramic images were taken to represent views from the observer's perspective. These images were taken using a Canon PowerShot digital camera and the GigaPan Epic 100 system, a robotic camera mount coupled with stitching software. A series of images were captured and the individual photographs were "stitched" into a single high-resolution panoramic image (Figure 4). These photographs provided a means of illustrating the indicators for integrity of the viewshed at the monument.

Indicators of Scenic and Historic Integrity

Two primary indicators of scenic and historic integrity from a given vantage point were applied: (1) the extent of intactness, and (2) the conspicuousness of non-contributing features.

Extent of Intactness

The extent of intactness provides a measure of the degree to which the viewshed is unaltered from its original (reference) state. In particular, it measures the extent to which intrusive or disruptive elements may harm or diminish the character of the scene (USFS 1995, Johnson et al. 2008). The "original" state is based on a reference period relevant to the resource. At Fort Union, intactness

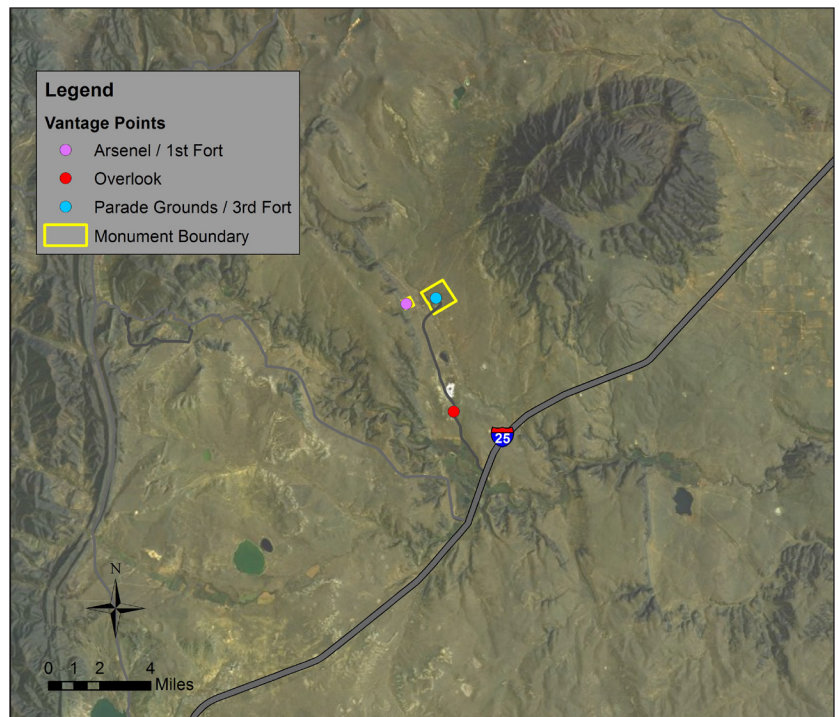


Figure 3. Viewshed vantage point locations for Fort Union NM viewshed assessment.

is considered relative to the historical time periods mentioned above. We used four classes for extent of intactness in relation to relative amount of development (Table 3). In addition to assessing intactness of the overall viewshed, the assessment was refined by considering intactness within major ecological landform units that contribute to the scenic and historic integrity.

The cultural landscape inventory (NPS 2005) identifies short-grass prairie ecosystems, as well as views and vistas of the Fort Union and Mora Valleys, the Turkey and Sangre de Cristo mountains, and Black Mesa and Cerro Pelon as contributing to the cultural landscape. We have condensed these into three categories: (1) views of the short-grass prairie ecosystem, (2) views of the forest and woodlands bordering the Fort Union and Mora Valleys, and (3) views of the more distant mountains (i.e., Sangre de Cristos;

Figure 4. GigaPan uses a robotic camera mount combined with stitching software to join a series of images into a single high-resolution panoramic image.



Table 3. Classes used for the extent of intactness within the viewshed at Fort Union NM.

Intactness	Description
Fully Intact	No non-contributing features or developments are visible within the viewshed.
High	Some non-contributing features or developments are visible, but the vast majority of the landscape is dominated by natural and/or historic features. Even if some development has occurred, the scene appears largely intact.
Moderate	Non-contributing features or developments, occupy a moderate portion of the landscape, but sufficient intactness remains some degree of integrity.
Low	The vast majority of the landscape is dominated by non-contributing features or developments, such that little integrity or “sense of place” remains.

Figure 5). These aspects add additional elements to the scenic integrity, and are likely to be altered in different ways. For example, forests clear cuts within the surrounding mountains may have a different impact than the addition of modern houses or barns on the prairie landscape.

The Conspicuousness of Noncontributing Features

A substantial volume of research demonstrates that human-made features on a landscape are perceived more positively when they appear in harmony with the landscape (e.g., Kaplan and Kaplan 1989, Gobster 1999, Kearney et al. 2008). For example, Kearney et al. (2008) showed that survey respondents preferred development that blended with the natural setting through colors, smaller scale, and vegetative screening. For this indicator, we analyzed four characteristics, or groups of characteristics, that contribute to the

conspicuousness of man-made features.

These are: (1) distance from a given vantage point, (2) size, (3) color and shape, and (4) movement and noise (Table 4) described as follows:.

Distance

The impact that individual human-made features have on perception is influenced by the distance from the observer to the feature(s). Viewshed assessments using distance zones or classes often define three classes: foreground, middle ground, and background (Figure 6). For this assessment, we have used distance classes commonly used by the NPS:

Foreground = 0-½ mile from vantage point

Middle ground = ½-3 miles from vantage point

Background = 3-60 miles from vantage point



Figure 5. We considered the extent of intactness for distinct ecological/landform units in addition to the overall viewshed.

Table 4. Characteristics that influence how less conspicuous human-made features are within a viewshed.

Characteristic	Less Conspicuous	More Conspicuous
Distance	Distant from the vantage point	Close to the vantage point
Size	Small relative to the landscape	Large relative to the landscape
Color and Shape	Colors and shapes that blend into the landscape	Colors and shapes that contrast with the landscape
Movement and Noise	Lacking movement or noise	Exhibits obvious movement or noise

The *foreground* is the zone where visitors should be able to distinguish variation in texture and color, such as relatively subtle variation among vegetation patches, or distinguishing clusters of tree boughs. Large birds and mammals would likely be visible, as would small or medium-sized animals at the closer end of this zone (USFS 1995).

