

Appendix J-1

Public Roads Use Plan (and Traffic Study)

TWO RIVERS WIND PROJECT PUBLIC ROADS USE PLAN

PREPARED FOR:

Two Rivers Wind LLC.
c/o Cogency Global
850 New Burton Road, Suite 201
Dover, Delaware 19004 USA
Contact: Glenn Isaac, Director Regulatory and Environment
glenn@bluearth.ca

PREPARED BY:

ICF
3665 JFK Parkway,
Building 1, Suite 300
Fort Collins, CO 80525
Contact: Melanie Martin
melanie.martin@icf.com

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Attachment 1. Traffic Study

1.0 Introduction

This Public Road Use Plan was developed by Two Rivers Wind, LLC (Two Rivers Wind) for the Two Rivers Wind Project (Project) Carbon County, Wyoming (**Figure 1**). The Project is located on the Two Rivers Ranch in Carbon County, Wyoming immediately to the north of the town of Medicine Bow.

The Two Rivers Wind Project consists of up to 60 wind turbines on approximately 15,657 acres of BLM-administered, private, and state land in T23N, R78W (Phase I, II, and III site) including a right-of-way for State Highway (WY) 487. A lease has been negotiated with the Wyoming Office of State Lands and Investments for the use of State lands.

This Public Roads Use Plan describes the location and status of the public roads that would be used to transport construction workers, equipment, and project components to the Project site, existing and projected traffic volumes, and potential impacts to public roads from Project construction.

The Public Roads Use Plan is based on a Traffic Impact Study prepared in 2019 by Mike Gostovich, PE, a licensed Wyoming Professional Engineer, included as Attachment 1. The information and analysis in this plan were used to develop a Public Road Use Agreement, which was signed on May 22, 2019, between Carbon County and Two Rivers Wind. Two Rivers Wind will work with the County to update the current Road Use Agreement prior to the commencement of Project construction.

Figure 1. Project Location

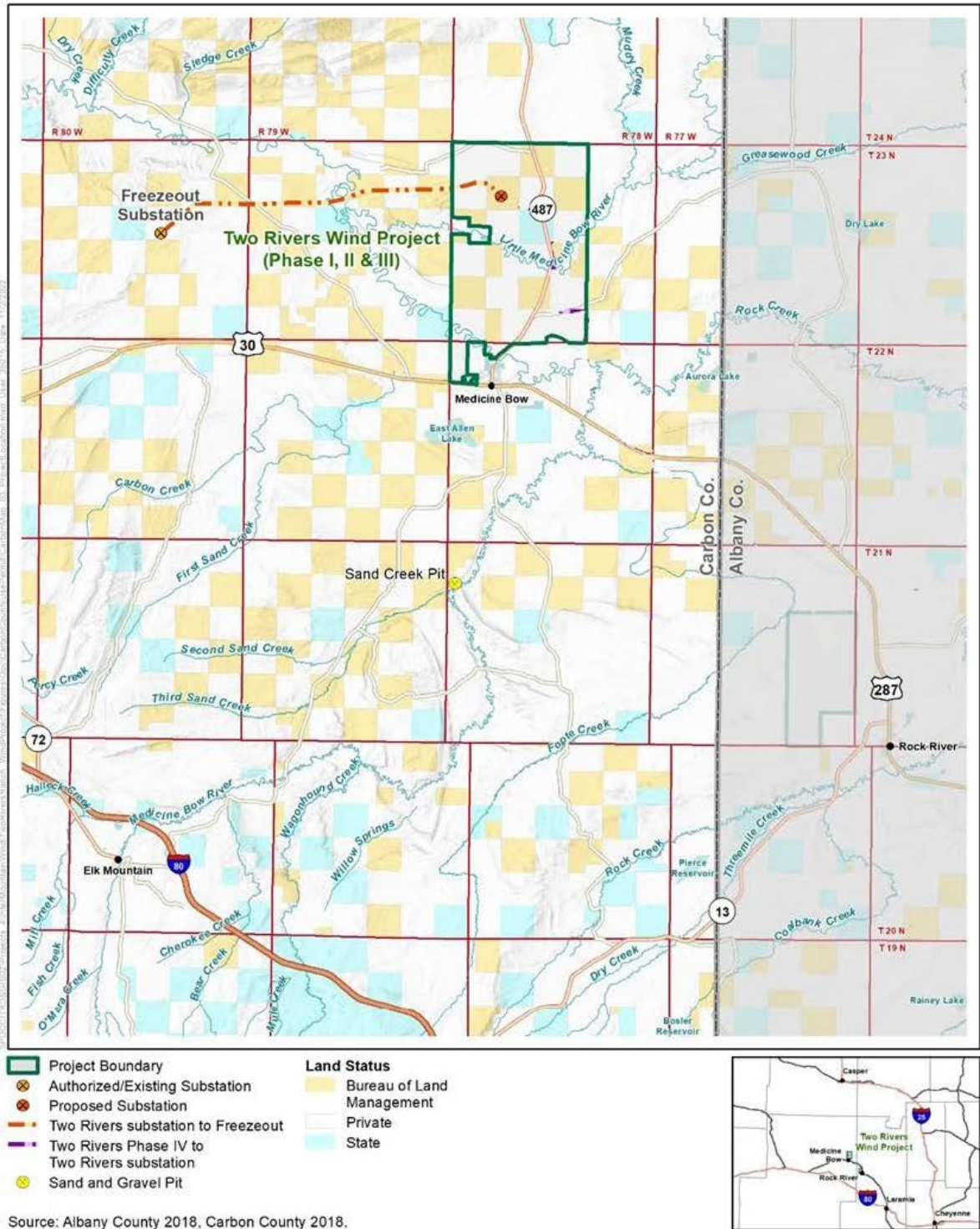


Figure 1
Two Rivers Wind - Project Location

2.0 Project Access and Transportation Routes

Legal access to the Project sites is provided by US 30/287, WY 487 and Carbon County road (CR) 294. Additional roads in the area will be used to access the transmission line right-of-way including Roads 121/270 and Road 262. New private project access roads would also be constructed in both sites to provide access to the turbine locations for construction, operation and maintenance, and decommissioning of the Project (**Figures 2a -2b**).

Primary Haul Routes for wind turbine components will be from Cheyenne traveling west on I-80 and then north to the Project site on WY 13, US 30/287, and WY 487 (see primary haul routes on **Figure 1**). The primary haul route for construction water and gravel is anticipated to be on WY 487 and US 30/287 between Medicine Bow and the Project site. WY 487 and US 30/287 will provide the main access routes for construction vehicles. Secondary haul routes for the transportation of construction workers, equipment, and supplies could include US 287 north from Laramie, I-80 east from Rawlins, WY 220 to WY 487 south from Casper, and I-25 to WY 34 west from Wheatland.

2.1 County Road 294

County Road 294 (Oil Springs Road) is a gravel road that extends west to east through the extreme northwestern portion of the Phase I, II, and III site. It is currently approximately 15 feet in width with a 24 ft. wide cattle guard at its intersection with WY 487. CR 294 would be expanded to 26 ft. during construction and then reduced to 22 feet following construction, and would be used for construction, component delivery, maintenance, and operation activities within the site.

2.2 State Highways 13 and 487

Both WY 13 and WY 487 are paved two-lane roadways that are functionally classified as minor arterials. They extend northeast to southwest (WY 13) and north to south (WY 487) between Casper and Medicine Bow providing access to various rural areas surrounding the Project site. WY 487 would be one of the primary routes used for project-related traffic.

2.3 US 30/287

US 30 is an east-west route that extends from Cheyenne through Laramie, Rawlins, and ultimately to the Utah border. US 287 is a north-south route beginning at the Colorado border, running north to Laramie, west to Rawlins, and then north to Lander. While both are separate routes, they overlap and operate as a single roadway between Laramie and Rawlins. The US 30/287 roadway is functionally classified as a minor arterial between Laramie and Walcott junction. This road section is an asphalt paved highway. It is primarily a two-lane road with a short section of divided four-lane road where it passes through the town of Medicine Bow. The driving lanes are 12-foot wide with 5-foot shoulders. US 30/287 would be a primary route for delivery of Project components, construction equipment, and materials to the Project site.