Within the *middle ground* there is sufficient texture or color to distinguish individual trees or other large plants (USFS 1995). It is also possible to distinguish larger patches within major plant community types (e.g., grasslands), provided there is sufficient difference in color shades. Within the closer portion of this class, it may be possible to see large birds contrasted against the sky, but other wildlife would be difficult to see without the aid of binoculars.

The *background* distance class is where texture tends to disappear and colors flatten. Depending on the actual distance, it is sometimes possible to distinguish among major vegetation types with highly contrasting colors (e.g., forested or grassland), but any subtle differences within these broad cover classes would not be apparent without the use of binoculars, and even then may be difficult.

Size

Size is another characteristic that may influence how conspicuous a given feature dominates the landscape, and how it is perceived. For example, Kearney et al. (2008) found human preferences were lower for human-made developments that tended to dominate the view (e.g., large multi-story buildings) and were more favorable for smaller single-family dwellings. In another study, Brush and Palmer (1979) found that farms tended to be viewed more favorably

than views of towns or industrial sites (which ranked very low). This is consistent with studies that have reported rural family dwellings, such as farms or ranches, as quaint and contributing to rural character (Schauman 1979, Sheppard 2001, Ryan 2006), or as symbolizing good stewardship (Sheppard 2001).

We considered the features on the landscape surrounding Fort Union as belonging to one of six size classes (Table 5). These reflect preference groups reported by studies. Using categories of mixed measures we considered size classes within the context of height, volume, and length.

Figure 6. Approximate distance classes from a vantage point near the Arsenal.

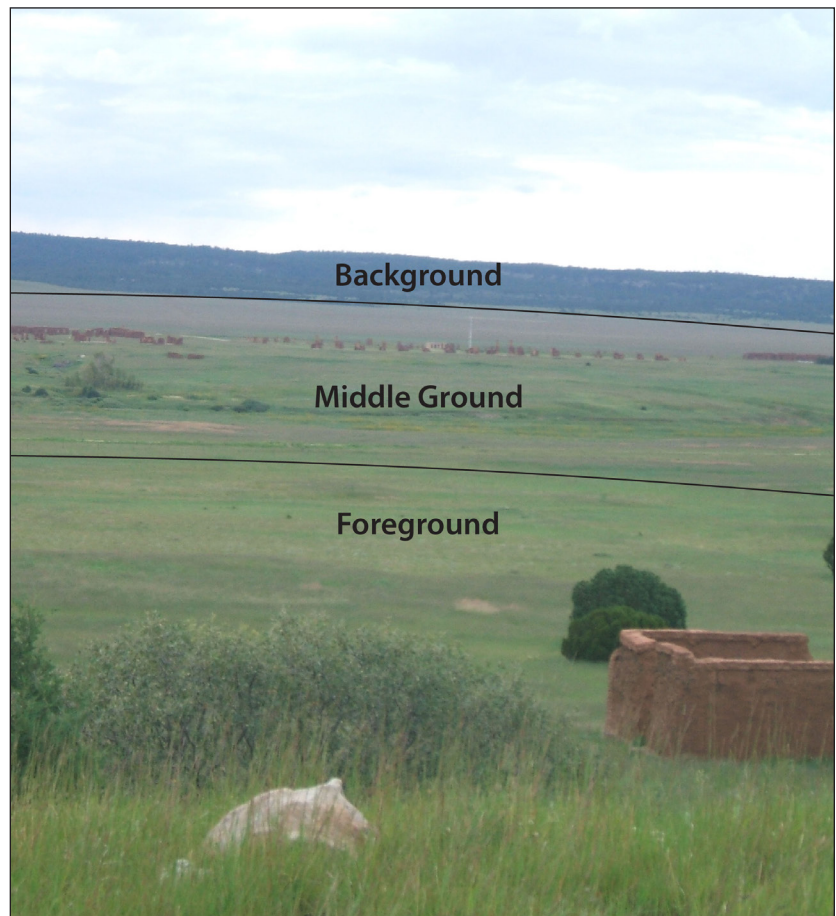


Table 5. A matrix describing the six size classes used for visible human-made features.

	Low Volume	Substantial Volume
Low Height	Single family dwelling (home, ranch house)	Small towns, complexes
Substantial Height	Radio and cell phone towers	Wind farms, oil derricks
Substantial Length	Small roads, wooden power lines, fence lines	Utility corridors, highways, railroads

The first size class contains relatively small dwellings (i.e., single family homes or ranches) not particularly large in height or volume. The next class includes clusters of dwellings or other buildings, such as towns. The monument's housing complex might fit this size class. The third class contains features that are very high (substantially higher than a typical house or other buildings). This group includes features such as radio or cell phone towers. The fourth class includes features of both substantial height and volume, such as wind farms. The fifth class includes features that have substantial length, but not much height or volume. This group includes roads, wooden telephone or electric lines, and fence lines. We included power lines in this group (i.e., without substantial relative height). Large metal power lines (e.g., 500 kv lines) or utility corridors constituted the sixth class (with substantial height and length), if they were present.

Color and Shape

Numerous studies have shown that how people perceive a human-made feature in a rural scene depends on how well they seem to fit or blend in with that environment (Kearney et al. 2008, Ryan 2006). Kearney et al. (2008) found preferences for homes that exhibit lower contrast with their surroundings as a result of color, screening vegetation, or other ways of blending into the landscape (see Figure 7).

Colors lighter in tone or higher in saturation relative to their surroundings have a tendency to attract attention (i.e., contrast with their surroundings), whereas darker colors (relative to their surroundings) tend to fade into the background (Ratcliff 1972, O'Conner 2008).