Figure 2a. Project Site Plan

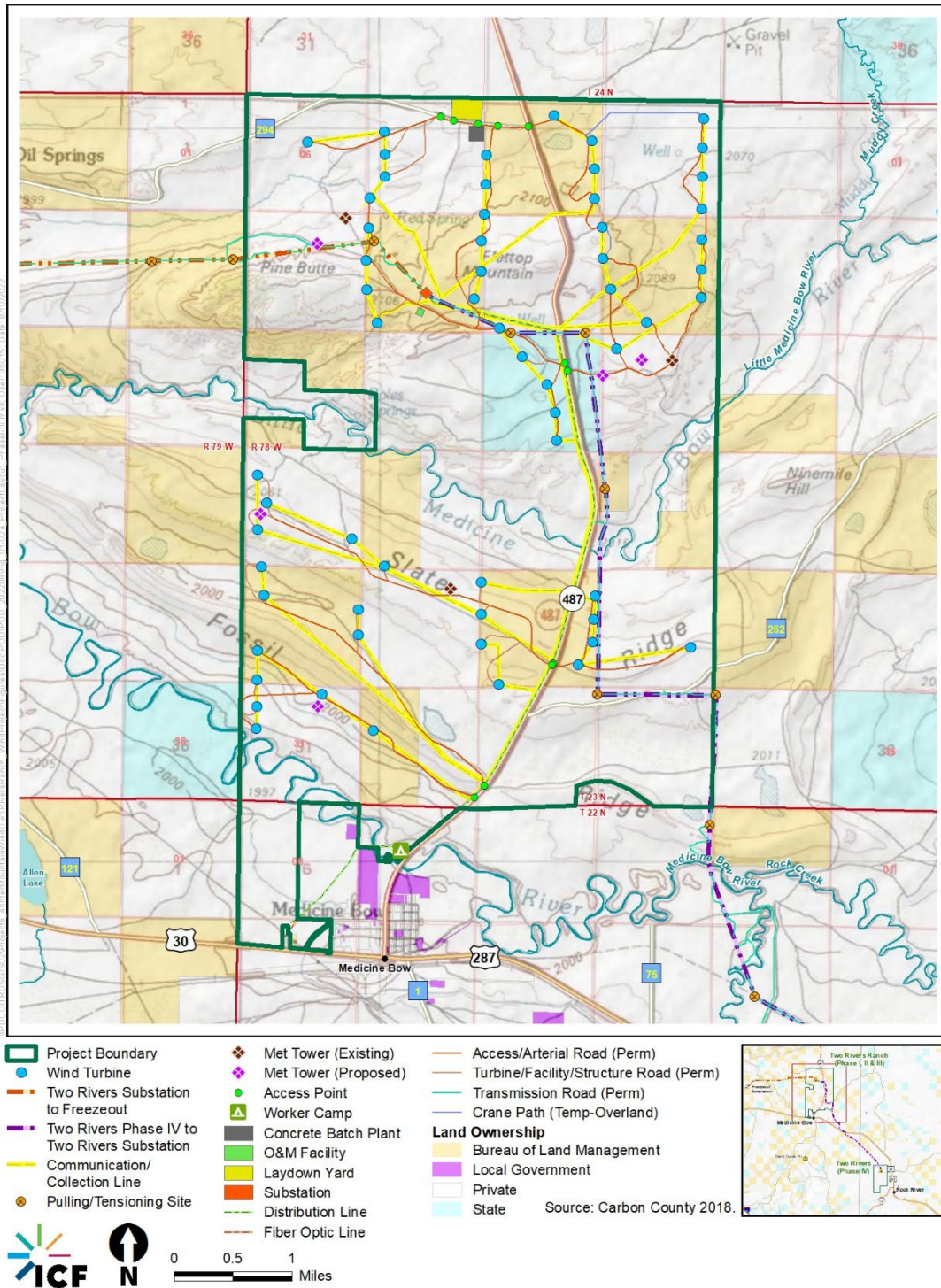
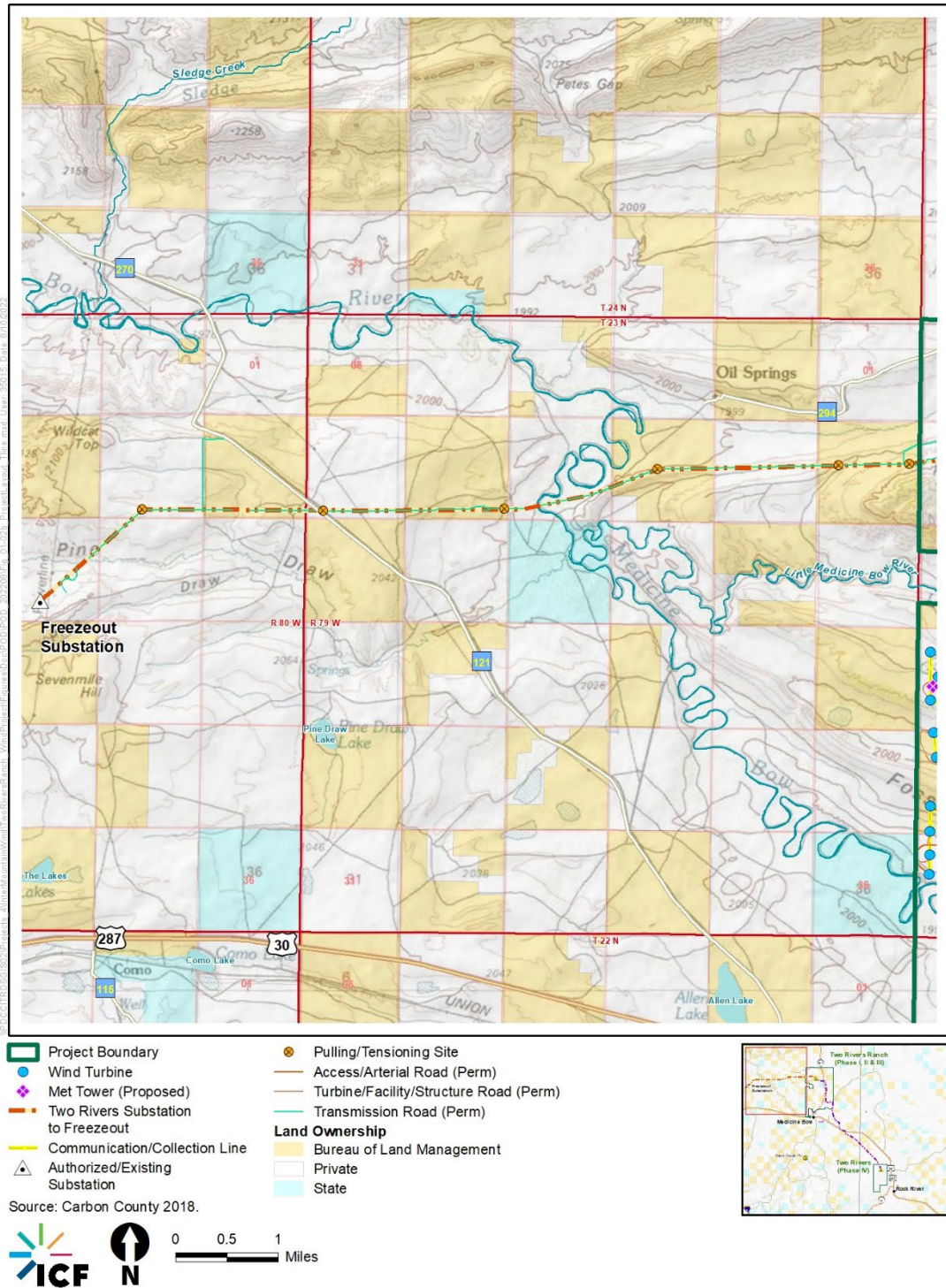


Figure 2b. Project Site Plan



2.4 Interstate 80

I-80 extends east to west across southern Wyoming and travels through Laramie and Rawlins. Its functional highway classification is a rural principal arterial interstate. There are two interchanges to connect I-80 with US 30/287. I-80 is a four-lane, divided, paved highway with 12-foot travel lanes and 8 to 10-foot outside shoulders with 2 to 4-foot median shoulders. I-80 would be a primary route for delivery of Project components, construction equipment, and materials to the Project site.

3.0 Traffic Volume

3.1 Existing Conditions

No traffic volume data is available for Carbon County routes; however, the Carbon County Road and Bridge Superintendent estimated volumes at less than 50 vehicles per day for CR 1 and CR 262. The estimated traffic volumes for CR 294 were less than 20 vehicles per day.

Table 1 shows average daily traffic (ADT) count data for several locations along I-80, US 30/287, and WY 487.

Table 1. 2016 WYDOT Traffic Count Data

Site #	Location	Milepost	AADT	Functional Roadway Classification	County
23	I-80 West of Rawlins	208.65	12,099	Rural (R.) Principal Arterial - Interstate	Carbon
26	I-80 East of Little America	71.6	12,094	R. Principal Arterial - Interstate	Sweetwater
106	I-80 West of Laramie	299.3	10,545	R. Principal Arterial - Interstate	Albany
178	US 30 East of Sage Junction	30.3	1,508	R. Principal Arterial - Other	Lincoln
114SE	WY 487 Southeast of WY 220	72.71	733	R. Minor Arterial - Other	Natrona
117	US 287 North of Spruce St	0.2	4,670	Urban (U.) Principal Arterial - Other	Carbon
145N	US 30/287 North of WY 34	310.85	985	R. Minor Arterial - Other	Albany
145E	WY 34 East of US 30/287	0	615	R. Minor Arterial - Other	Albany
145S	US 30/287 South of WY 34	310.85	1,391	R. Minor Arterial - Other	Albany

Source: WYDOT 2017.

AADT = Average Annual Daily Traffic

3.2 Forecast Vehicle Trips

Each wind turbine installation would require between 60 and 65 concrete and other material truck trips, approximately 22 crane related trips, 7 to 8 heavy weight wind turbine component truck trips,

and 2 to 5 extended reach fork lifts for an estimated total of 100 material and component truck trips per turbine.

In addition to the construction truck traffic described above, various ancillary trips related to fuel, mechanics, vendors, worker transport, and maintenance items are also expected. These trips are likely to originate in Albany and Carbon Counties. As such, they would impact traffic operations for streets and intersections evaluated in this analysis.

Construction activities are scheduled to begin in April of 2023, following the ROW grant, with the majority of turbine construction occurring in 2024. Construction would occur over two construction seasons with a target of completion by the end of 2024. The overall monthly workforce during construction is expected to vary from a low of 11 workers to a peak of 170 workers, with an average workforce of 156 workers during the last year of construction. Assuming a carpool rate of 2 persons/vehicle and only one trip in and one trip out per commuter vehicle, this would result in a commuter traffic generation of between 12 and 170 trips per day.

3.3 Transportation Routes

Primary haul routes for wind turbine components would be from Cheyenne traveling west on Interstate 80 and then north to the Project site on US 30/287 and WY 487 (**Figure 1**). The primary haul route for construction water and gravel is anticipated to be on WY 487 between Medicine Bow and the Phase I, II, and III site. Secondary haul routes for the transportation of construction equipment and materials could include Interstate 80 east from Rawlins and WY 487 south from Casper.

3.4 Construction Traffic Impacts

The Project would increase the volume of traffic on rural highways during construction due to vehicle and truck trips for transporting construction equipment, materials, project components, and the construction workforce. Based on the current proposed construction schedule, it is expected that the early months of the construction period would consist of road and foundation construction with the majority of work being performed after April 2023 and April 2024. The hourly and daily number of truck and worker trips will vary throughout the construction period due to factors such as construction scheduling, material arrival times and dates, number of workers, etc. Therefore, precise daily traffic volumes for the Project have not been estimated. However, the construction phase traffic volumes and the existing traffic volumes are low and substantial vehicle delay on transportation routes due to increased highway traffic capacity is not anticipated.

An evaluation of existing conditions showed that the highways and intersections associated with the proposed transportation routes currently experience a minimal level of traffic demand and thus, the level of service and reserve capacity for those facilities are more than adequate. Given that existing traffic volumes are relatively light in most areas, it is not expected that highway or intersection level of service would degrade. Therefore, lane expansion improvements will not be necessary for any of the associated roadways.

3.5 Operations Traffic Impacts

Traffic levels associated with Project operation and maintenance activities would be low in volume and would have no appreciable effect on the operation of the state highway system or the county road system. The actual timing of these vehicles on area roadways would vary based on Project needs, work schedules, and time of year.

4.0 Sight Distance Evaluation Criteria

The minimum intersection sight distance is the distance needed by uncontrolled drivers on a road approaching an intersection to see a vehicle entering the road and be able to slow or stop to accommodate the entering vehicle. The American Association of State Highway and Transportation Officials (AASHTO), “Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)”, states that stopping sight distances that exceed the minimum stopping sight distances are intended to enhance traffic operations but are not minimum design criteria that are essential to safety (AASHTO 2001).

The stopping sight distance at an intersection is measured from a driver’s eye height of 3.5 feet above the road surface at both the intersection and along the intersecting uncontrolled road. This allows both drivers to see each other and take appropriate action. The WYDOT “Access Manual” requires a minimum of 695 feet of stopping sight distance for highways posted at 65 mph with a 0% grade. At a -5% grade the distance is 760 feet and at a +5% grade 645 feet (WYDOT 2005).

County Roads 262, and 294 have a gravel surface which can vary in surface texture from time to time and thereby have a variable traction coefficient. The AASHTO guidelines for low volume roads state that the traction coefficient can vary from 0.36 to 0.80 depending upon surface texture and if it is dry or wet. Therefore, for the purposes of this analysis the conservative traction coefficient of 0.36 is used to compute the stopping sight distance on the county roads. The stopping sight distances for a 40, 45, 50, and 55 mph speed limits are 295, 350, 415, and 480 feet on a 0% grade. For a -5% grade the stopping sight distances increase to 320, 380, 450, and 530 feet. For the purposes of this analysis the conservative -5% grade minimum stopping sight distance is used.

4.1 Project Access to State Highway 487 and County Roads 294

Access to the Phase I, II, and III site is from WY 487. Within the Project site, there would be 8 points of access from WY 487 (excluding CR 294) to Project facilities (**Figure 2a**). The access points have been adjusted in the current layout to address the findings from the Traffic Impact Study (Appendix G-2) and safe sight distances will be implemented in coordination with WYDOT.

There will be 5 access points located off CR 294. Two Rivers Wind will coordinate directly with Carbon County through the road use agreement, which will include reducing speed limits for safety as well as having flaggers as needed for heavier volumes of truck hauls off CR 294.

5.0 Recommendations Related to Road Safety and Geometrics

The primary safety concern is related to potential conflicts between oversized transport vehicles and other traffic on State Highways and county roads during the construction period. Some sections of the transportation routes for oversized loads are narrow. Travel lanes on highways are typically 12 feet wide while road widths for county roads can narrow to 16 to 20 feet for two-way traffic with minimal shoulders. Recommendations to provide for adequate intersection sight distances and road widths for access to the Project site from WY 487 and WY 13 are described below.

5.1 Projects Access to State Highway 487

The access points have been adjusted in the current layout to address the findings from the Traffic Impact Study (Attachment 1) and road safety and geometry will be addressed in coordination with WYDOT. Reducing speed limits to 55 mph and using flagmen, traffic signals, signage, or other appropriate methods may also be used to control both public and construction traffic to maintain safety and minimize impacts to the public. This provides an alternate solution to moving the access points listed above.

6.0 Traffic Control

Where construction traffic uses or crosses public roads, Two Rivers Wind will maintain traffic control as needed. Flagmen, traffic signals, signage, or other appropriate methods will be used to control both public and construction traffic to maintain safety and minimize impacts to the public.

7.0 Signage and Public Notices

Two Rivers Wind will provide information to the public in the form of notices or signs as practicable on Project activities that will impact public traffic. To the extent possible, Two Rivers Wind will provide this information in advance of these activities.

8.0 County Road Use Agreement

The Project would use CR 294 to accommodate Project construction activity to the work sites as described above. Two Rivers Wind will conduct a pre-construction baseline survey to document existing road conditions. This baseline survey will be used as the benchmark to which potential damage to roadways resulting from Project development will be compared. Two Rivers Wind will enter into a Road Use Agreement with Carbon County that will specify commitments related to road

improvements, road maintenance, and road repairs, if necessary, during construction, operation, and decommissioning of the Project.

Two Rivers Wind recognizes its responsibility for the repair of any accelerated road wear caused solely by Project traffic and will work with Carbon County to identify these areas of responsibility. Two Rivers Wind will implement and maintain a reasonable dust abatement plan when using county roads during construction of the Project and will consult with Carbon County on the preferred method of dust control.

Two Rivers Wind anticipates that specific road maintenance requirements will be addressed in the County Road Use Agreement and commits to working cooperatively with Carbon County to determine road access, safety measures, upgrades and maintenance requirements. Where modifications to a county road are necessary for the Project, Two Rivers Wind will present the design to the Carbon County Road and Bridge Supervisor for review. At the completion of the Project and during decommissioning, Two Rivers Wind will reclaim disturbed areas in accordance with the Reclamation Plan submitted as an appendix to the County permit application.

9.0 Wyoming Department of Transportation

9.1 Permit for Oversized/Overweight Loads

Project components would be trucked to the site via Interstate 80, US 30/287 and WY 13 and 487. Two Rivers Wind or their turbine supplier would obtain necessary permits from WYDOT for transporting oversized/overweight loads prior to transporting turbine components from the State port of entry to the Project site.

9.2 State Road Use Agreement

WY 487 will provide the main access route for construction, operation, and maintenance vehicles for Phase I, II, and III of the Project. Two Rivers Wind will enter into a Road Use Agreement with WYDOT prior to commencement of construction. The Road Use Agreement will describe the exact routes to be used for the delivery of construction materials and equipment, and project components, so that impacts to roadways are appropriately managed. Any necessary modifications to State highways or intersections to accommodate construction traffic will also be defined in the Road Use Agreement.