Similarly, shapes of features that contrast sharply with their surroundings may also have an influence on how they are perceived. This is a primary focus of visual resource programs of land management agencies (Ribe 2005). In forest management, negative perceptions relating to the contrasting shapes of forest harvest within their surroundings (e.g., clear cuts) were so strong that harvest shapes were addressed in the National Forest Management Act of 1976 calling for "*cuts . . . shaped and blended to the extent practicable with the natural terrain*" (16 USCA 1604g3Fiii). The Visual Resource Management Program of the BLM (1980) similarly places considerable focus on design techniques that minimize visual conflicts with features such as roads and power lines by aligning them with the natural contours of the landscape. For example, a straight road going through a landscape can be in marked contrast to the background environment, whereas a road that winds through a landscape along the natural contours (e.g., along hills, vegetation patterns) can be perceived much more positively, and can even be favored (Kaltenborn and Bjerke 2002; Figure 7).

Based on characteristics of contrast, three categories were used for how well individual human-made features blended into or contrasted with their surroundings (Table 6). We considered the color of a feature in relative harmony with the landscape if it closely matched the surrounding environment, or if the color tended to be darker relative to its environment which, as described previously, tends to make the feature less conspicuous. We considered the shape of a feature in relative harmony with the landscape if it was not in marked contrast to the environment, for example, if a linear feature followed natural contours.

Noise and/or Movement

Motion and sound can both have an influence on how a landscape is perceived (Hetherington et al. 1993), specifically by attracting a person’s attention to a particular area of a viewshed. Movement and noise parameters can be perceived either positively or negatively depending on the source and context. For example, the motion of running water generally has a very positive influence on perception of the environment (Carles et al. 1999), whereas noise from vehicles on a highway may be perceived negatively. We used three categories for this assessment to describe the level of conspicuous noise or movement associated with a human-made feature (Table 7).

Relationship Among Characteristics
Influencing Conspicuousness

These characteristics do not act independently with respect to their influence on the conspicuousness of features; instead, they tend to have a hierarchical effect. For example, the color or shape of a house would not be important to the integrity of the monument’s viewshed if the house is located too far away to distinguish those characteristics. Thus, distance becomes the primary characteristic that affects the potential conspicuousness of the remaining feature characteristics (e.g., size, color, shape, movement, noise). Therefore, we considered potential influences on conspicuousness in the context of a hierarchy based on the

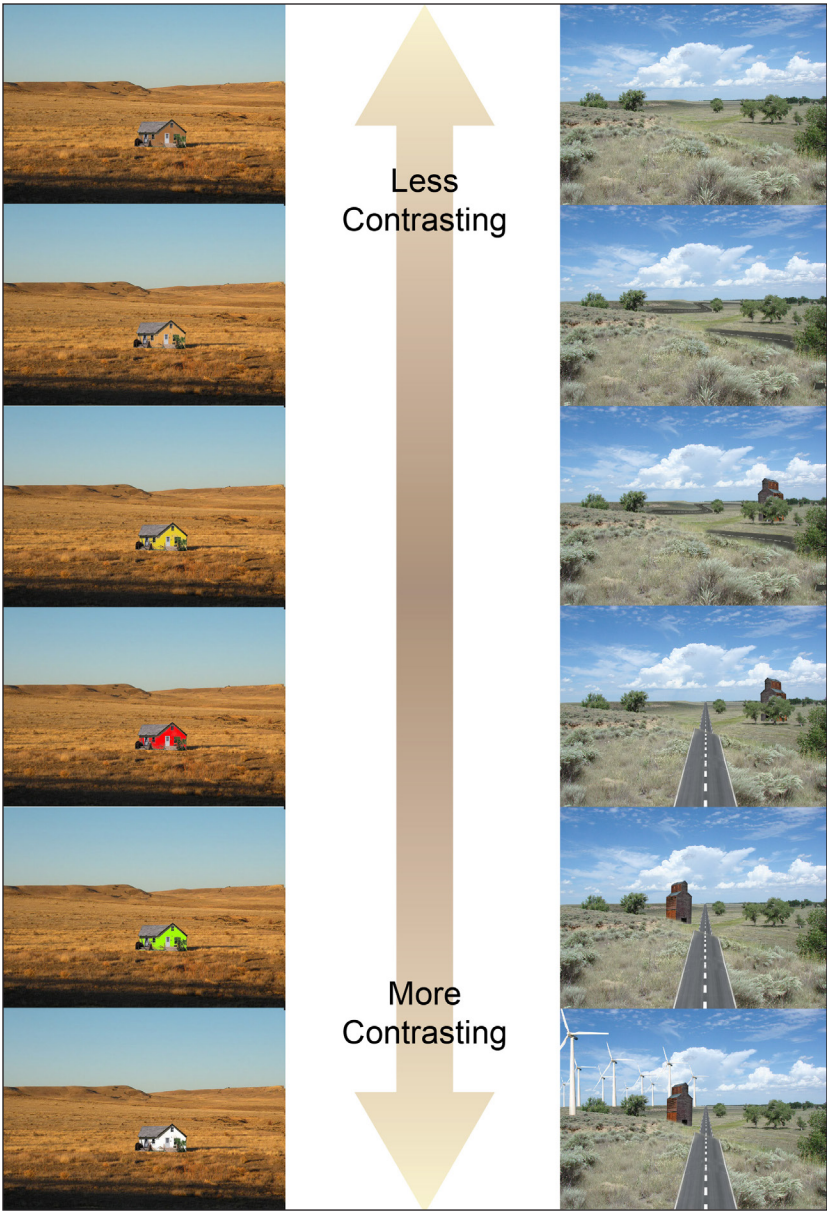


Table 6. Categories used to describe how well a given human-made feature contrasts/blends with the surrounding landscape.

Degree to Which Human-made Feature Contrasts/Blends With Surrounding Landscape		
Less Contrasting with the Landscape	Somewhat Contrasting with the Landscape	Contrasting with the Landscape
The color, contour, and shape blend well with the surrounding landscape.	The color, contour, and shape contrast to a moderate degree with the surrounding landscape.	The color, contour, and shape are in marked contrast with the surrounding landscape.

Table 7. Categories used to describe conspicuousness of noise or movement associated with a human-made feature.

Degree of Conspicuous Noise or Movement Associated with a Human-made Feature		
Not Conspicuous	Moderately Conspicuous	Conspicuous
Little or no conspicuous noise or movement associated with the feature	Moderate degree of conspicuous noise or movement associated with the feature	Conspicuous noise or movement associated with the feature

Figure 7. Illustration showing how color (left panel) and shape (right panel) can influence how human-made features blend or contrast with their surroundings. Note the influence of vegetation screening on the grain silo and the difference when the road follows the natural contours (upper right photos) or deviates from the natural contours (lower right photos).

distance characteristic having the most impact on the integrity of the viewshed, followed by the size characteristic, then both the color and shape and noise and movement characteristics (Figure 8).

Distance can have a dominant effect that may render remaining features relatively unimportant (Figure 9). Consequently, we considered the remaining effects only for features in the foreground for a given vantage point. The exception to this would have been if features in the middle ground were sufficiently large to warrant consideration of the remaining effects, but we encountered no such features at Fort Union vantage points.

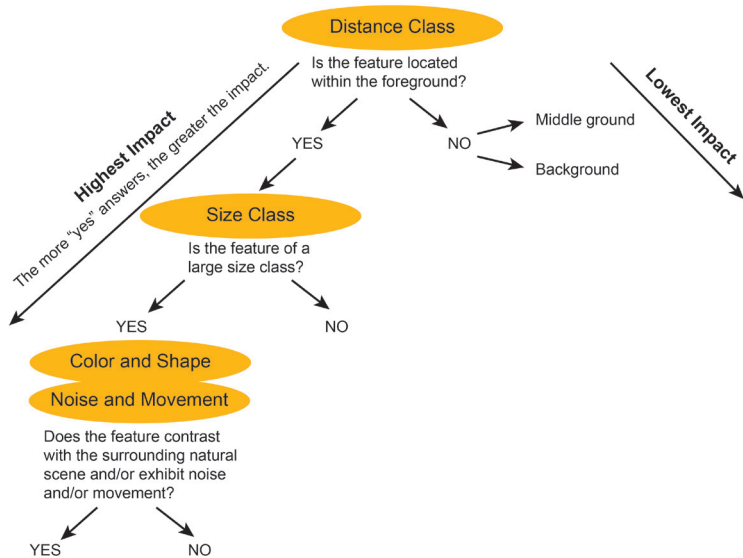


Figure 8. Conceptual framework for hierarchical relationship of characteristics that influence the conspicuousness of features.

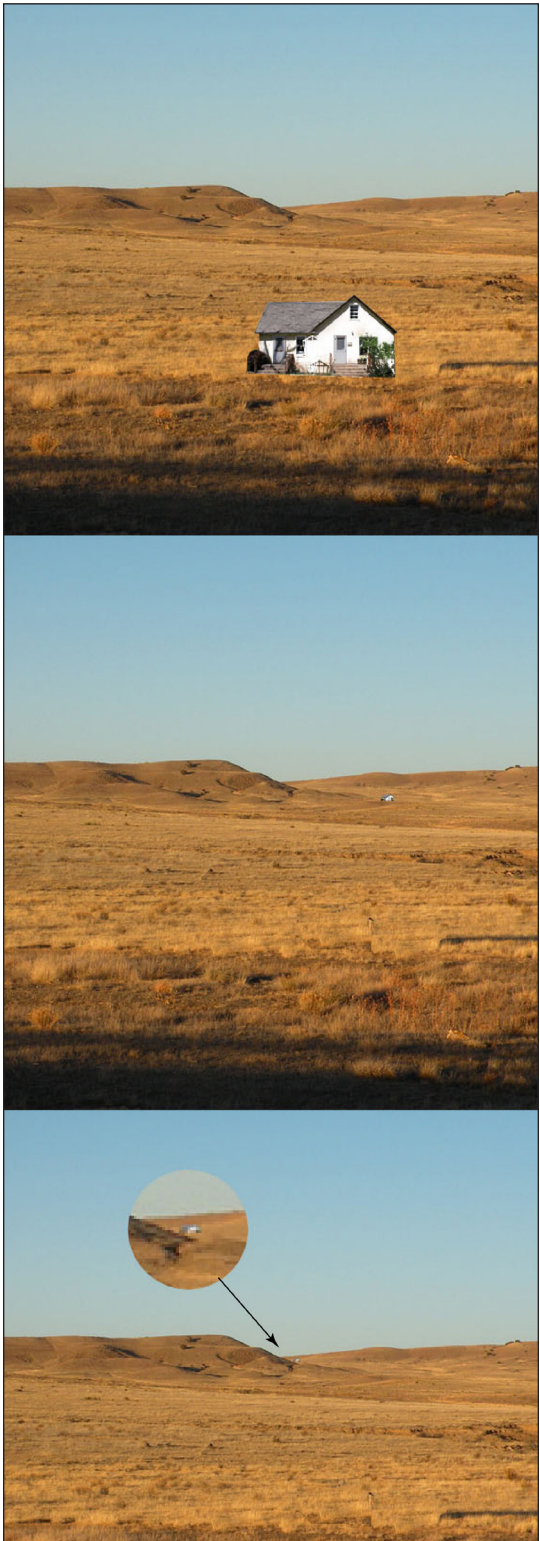


Figure 9. Illustration of the dominant effect of distance class on the conspicuousness of features on the landscape. The contrasting color of the house in the foreground (top image) is readily apparent. Although still discernible, the same house viewed in the middle ground (middle image) has much less of an impact. Finally, the contrasting color of the same house in the background (bottom image) is negligible.

A Landscape Perspective Using GIS

The GIS component of the assessment of scenic integrity included two descriptive elements: (1) a viewshed analysis from vantage point locations, and (2) GIS maps presenting prominent features that are non-contributing to the scenic and historic integrity.

Viewshed Analysis

Viewshed analyses were produced from each vantage point location and depicted the total visible area seen from each of those locations (Figure 10). These visible areas may or may not overlap among the vantage point locations, but each provided a unique perspective of the monument. The viewshed analysis process accounted for changes in elevation and other obstructions, such as tree, mountain, or building heights.

GIS Maps

GIS was used to show spatial patterns of prominent features on the landscape that are visible from the vantage points, providing an aerial or “bird’s eye” view. These features include individual roads and dwellings, as well as developments that might influence the scenic integrity of the viewshed. Not every non-contributing feature was included and an area within 10 miles was chosen, since features at greater distances have relatively less impact on scenic integrity than those in closer proximity.