10.0 Conclusion

Impacts to area roads will be avoided or minimized by road improvements completed prior to construction, road maintenance activities during construction, and where necessary, road repairs following construction of the Project. Road improvements, maintenance, and repair would be completed by Two Rivers Wind in accordance with the terms and conditions of the County and State Road Use Agreements to be executed prior to commencement of construction. Two Rivers Wind or their turbine supplier would obtain any necessary oversized weight/oversized load permits prior to

transporting overweight/oversized loads from the State port of entry to the Project site. Though impacts to public traffic during construction may result in occasional inconvenience to area residents, such impacts will be infrequent and of short duration. Vehicles associated with Project construction are not anticipated to impair the health, safety, or welfare of current road users in any material way. Existing roads and intersections associated with the proposed transportation routes currently experience a minimal level of traffic demand and thus, the level of service and reserve capacity for those facilities are more than adequate. It is not expected that highway or intersection level of service would degrade. Operation of the proposed Project would result in negligible impacts to roads and an incremental increase in light vehicle traffic on WY 487, CR 294, US 30/287, WY 13, and I-80.

11.0 References

- American Association of State Highway and Transportation Officials (AASHTO). 2001. Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT<400). Available: <<https://bookstore.transportation.org/imageview.aspx?id=450&DB=3>>. Accessed: January 21, 2016.
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- WYDOT. 2014. Traffic Program Access Manual.

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Attachment 1 - Traffic Study

**Traffic Impact Study
Two Rivers Wind Project
February 2019**



Traffic Impact Study Two Rivers Wind Project February 2019

Prepared for:

**ICF International
3665 JFK Parkway, Building 1, Suite 300
Fort Collins, CO 80525**

Prepared by:

Mike Gostovich, PE
11800 Blazer Road
Cheyenne, WY 82009



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Summary

The Two Rivers Wind Project (the Project) is located in south central Wyoming in the area of the towns of Medicine Bow and Rock River. This development is undertaken by Two Rivers Wind LLC., a fully owned subsidiary of BluEarth Renewables LP, and the Project is currently being designed for 77 wind turbine generators with a nameplate capacity of 280 MW. Construction of the Project is scheduled to start in the spring of 2021 and be completed by January 2022.

This report looks at operational characteristics of the highway infrastructure and the safety of manpower and equipment entering and exiting the worksites. The state highway system included in this report is WY 13 from I-80 to US 30, US 30 between WY 13 and WY 487 and Medicine Bow, and WY 487 between US 30 in Medicine Bow and CR 294 (the Oil Springs Road). Three Carbon County roads, CR 1, CR 262, and CR 294, are also included.

Detailed estimates of the traffic volumes associated with construction equipment and workforce personnel are ongoing, however, it is recognized there will be increased traffic volumes on both the state highway system and affected County roads. For this reason, the developer is taking steps to reduce the traffic impacts. A man camp is proposed for a portion of the workforce, and buses are being considered to move people from the man camp and adjacent population centers to the worksite. The existing transportation infrastructure in the Project operates well below its design capacity. Based upon previous wind developments similar to the proposed Project, the existing roadways will be able to handle the increased traffic volumes as the impacts to the road systems will be short-term, and the Wyoming Department of Transportation has not requested 'level of service computations' be included in this report.

The safety of traffic movements is directly related to the sight distance at intersections and access points. All of the existing intersections, with the exception of one, have adequate sight distance. The exception is the WY 487/CR 262 intersection north of Medicine Bow. At this location, it is recommended that diamond warning signs be erected to maintain a safe intersection. The proposed new access points on both the state highway system and the county road system either have acceptable sight distance or can be moved slightly to locations with adequate sight distance.

Most of the County roads that will be used for access to this Project will require widening to ensure they are capable of handling the increased traffic volume and the length of vehicles delivering items to the Project site. It is recommended that a portion of CR 1 be widened to approximately 30 feet in width, and the other roads used by construction personnel be widened to 26 feet. After completion of the Project, the roads widths should be reduced to 22 feet with the exception of CR 1. Carbon County will maintain a 30-foot width road section on CR 1.

There are several locations on the Carbon County roads where the road curves are not appropriate for the 55-mph speed limit. These locations should either be appropriately signed or the speed limit be reduced during the construction period.

New access points on the state highway system should be controlled with STOP signs, and either STOP signs or YIELD signs should be used to control the accesses on the county road system.

The Wyoming Department of Transportation has indicated that the radii associated with the existing intersections on the state highway system have been adequate for other trucks hauling wind turbine blades. The access locations into the construction site will need the radii modified or constructed based upon the turning characteristics of the trucks hauling the wind turbine blades.

Carbon County will require a maintenance agreement to cover the potential damage to the road system.

Introduction

Wyoming has long been recognized for its potential in renewable wind energy. The combination of high plains and a series of ridges provide the right environment for strong and constant winds. This potential was recognized years ago when NASA and the US-DOE constructed two experimental wind turbine generators south of Medicine Bow

In the summer of 2018, BluEarth Renewables LP purchased Two Rivers Wind LLC and the right to construct the Two Rivers Wind Project which is located in Carbon and in Albany County. BluEarth Renewables LP is a Canadian company prominent in the development of hydroelectric, wind, and solar energy projects across Canada and the United States with headquarters in Calgary, Alberta. The Two Rivers project is anticipated to produce 280 MW of electricity.

The Project is located in the Medicine Bow/Rock River area and consists of two separate and distinct areas of land. One section is north of Medicine Bow along both sides of WY 487, and the other area is south of US 30 and west of Rock River. The portion of the Project that is north of Medicine Bow is in Carbon County, and the southern portion of the Project is in Albany County. Figure 1 shows the general location of the proposed Project.



Figure 1. General Location

Study Scope

The purpose of this traffic impact study is to document the existing conditions in the vicinity of the Two Rivers Wind Project and to analyze the impact the proposed development will have on the existing highway infrastructure under the jurisdiction of the Wyoming Department of Transportation and affected county roads. The report will also consider the safety aspects related to new and existing access points on both the state highway system and affected county roads. This report will consider three highways under the jurisdiction of the Wyoming Department of Transportation. The first is WY 13, the second is US 30, and the third is WY 487. These roads represent the haul route for supplies coming into the Project site. There are three Carbon County roads that are included in the report. They are Carbon County 1 (CR 1, the McFadden Road), Carbon County 252 (CR 252, the Marshall Road), and Carbon County 294 (CR 294, the Oil Springs Road). There are no Albany County roads that will be affected by the Project. Figure 2 is a portion of the Wyoming Department of Transportation interactive map which shows the study areas on the state highway system. Figure 3 is a portion of the County road map which outlines the areas included in the study that are part of the county road system.