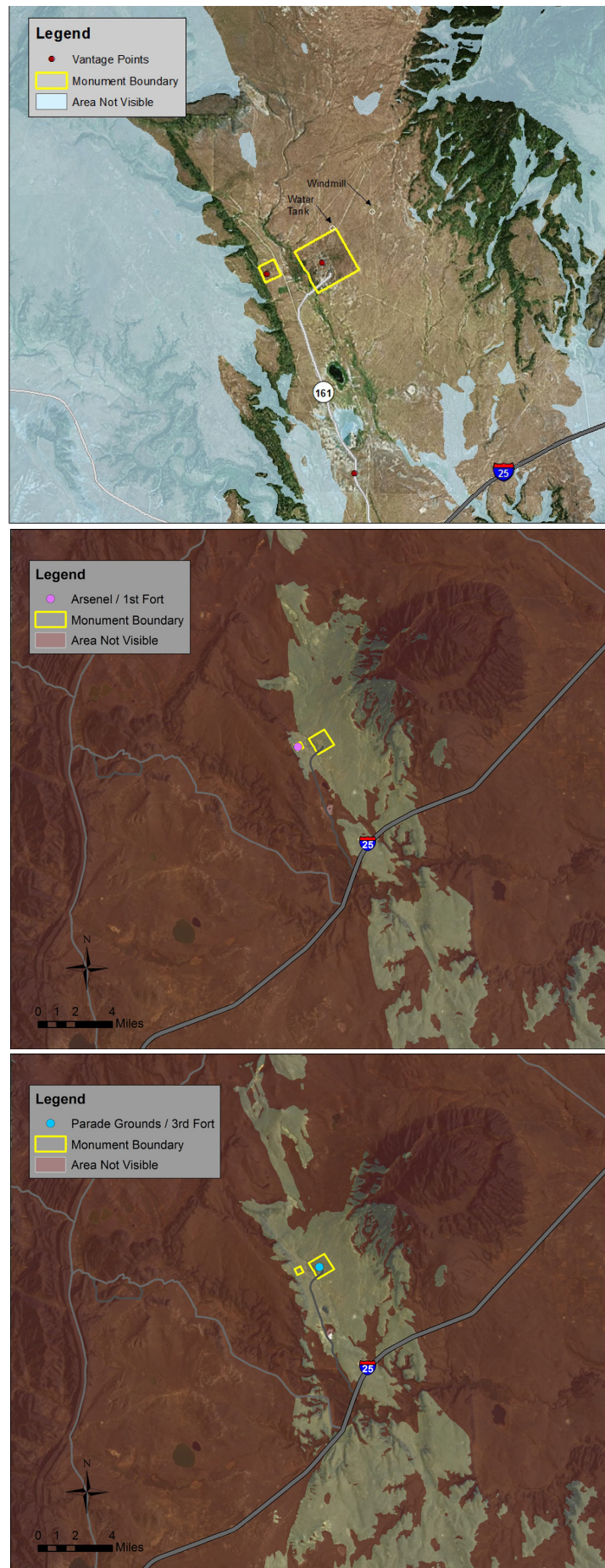


Figure 10. The full extent of the area considered (top) and the area visible and not visible from each of the vantage points.

Results and Discussion

Scenic and historic integrity is the extent to which the viewshed is intact (and maintains contributing features) and the extent to which non-contributing features are conspicuous. The following describes the results of the assessment.

Scenic Integrity

The viewsheds at Fort Union contain a very low proportion of non-contributing features overall (Table 8, Figures 11-12). Many of the features most visible are rural homes or ranches, which fall into the category of being perceived as “fitting into” the landscape (Kearney et al. 2008, Ryan 2006). Most of the features that may be viewed less positively were at greater distances within the monument’s viewshed, making them less conspicuous.

The most prominent human-made features within the viewshed are park facilities (Visitor Center, roads, housing, and other structures). Since the NPS presence is for the protection of the resource and telling of area stories, these are likely to fall within the perception of stewardship, and accepted as part of the landscape.

Based on the indicator classes described above, the monument’s viewshed is described as minimally developed and in good condition.

Predominate Non-contributing Features

Table 8 lists the primary features on the landscape within Fort Union’s viewshed and the characteristics that influence the conspicuousness of those features. We illustrate the spatial patterns of the most prominent human-made features located within Fort Union’s viewshed in Figure 13, and more detailed descriptions as follows.

Roads and Highways

From a scenic integrity standpoint, road densities and road visual impact are not a concern at Fort Union. The most prominent road within the Fort Union viewshed is New Mexico Highway 161, which is the primary

entrance to the monument. This highway winds through prairie and ranch landscape in a way that is relatively inconspicuous. Except during peak visitation, traffic along this highway is relatively light and the road ends at the Fort Union Visitor Center. In contrast, Interstate Highway 25, the four-lane divided highway that runs north-south, has substantial traffic, but is barely visible from the monument key vantage points. Similarly, the rural roads in the area that are visible from key vantage points are not very conspicuous, have quite low traffic, and do not impose any significant visual impact.

Rural Homes

Other than monument housing, only a few scattered rural ranches exist within this class. As mentioned previously, rural ranches do not evoke as much negative reaction as other types of structures because they are seen as harmonious with a rural landscape (Kearney et al. 2008, Ryan 2006). There are a few ranches visible from the vantage points; however, some of these are part of Tiptonville, which itself has historic significance. Given the low number of ranches visible, the perception of ranches fitting into the landscape, and the historic significance of some ranches, the impact of these features on the intactness of Fort Union’s viewshed is negligible.

Other Developments

There are few other developments of note within the Fort Union viewshed. One windmill is visible from all vantage points, but like ranches, this feature is likely to be perceived as fitting into a rural landscape. The feature that probably is the most conspicuous is the park water tank in the northeast corner of the monument. This feature does contrast somewhat with its surroundings, although it too is not within the foreground of any of our vantage points.