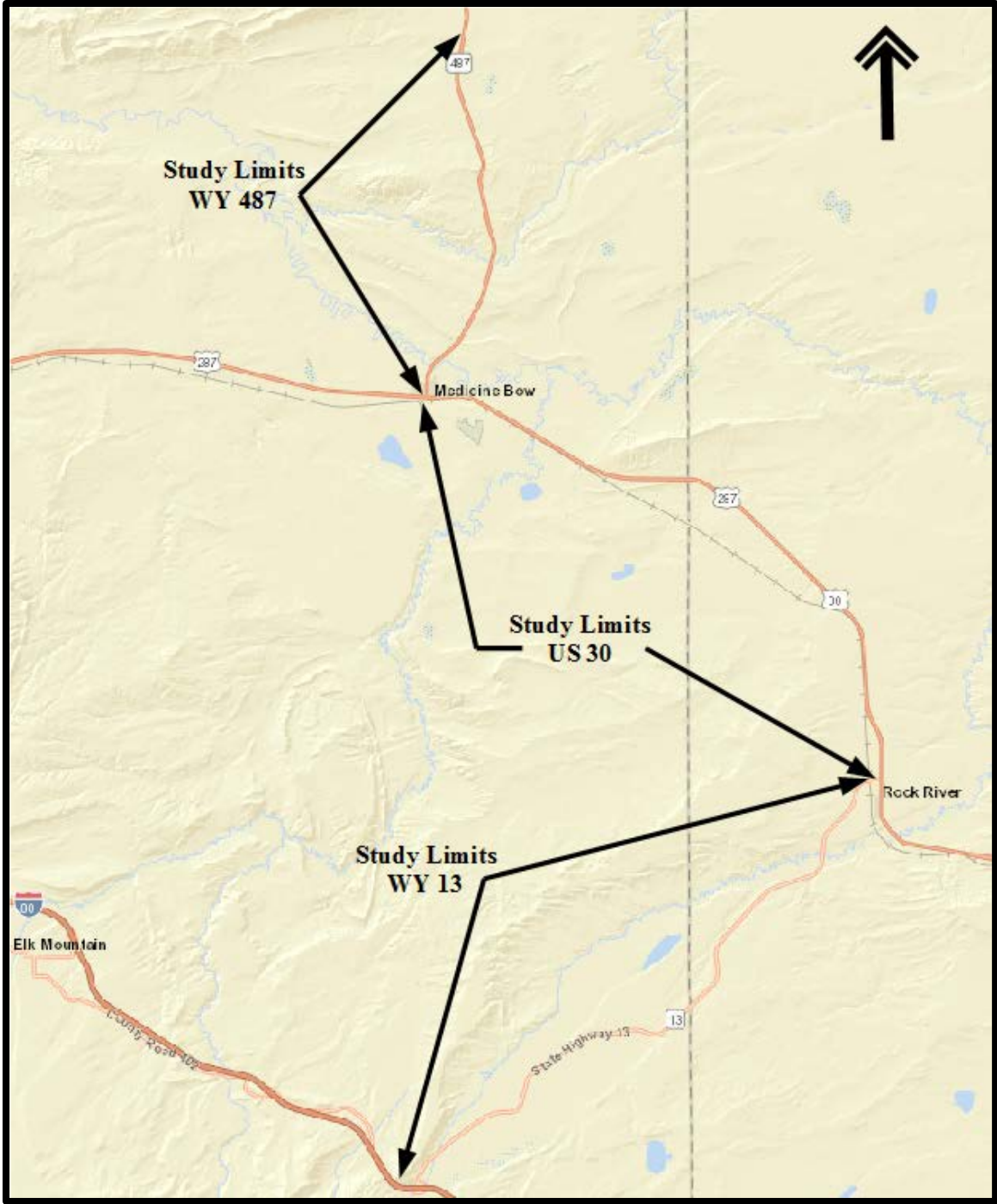


Figure 2. Map View Study Area-State Highways

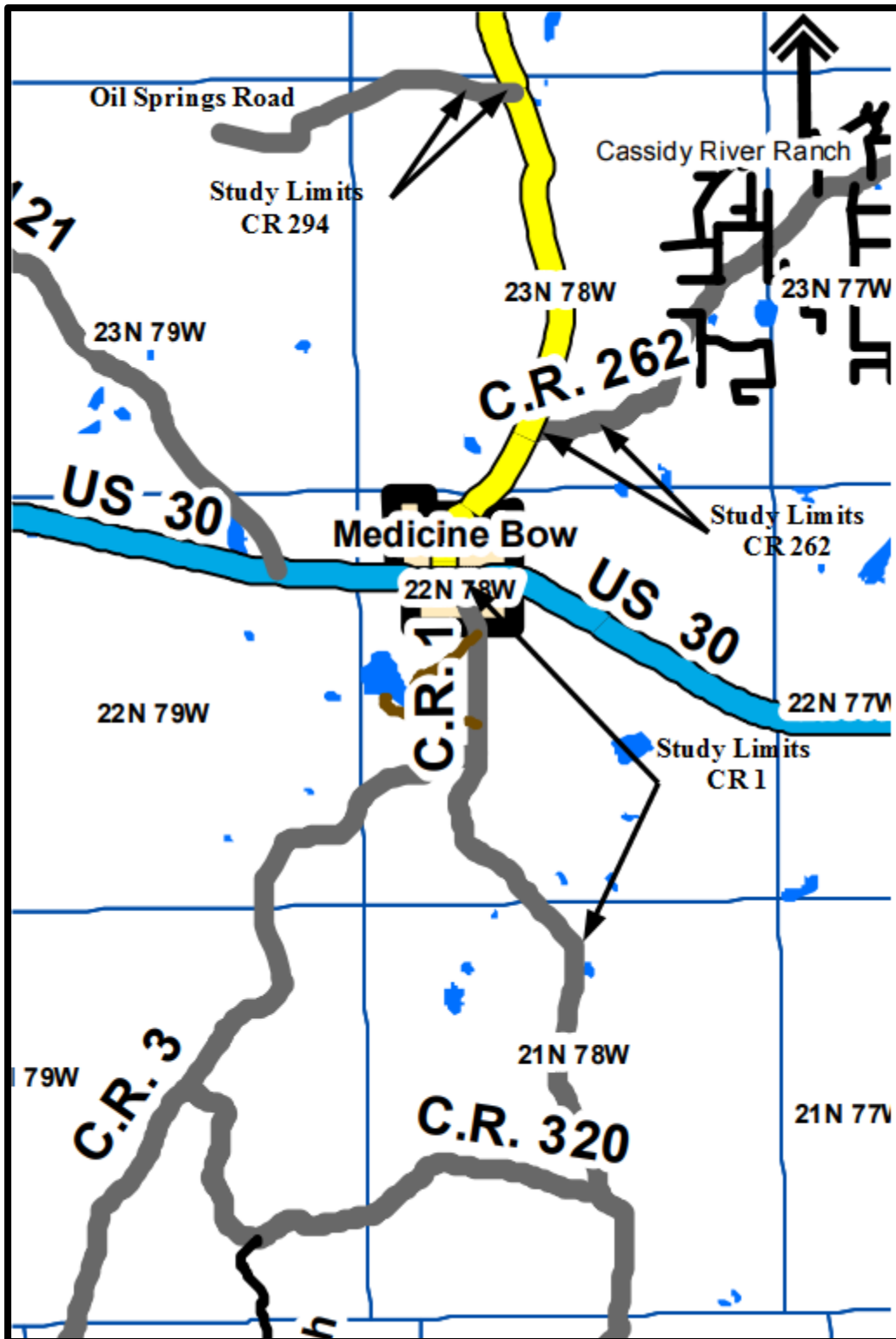


Figure 3. Map View Study Area-County Roads

Crash data for the existing intersections on the Wyoming State routes was obtained from the Safety Program of the Wyoming Department of Transportation and was reviewed for existing safety problems.

Existing Conditions

Land Use

The land being proposed for the Project is presently vacant land, and its primary use is agricultural pasture for grazing animals. The land in the vicinity of this Project is a combination of private land, federal land (BLM) and State of Wyoming land. While all the land is used for grazing, the federal and State of Wyoming land is used for recreation (primarily hunting).

The land is open with some trees near watercourses. Figure 4 is a picture depicting the typical landscape in the proposed development area.



Figure 4. Photograph Showing Typical Project Landscape

Most of the private land in the vicinity of the proposed wind development north of Medicine Bow is classified RAM (ranching, agricultural, and mining). This is consistent with the existing land use. The state and BLM lands are not classified. Figure 5 is a portion of the Carbon County Parcel Map which shows land classified as PUD (Planned Unit Development) or Residential near the north Project limits.

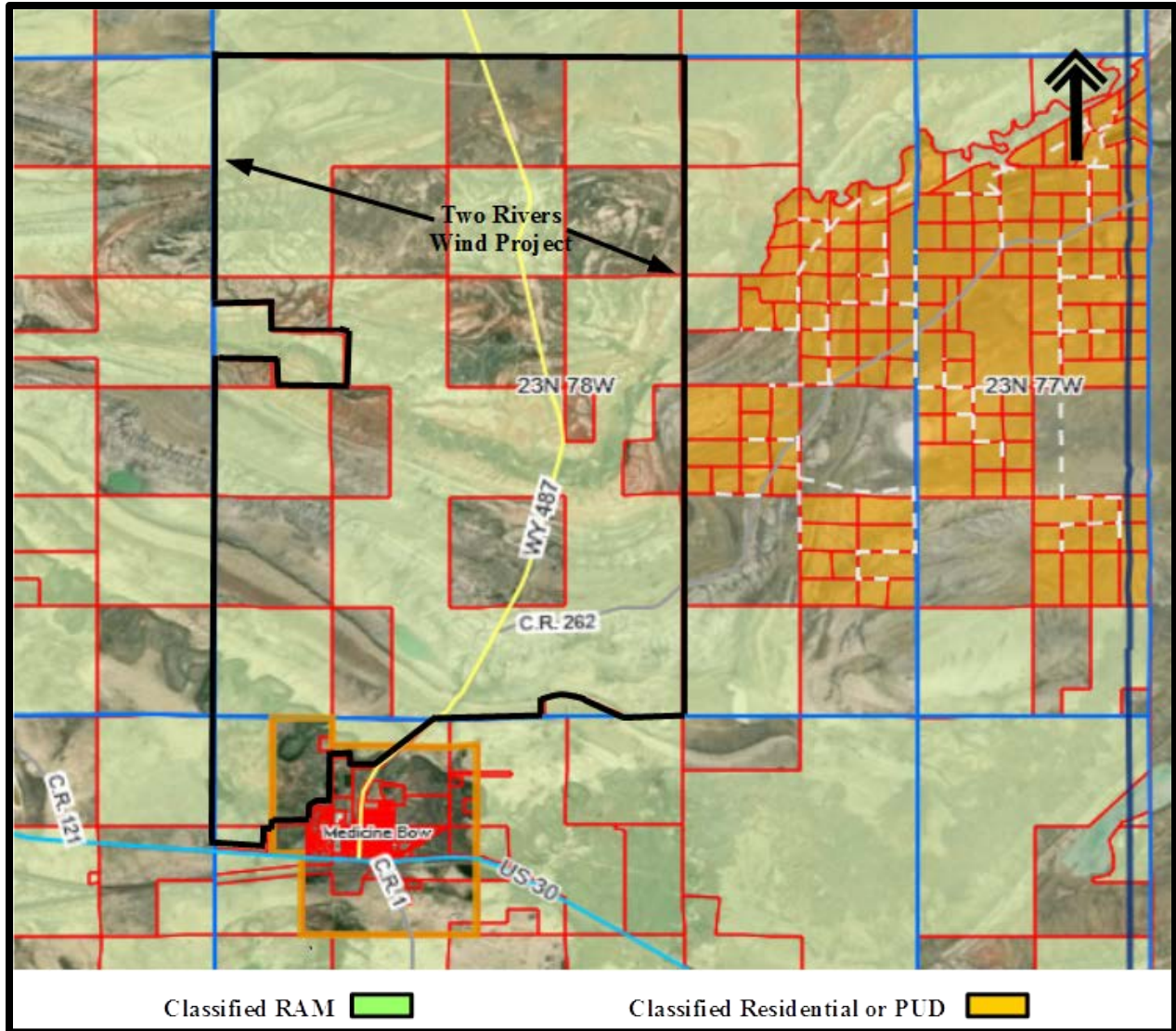


Figure 5. Carbon County Zoning North of Medicine Bow

The Project site, south of US 30 and west of Rock River, lies partially in Carbon County and partially in Albany County. All of the land in Carbon County is classified as RAM. Figure 6 is a portion of the Carbon County Parcel Map which shows land classified as RAM.

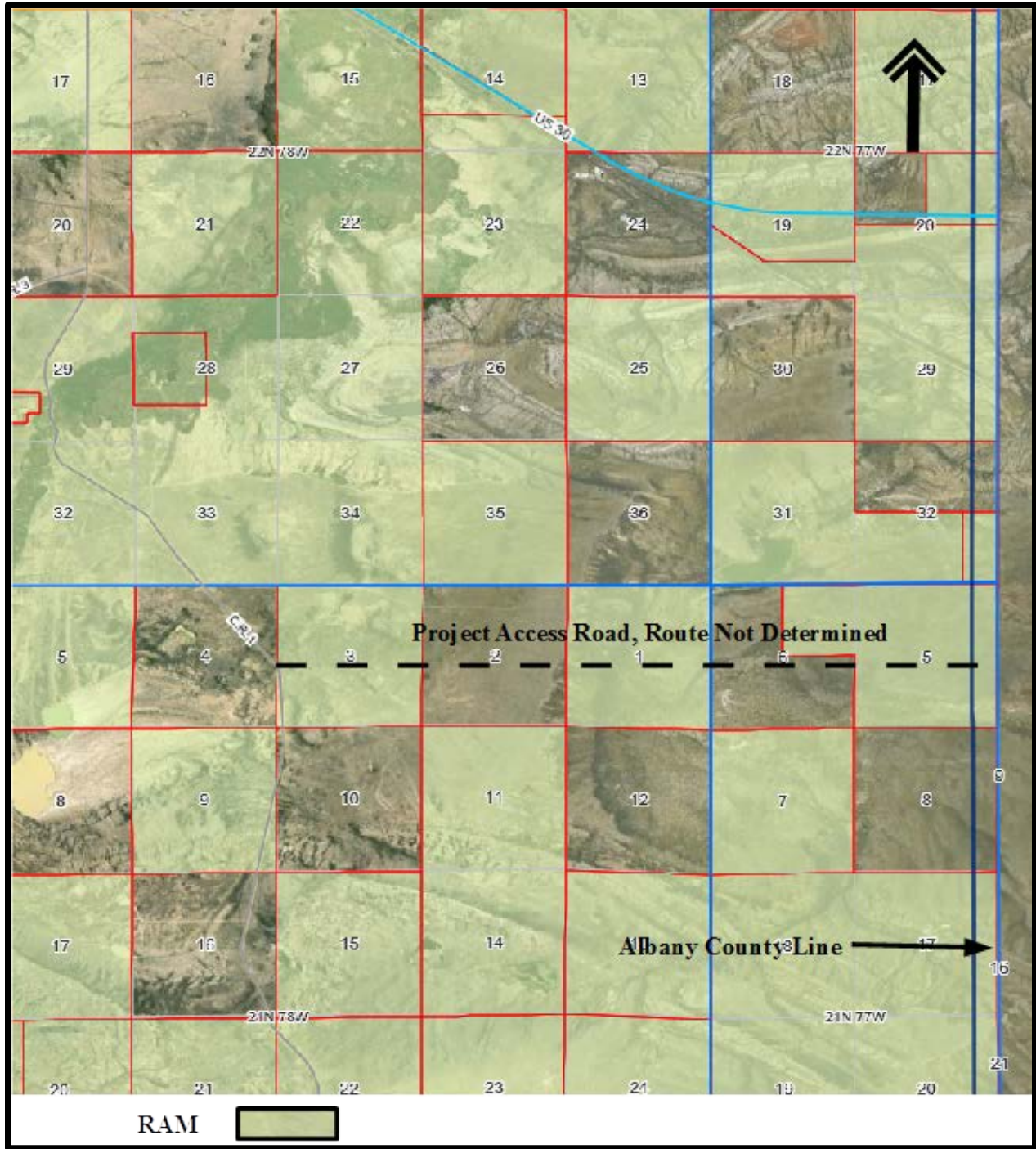


Figure 6. Carbon County Zoning South of Medicine Bow

All but 320 acres of the Project land (classified as residential) in Albany County are classified as agricultural. The residentially-classified land is currently vacant. The zoning in Albany County is shown in Figure 7.

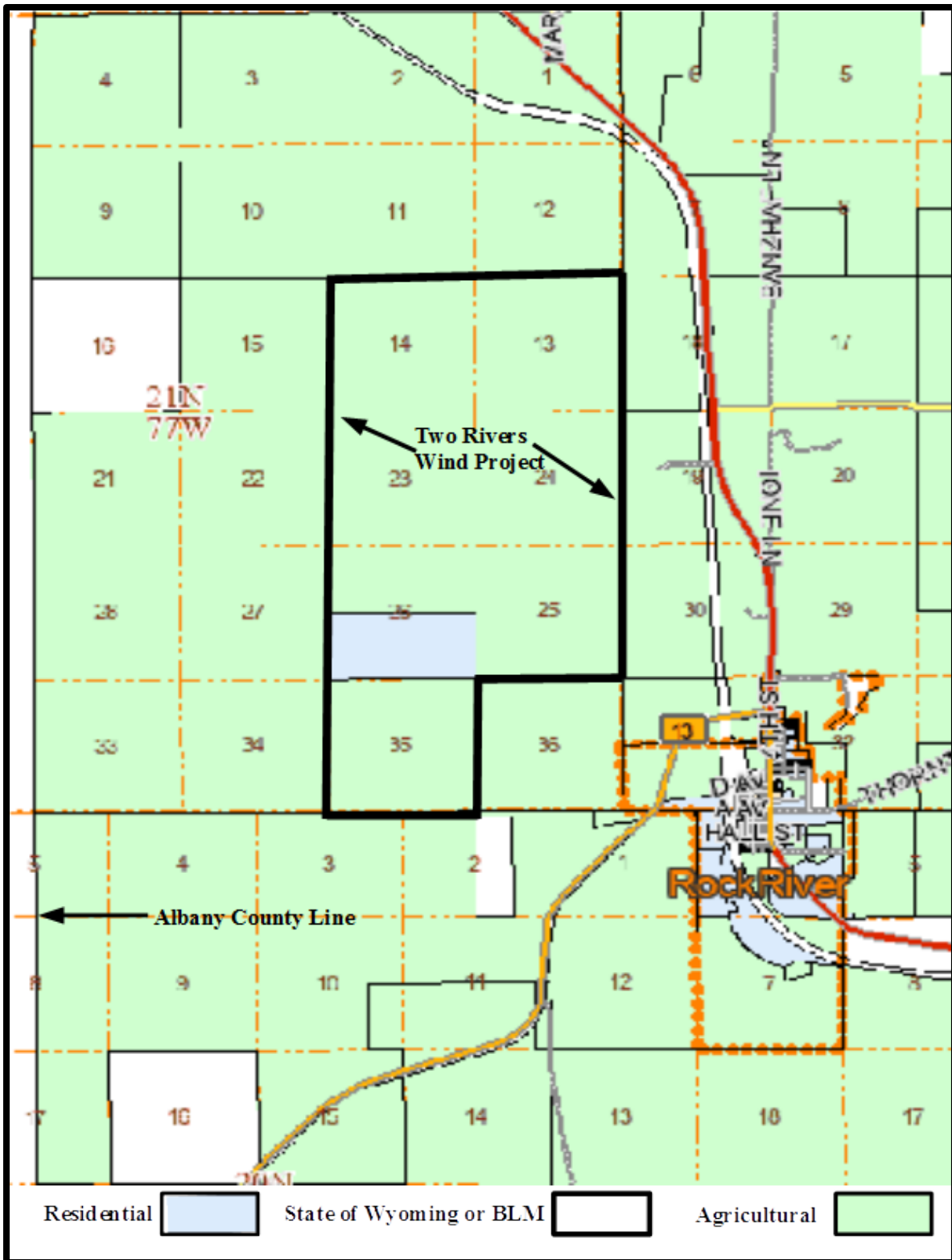


Figure 7. Albany County Zoning South West of Rock River

Roadway Infrastructure

Equipment and supplies will be transported to the various sites by way of WY 13, US 30, and WY 487. Trucks will exit I-80 at the Arlington interchange, go north on WY 13, and then west on US 30. At Medicine Bow, equipment and supplies will turn south on CR 1 or go north on WY 487 to various locations.