Intactness of the Major Ecological Landform Units

The biggest impact on visual intactness of major ecological landforms is on the short-grass prairie, and the visual impact in this

Table 8. The primary non-contributing features on the landscape visible within Fort Union’s viewshed and whether or not the features are visible from each vantage point; and if so, the distance class from that vantage point. Also shown are the key characteristics that influence conspicuousness of those features that are in the foreground at one or more vantage points; otherwise the cell is shaded. Features are arranged by whether or not they are within or outside of the monument boundaries.

Structure or Feature	Type of Feature	Size Class	Color and Shape Class	Noise and Movement Class	Vantage Points (Distance Class) ¹	
					Parade Grounds	Arsenal
Features Within Fort Union National Monument ¹						
Monument Access Road/ Hwy. 161 ²	Road or Highway	Substantial length but low height and volume	Somewhat contrasting	Moderately conspicuous	Yes-M	No
Park Access Roads (Paved & Unpaved) ²	Road or Highway	Substantial length but low height and volume	Somewhat contrasting	Moderately conspicuous	Yes-F	Yes-F
Water Tank ²	Other Development	Low height and volume	Somewhat blended	Not conspicuous	Yes-M	Yes-M
Features Outside Fort Union National Monument ¹						
Windmill	Other Development	Substantial height but low volume	Somewhat blended	Moderately conspicuous	Yes-M	Yes-M
Interstate 25	Road or Highway	Substantial length but low volume	Somewhat contrasting	Moderately conspicuous	Yes-B	No
Rural Roads	Road or Highway	Substantial length but low volume	Somewhat blended	Not conspicuous	Yes-M	No
Power Lines	Other Development	Substantial length but low height and volume	Somewhat contrasting	Not conspicuous	Yes-M	Yes-M
Fence Lines	Other Development	Substantial length but low height and volume	Somewhat contrasting	Not conspicuous	Yes-M	Yes-F/M
Rural Ranches	Rural Home or Ranch	Low height and low volume	Somewhat contrasting	Not conspicuous	Yes-M	No
Cell Tower	Other Development	Substantial height but low volume	Somewhat contrasting	Not conspicuous	Yes-B	No

¹Distance classes indicated for each feature based on foreground (F; 0-1/2 mile), (M) middle ground (1/2mile-3 miles), and (B) background (3-60 miles) distance classes.

²For the purpose of this assessment, these features were considered as non-contributing; however, their status as potentially contributing under Mission 66 has not yet been determined.

¹Features that occur both within and outside the monument’s boundaries are listed under that category where they occur most.

landform is quite low. The visual intactness of the surrounding forests and woodlands, as well as background mountains, is quite high and woodlands, as well as the background mountains, is quite high.

Historic Integrity

The landscape, land use, and historic views remain largely intact, although technology has changed, roads have been improved, and wagons and horses no longer have significant presence on the land. In a general sense, the current state of historic integrity for the Fort Union viewshed is in good condition. Major landmarks within the valley, the surrounding mountains, and vegetation patterns remain largely unchanged.

Although the once-bustling military post of Fort Union is now a much quieter physical remnant with a much-decreased human presence, visual connections between key historic viewpoints have been maintained. Adjacent private land is still in pastoral ranchlands and the integrity of historic views has been retained.

In Table 9 we list the contributing historic features within Fort Union’s viewshed, along with the vantage point locations from where the features are visible. The most prominent features are shown on the map in Figure 14, to help gain a sense of their spatial configuration.



North



East



South



West

Figure 11. Views from the Parade Grounds vantage point looking in each cardinal direction, showing the most prominent non-contributing features (inset photos).



North



East



South



West

Figure 12. Views from the Arsenal vantage point looking in each cardinal direction, showing the most prominent non-contributing features (inset photos).

Figure 13. The most prominent non-contributing features that are visible from at least one of Fort Union Vantage Points.

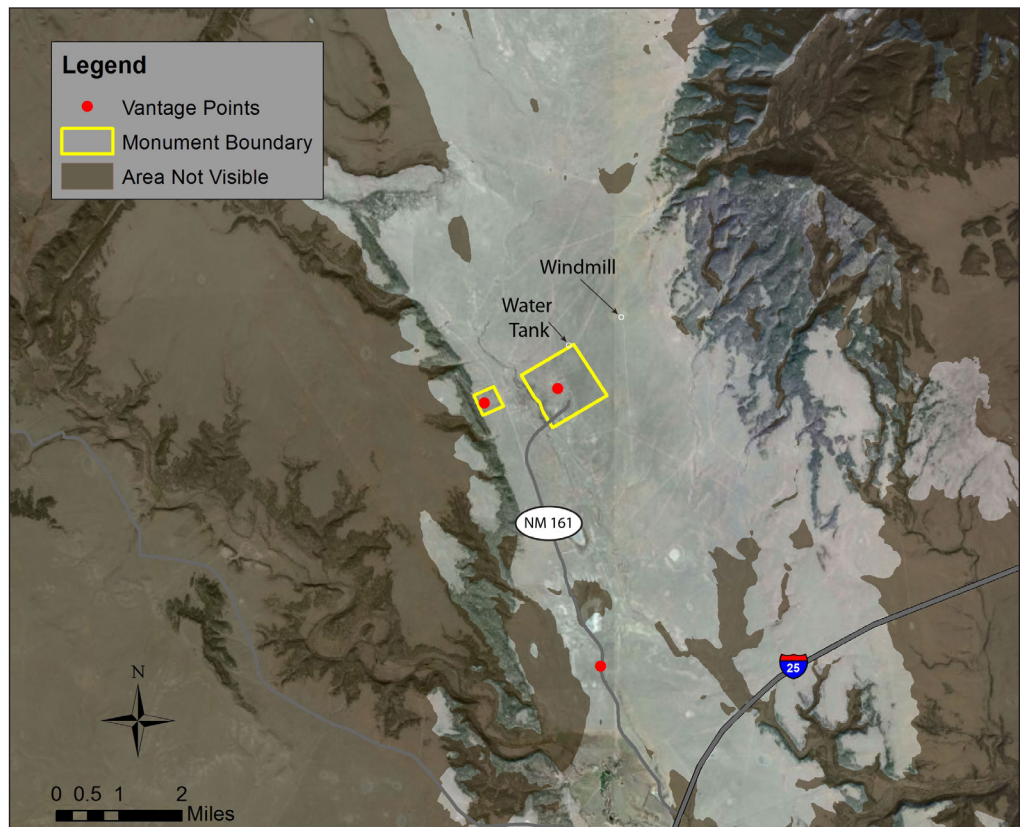


Table 9. The primary contributing historic features associated with the monument during the historic period or Mission 66 period, and whether they can be seen (indicated by Yes) from each of the vantage point locations.