WY 13 is a two-lane road that begins at I-80 and ends at US 30, and it is 17.33 miles in length. The road has an asphalt surface, and it is 28 feet wide. There are two 12-foot lanes in each direction with a two-foot wide shoulder. Figure 8 is an aerial view from Google Earth which shows the highway at a typical location.



Figure 8. Aerial View WY 13

US 30 is the third longest route in the United States. It starts in the west at Astoria, Oregon, and it ends on the east coast at Atlantic City. In Wyoming, US 30 begins at the Utah border and it ends at the Nebraska border. It has various lane configurations along its entire length in Wyoming, but in the area of this traffic impact study, it is a two-lane road with added lanes to provide passing opportunities. It widens to a four-lane road through the Town of Medicine Bow. Figure 9 is a typical aerial view of a two-lane section.



Figure 9. Aerial View US 30

As US 30 goes through Medicine Bow, it widens to a four-lane section with a park lane on each side of the highway. There is curb and gutter on both sides of the road, but there are no sidewalks. Figure 10 is a Google Earth aerial photograph of the four-lane highway through Medicine Bow.

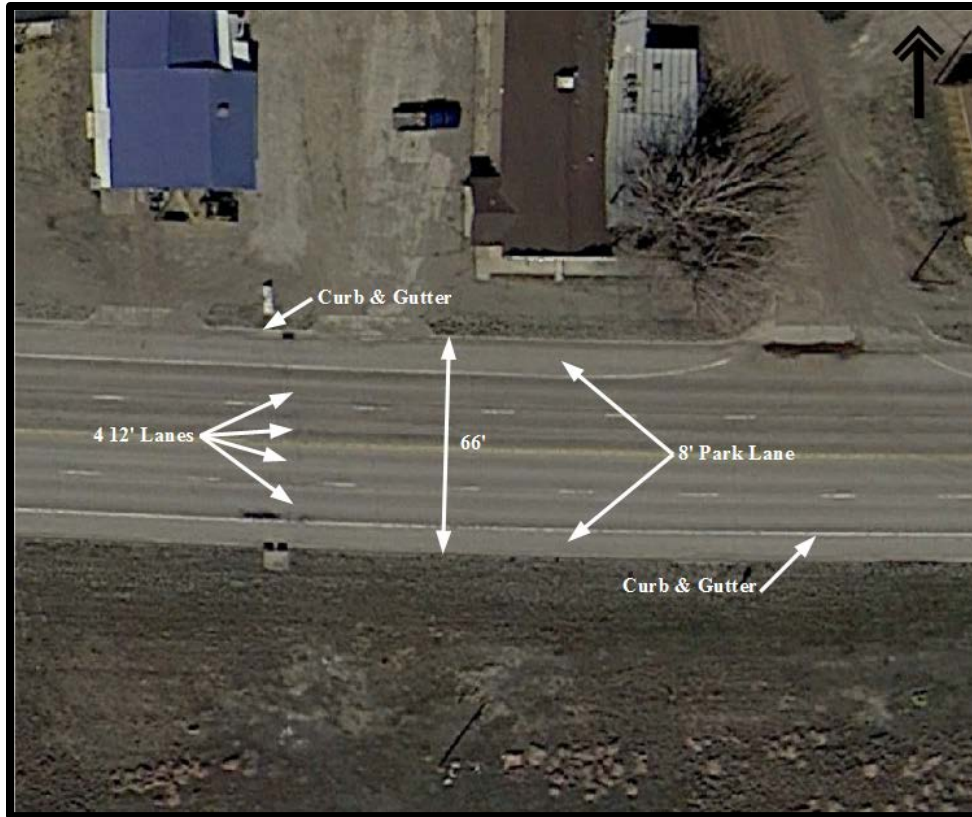


Figure 10. Aerial View US 30 in Medicine Bow

WY 487 begins at the junction with US 30 and continues north 73 miles to the junction with WY 220. In the study area, it is an asphalt-surfaced two-lane road with 6.5-foot-wide shoulders and two 12-foot-wide travel lanes. Figure 11 is an aerial view from Google Earth of WY 487.



Figure 11. Aerial View WY 487

CR 1 runs between US 30 in Medicine Bow and WY 13. CR 1 is a two-lane gravel road. The first 2.5 miles south of US 30 (between CR 1 and CR 3) has been reconstructed to a wider section than the remaining portion of CR 1. Figure 12 is an aerial view from Google Earth showing the typical road section just to the south of CR 3. This section has a top width of 26 to 30 feet with side slopes of approximately 3:1 to 4:1. There is a railroad crossing just south of US 30, and there are two cattle guards on this section. The first cattle guard is 30 feet wide, and the second is 24 feet wide.



Figure 12. Aerial View CR 1 Just South of Medicine Bow

South of CR 3, the road narrows to approximately 22 feet. The side slopes fall in the same 3:1 to 4:1 range as the first section. Between CR 3 and Two Rivers Wind Project access, there are two more cattle guards and a bridge over the Medicine Bow River. The cattle guards and the bridge width are all 24 feet. Figure 13 is an aerial view from Google Earth of CR 1 south of CR 3.



Figure 13. Aerial View CR 1 South of CR 3

CR 262 (the Marshall Road) begins at WY 487. The junction is 2.5 miles north of Medicine Bow, and CR 262 runs east and then south to where it terminates on US 30. This is a gravel county road approximately 18 feet to 20 feet in width with side slopes in the range of 3:1 to 4:1. Figure 14 is an aerial photograph from Google Earth CR 262. In the study area, there is one 24-foot-wide cattle guard located at the edge of the Wyoming Department of Transportation right of way.



Figure 14. Aerial View CR 262

CR 294 (the Oil Springs Road) runs west from WY 487 approximately 7.75 miles north of Medicine Bow. It runs west roughly 4.75 miles. The gravel road is approximately 15 feet wide with side slopes of 3:1 to 4:1 in the area that will be used as access to the wind generator sites. There is a 24-foot-wide cattle guard just to the west of WY 487 in the right-of-way fence line. Figure 15 is a Google Earth aerial photograph of CR 294.



Figure 15. Aerial View CR 294

Traffic Control

All major intersections included in this study are controlled with STOP signs, including the three highways under the jurisdiction of the Wyoming Department of Transportation which have STOP signs at intersections with county roads. Minor intersections such as residential accesses, are uncontrolled. All three highways have appropriate pavement markings for the centerline and edge line, contain no passing barriers, and have curve warning signs where necessary. All three highways are fully delineated.

The three Carbon County roads in this study are gravel and, therefore, have no markings. All of the intersections within county roads in the study area are uncontrolled with the exception of the CR 1/CR 3 intersection. CR 3 is controlled with a YIELD sign. There are no curve warning signs in place.

The speed limit on US 30 and WY 487 in the Town of Medicine Bow is 30 mph. The rural sections of US 30 and WY 487, as well as WY 13, are posted at 70 mph. The three county roads have no speed limit signs erected, and therefore, the speed limit is 55 mph by state statute.

There is a school crossing on WY 487 at the intersection of WY 487 and Birch Street in Medicine Bow. The marked and signed school crossing is 530 feet north of the US 30/WY 487 intersection. The speed limit through the school crossing is 20 mph when the amber beacon is flashing.

There is a gated crossing of the UP railroad tracks south of the US 30/CR 1 intersection. There is approximately 195 feet of storage between US 30 and the railroad gates.

Sight Distance

The availability of sight distance is directly related to the safe operation of an intersection. There are several types of sight distances that are applicable to this study. Stopping sight distance is defined as the distance it takes a vehicle to stop with a normal reaction time and an appropriate deceleration rate. The stopping sight distance for an intersection is measured as a line of sight between the driver's eye height at 3.5 feet and an object height at the intersection of 3.5 feet. Normally the stopping sight distance for a car is used for all situations. It is recognized that it takes trucks longer distances to stop than cars, but the truck driver sits much higher than the driver of a car. This extends the available sight distance for a truck driver.