Feature	Vantage Point	
	Parade Grounds	Arsenal
Historic Period		
Santa Fe Trail (ruts and satellite roads)	Yes	Yes
Arsenal Ruins, includes feeder ditches and "pond" (Fort 3)	Yes	Yes
Earthworks (star; Fort 2)	No	Yes
Structures-60+ (Fort 3)	Yes	Yes
Flagstone Walks (Fort 3)	No	Yes
Archaeological Deposits (visible by mounds and depressions; Forts 1, 2, & 3)	No	No
360 degree view of Mora Valley, mesas and mountains (Forts 1,2, & 3)	Yes	Yes
Shortgrass Prairie	Yes	Yes
Adobe-clay Fields (Fort 3)	Yes	No
Visual Connection Between 1st and 3rd Forts (across valley)	Yes	Yes
Spatial Arrangement/Organization of Structures (Forts 2 & 3)	No	Yes
Haying and Grazing Fields (Fort 3)	Yes	No
Racetrack (Fort 3)	No	No
Historic Communities (Fort 3)	No	No
Views of Fort Union (from Santa Fe Trail)	Yes	Yes
Mission 66 Period		
Visitor Center / Admin Facilities / Parking Lot	Yes	Yes
White Fence	Yes	Yes
Ornamental Plantings	Yes	Yes
Employee Housing	No	Yes

In addition to the NPS mandate to preserve historic elements, these historic features help to tell the story of the monument. Their presence creates a visual record of a rich history; the Santa Fe Trail ruts, architectural remains, the spatial arrangement of the ruins, and perhaps most importantly, the minimally changed landscape, provide an authentic setting for visitors to imagine and reflect upon human activity and military life on the western frontier (NPS 2008). It is this intact landscape, its broad views, and largely rural modern activities that allow visitors to “go back in time” and imagine life in this short-grass prairie valley over 150 years ago. Defining events surrounding the history of the fort and its varied communities are retold by park rangers to help visitors understand events of the past and the importance of the monument’s “sense of place.”

Historic features contribute to a sense of the historic viewshed, and some of those features have significant historical relevance that may not be easily recognizable to the average visitor. For example, since Fort Union was a military post, many strategic and tactical elements contributed to the construction and layout of this military post. Many of these elements are still evident today.

We have defined this historical context as strategic visibility. Strategic visibility was used as a means of creating safety and security in an otherwise unpredictable environment (Table 10). For example, the Arsenal for the third fort was constructed across the valley at the first fort’s location. *“This spatial separation from the third fort were rooted in concerns for safety and security (NPS 2005:50).”*

There was also separation between the post commander’s residence, officers’ quarters, the parade grounds, and several other features and elements of frontier military forts (NPS 2005). This cluster of

fort structures was built along an axis that provided the “visual backbone” of the fort (NPS 2005), and centered around a common parade ground.

In Figures 14-16 present a series of panoramic images from each of the primary vantage points and describe key contributions to historic integrity and to the interpretation of Fort Union.

Non-contributing Features that Impact the Historic Integrity of Fort Union’s Viewshed

The non-contributing features that detract from historic integrity are similar to those that impact scenic integrity, although the reasons why they detract from the viewshed may differ. For example, a visitor imagining the historic context of the fort may be distracted by a feature because it is inconsistent with the scene they are trying to imagine. A visitor trying to appreciate the scenic beauty may find features that detract from that beauty. Thus, reasons may differ, but in both cases, a non-contributing feature is perceived as not fitting in with the context that they value.

Additional Views that Help Tell the Story Fort Union

In addition to the vantage points assessed, supplemental views outside the park can help tell the story of Fort Union. One example is the “Fort Union Overlook” along the park entrance road (New Mexico State Route 161). This overlook provides visitors with a view of the Mora Valley and a far-off view of the fort and adjacent prairie and ranchlands. It captures the grandeur of the surrounding landscape (Figure 17). While not considered a vantage point as part of the assessment (because it is outside the park boundary), this additional view of the park and its surroundings are important to visitors’ experience of the approach to the monument.

Table 10. Contributing historic features that exhibit a strategic visibility aspect.

Feature	Strategic Visibility Aspect
Santa Fe Trail	All forts were oriented to the Santa Fe Trail. One of the military personnel's primary responsibilities was protecting the commerce and travelers using the Trail.
Arsenal Ruins from Third Fort	Separated from third fort at the first fort's original location for safety and security of ordnance. However, it's still visible from third fort.
Spatial Arrangement/ Organization of Structures (First Fort)	Overlooks Mora Valley and is surrounded by the mesa from inclement weather. Later, when this area becomes the location for the third fort's arsenal, it provides a strategic view of the third fort, providing safety and security.
Spatial Arrangement/ Organization of Structures (Second Fort)	Situated in the bottom of Mora Valley, the location of the second fort was better suited for defensive purposes since it was built partially underground.
Spatial Arrangement/ Organization of Structures (Third Fort)	The spatial arrangement of the third fort displays a balance between trade and defense based upon nearly equal areas devoted to each. The openness and proximity to the Santa Fe Trail as well as the second fort were the main reasons for its location. The spatial arrangement of the various structures also created a "visual backbone" where officers were located center stage, supporting the military hierarchical structure.
Topography and 360-Degree View of Mora Valley, Mesas, and Mountains across the short-grass prairie	The openness and expansiveness of Mora Valley provided long-range visibility, which helped alert military personnel to new arrivals, both friends and foe.
Views of Fort Union From Santa Fe Trail	The substantial views and vistas not only served the military personnel posted at the fort but also provided a sign of hope to approaching travelers. Today, these views provide a real sense of the vastness that historic travelers had to cover in order to reach a better life.

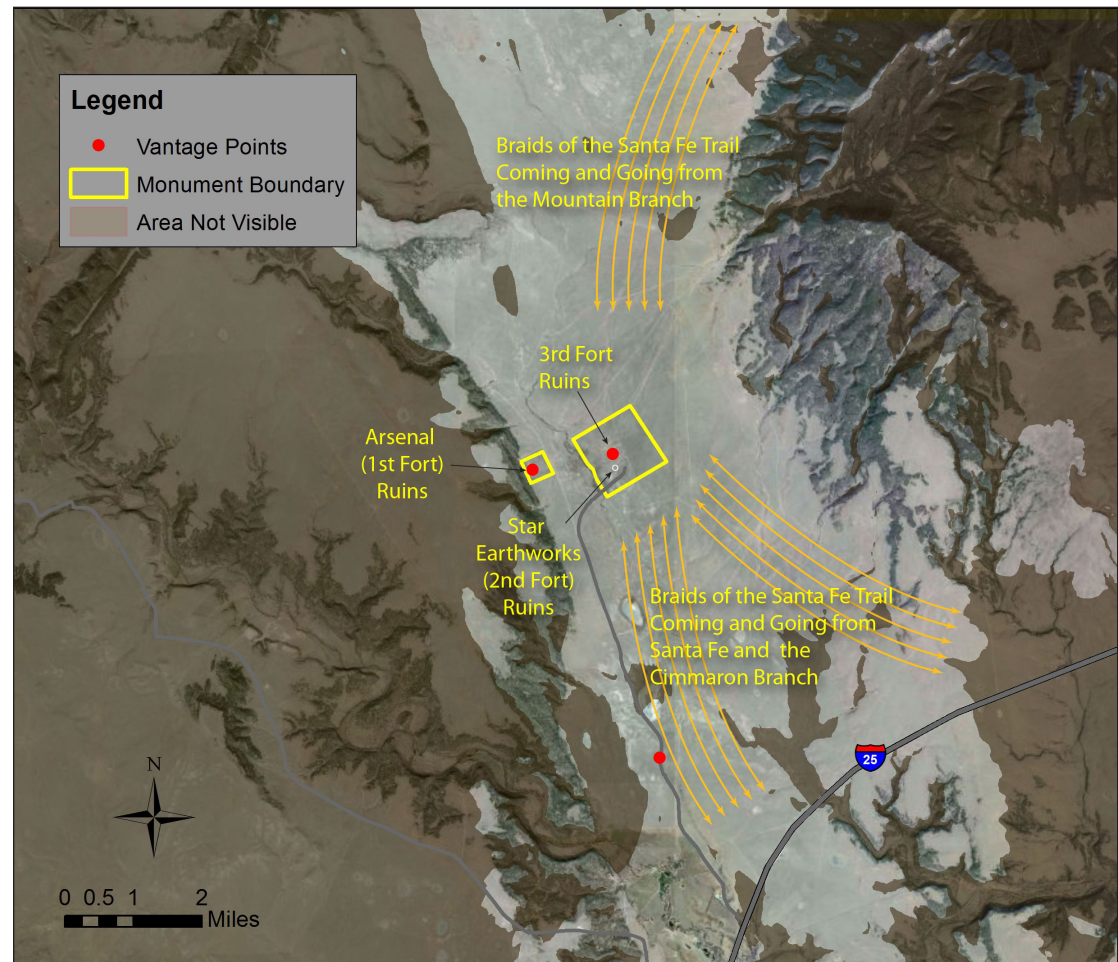


Figure 14. The most prominent historic contributing features from the Fort/Trail period that are visible from at least one of Fort Union Vantage Points.



North



East



South



West

Figure 15. Views from the Parade Grounds vantage point looking in each cardinal direction, showing the most prominent contributing historic features that help tell the story of Fort Union through its viewshed.



North



East



South



West

Figure 16. Views from the Arsenal vantage point looking in each cardinal direction, showing the most prominent contributing historic features that help tell the story of Fort Union through its viewshed.

Conclusion

For four decades the military post at Fort Union supplied other forts in the Southwest; sheltered soldiers providing a U.S. military presence in the New Mexico territory; and provided interaction between soldiers, civilian workers, Hispanos, and Native Americans (NPS 1939). Though these activities occurred over 150 years ago, the landscape in which they occurred is largely unchanged. The landscape commemorates this history and offers a 360-degree viewshed and insight into early New Mexico. This view is of short-grass prairie, mountains, valleys, and ranchlands, and offers a glimpse into life on the Great Plains in a time where wagons were a primary mode of transportation. These same views may have offered strategic benefits to the military commanders who chose the area for the location of Fort Union, as well as the junction of two important segments of the Santa Fe Trail.

These views are sought out by visitors to national parks, from all over the world. National park visitors repeatedly express their desire for the NPS to protect scenic vistas. Expansive views of land outside the park boundary, predominantly those of the Fort Union Ranch, along with the historic adobe ruins and other historic features, create a backdrop that allows a visitor's imagination to soar and to imagine a time

when the Santa Fe Trail was an international road between America and the young nation of Mexico, and later the New Mexico Territory. Because of its intact landscape, largely due to the efforts of its neighboring landowners, visitors to Fort Union are aided in imagining what life was like many years ago.

Visitors may respond to the same features that appealed to early Native American residents, Hispano farmers, and Americans traveling west by wagon to a new beginning. The landscape, the land, and its many appealing views, remain the same for both historic communities and modern visitors to the area; the people and their environment (including viewshed) are intertwined. The Fort Union area, consisting of beautiful, largely unchanged landscapes, possesses critical scenic and historic integrity. This integrity is important to telling the stories of the land, its inhabitants, and the interactions between cultures that impacted people of New Mexico historically and even today. We hope that the results of this assessment may provide some guidance to the continual management and protection of these scenic and historic values so that future visitors may have the opportunity to experience this landscape and the stories it has to tell.



NPS/ROBERT BENNETTS

Figure 17. Views from the overlook outside the park help tell the story of what travelers must have seen and felt as they approached the fort.

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