Table 1 shows the stopping sight distance used by the Wyoming Department of Transportation, and it also shows the stopping sight distance from the 2011 edition of *A Policy on Geometric Design of Highways and Streets*. (The Wyoming Department of Transportation stopping sight distance is taken from Table II-1 in the *Traffic Program Access Manual 2014 Edition. A Policy on Geometric Design of Highways and Streets* is a commonly used design reference, and stopping sight distance criteria is found on Pages 9-38. This reference, commonly called *The Green Book*, is published by AASHTO.) The Wyoming Department of Transportation stopping sight distance is slightly more conservative than the stopping sight distance from the *Green Book*. At a minimum, stopping sight distance must be provided at all intersections.

Intersection sight distance is defined as the distance necessary for a vehicle to make a left-hand turn onto a roadway and not impede a vehicle coming from the right. The *Green Book* contains the intersection sight distance criteria (*A Policy on Geometric Design of Highways and Streets* Pages 9-38) used by many jurisdictions. Intersection sight distance varies by the speed of the roadway and by the left-turning vehicle. Table 1 contains the intersection sight distance criteria for a car and a combination truck.

	WYDOT		Green Book		
	Stopping Sight Distance	Stopping Sight Distance With Large Vehicles	Stopping Sight Distance	Intersection Sight Distance Car	Intersection Sight Distance Combination Truck
Speed Limit					
30 mph	220	250	200	335	510
55 mph	535	680	495	610	930
65 mph	695	865	645	720	1100
70 mph	780	965	730	775	1185

Table 1. Sight Distance Criteria

WY 13 has a speed limit of 55 mph at the junction with I-80. It increases to 70 mph north of the built-up area. The westbound off ramp at the intersection of I-80 and WY 13 has 1,000 feet of sight distance to the north and to the south. The eastbound I-80 off ramp has 1,000 feet of sight distance to the north, but only 400 feet of sight distance to the south due to a curve on the county road with trees that block the line-of-sight. The curve on the county road to the south is signed with a SLOW diamond warning sign with a 15-mph advisory speed plaque. The three quadrants with 1,000 feet of sight distance are adequate for 55 mph. Because the curve limits the northbound speeds, the 400 feet of sight distance at the eastbound off ramp is adequate. Figure 16 is an aerial photo of the interchange from Google Earth. Figures 17, 18, 19, and 20 are at-grade photographs taken at the intersections of the I-80 off ramps with WY 13.



Figure 16. Aerial View I-80/WY 13 Intersection



Figure 17. Photograph Westbound I-80 Ramp with WY 13 Looking North



Figure 18. Photograph Westbound I-80 Ramp with WY 13 Looking South



Figure 19. Photograph Eastbound I-80 Ramp with WY 13 Looking North



Figure 20. Photograph Eastbound I-80 Ramps with WY 13 Looking South

The intersection of WY 13 and US 30 is in a reduced speed zone area. Approaching the intersection from the north, the speed limit is 70 mph, and approaching the intersection from the south, the speed limit is 40 mph. The speed limits change right at the junction. The sight distance is greater than 1,200 feet in both directions along US 30. The sight distance is adequate. Figure 21 is an aerial view of the intersection from Google Earth, and Figures 22 and 23 are at grade photographs looking north and south from the intersection.



Figure 21. Aerial View US 30/WY 13 Intersection



Figure 22. Photograph US 30/WY 13 Looking Northbound



Figure 23. Photograph US 30/WY 13 Looking Southbound

The junction of US 30 and CR 1 is in the Town of Medicine Bow. The speed limit through Medicine Bow is 30 mph, and the sight distance at this intersection is greater than 1,000 feet in both directions. The sight distance is adequate. Figure 24 is an aerial view of the intersection and Figures 25 and 26 are at-grade photographs looking east and west.



Figure 24. Aerial View US 30/CR 1 Intersection



Figure 25. Photograph US 30/CR 1 Looking East



Figure 26. Photograph US 30/CR 1 Looking West

The US 30/WY 487 intersection is also in Medicine Bow with a speed limit of 30 mph. The sight distance is greater than a thousand feet in both directions, and the sight distance is adequate. Figure 27 is an aerial view of the intersection, and Figures 28 and 29 are at-grade photographs in both directions.



Figure 27. Aerial View US 30/WY 487 Intersection



Figure 28. Photograph US 30/WY 487 looking East



Figure 29. Photograph US 30/WY 487 Looking West

The junction of WY 487 with Carbon County 262 (the Marshall Road) is a T intersection with the stem of the T, CR 262, to the east. The speed limit on WY 487 at this location is 70 mph. This intersection is located in a no passing barrier for both the northbound and southbound direction. Based upon the criteria of the Wyoming Department of Transportation for a no passing zone, the sight distance at this point is less than the required 1,200 feet in both directions. Field measurements indicate that the sight distance is 900 feet for both the northbound and southbound directions. The 900 feet provide adequate stopping sight distance, but the 900 feet of sight distance do not provide enough distance for a left-turning vehicle from CR 262 to WY 487 to pull out without impeding a southbound vehicle on WY 487. Figure 30 is an aerial view from Google Earth of the WY 487/CR 262 intersection, and Figures 31 and 32 are at-grade photographs in the north and southbound direction.



Figure 30. Aerial View WY 487/CR 262 Intersection



Figure 31. Photograph WY 487/CR 262 Looking North



Figure 32. Photograph WY 487/CR 262 Looking South

The intersection of WY 487 with CR 294 (the Oil Springs Road) is another T intersection with CR 294 forming the stem of the T in a westward direction. There are no passing restrictions at this location, and using the Wyoming Department of Transportation

criteria for no passing zones, there is a minimum of 1,200 feet of sight distance in both directions. Figure 33 is a Google Earth aerial photo of the intersection, and Figures 34 and 35 are photographs in the north and south directions.



Figure 33. Aerial View WY 487/CR 294 Intersection



Figure 34. Photograph WY 487/CR 294 Looking North



Figure 35. Photograph WY 487/CR 294 Looking South

Pedestrian and Bicycle Facilities

There are no pedestrian or bicycle facilities at any of these locations.

Schools

Carbon County School District 2 was contacted to see if any school bus routes would be impacted by this project. The only highway that the school district uses in the general area is WY 487 north from Medicine Bow. The school district does not anticipate any issues with the proposed Project transportation routes.

Safety

The Safety Program at the Wyoming Department of Transportation was contacted to obtain crash data information at the intersections within the Project transportation routes. Table 2 shows the results of the five-year search of their crash records. Based on this data there is no evidence to suggest any existing safety problems.

Location	Number of Crashes	Comments	Fatality	Injuries
I-80/Arlington Interchange	0			
US 30/WY 13	2	One vehicle hit a deer One vehilce jackknifed	0	0
US 30/Cr 1	0			
US 30/WY 487	1	Hit a utility pole	0	0
US 30/CR 262	0			
US 30/CR 294	0			

Table 2. Crash information at Existing Intersections

Traffic Volumes

The Wyoming Department of Transportation collects volume data at sites with automatic traffic counters and with manual counts. This data is collected and made available in two different reports. The automatic counters collect traffic volume data 365 days of the year, and that information is reported in the *Wyoming Automatic Traffic Recorder Report Book*. The second location where traffic volume data is available is in the *Vehicle Miles Book*. This source gives an estimated traffic volume by road sections.

The vehicle miles book estimates the traffic volumes on WY 13 at 309 vehicle per day at the north and south ends of the road, and 164 vehicles per day in the middle section.

There is an automatic recorder east of Medicine Bow on US 30. For 2016, the latest publication of the *Wyoming Automatic Traffic Recorder Report*, the average annual daily traffic between Medicine Bow and Rock River was 801 vehicles.

The traffic volumes on WY 487 are estimated to be approximately 635 vehicles per day between US 30 and the town limits. North of Medicine Bow, the average daily traffic volumes are estimated at 442 vehicles per day.

No volumes are available for the Carbon County routes. The ground was frozen, and it was not possible to put road tubes down to collect traffic volumes. In discussions with Bill Nation, Road and Bridge Superintendent, it was agreed to estimate volumes at less than 50 vehicles per day for CR 1 and CR 262. The estimated traffic volumes for CR 294 was less than 20 vehicles per day.

Proposed Development

Project Description

Two Rivers Wind LLC., a wholly-owned subsidiary of BluEarth Renewables, LP, is proposing to construct a wind farm in the Medicine Bow/Rock River area. Currently, a total of 77 wind turbine generators are planned in two different locations. The site north of Medicine Bow will house 58 turbines, and the area west of Rock River will house 19 turbines. The Project will encompass approximately 19,500 acres of land and have a nameplate capacity of 280 MW. Work on the Project is anticipated to start in the spring of 2021 and be completed January 2022.

In addition to the construction of the wind turbine generators, the project will include the construction of electrical lines, a temporary staging area, a temporary man camp, and 42 miles of access roads. It is estimated that the project will use approximately 175,000 cubic yards of aggregate and concrete. Figure 36 is a display showing the location of the Project and wind turbine generators for the Medicine Bow north location, and Figure 37 shows the same information for the Project location west of Rock River.

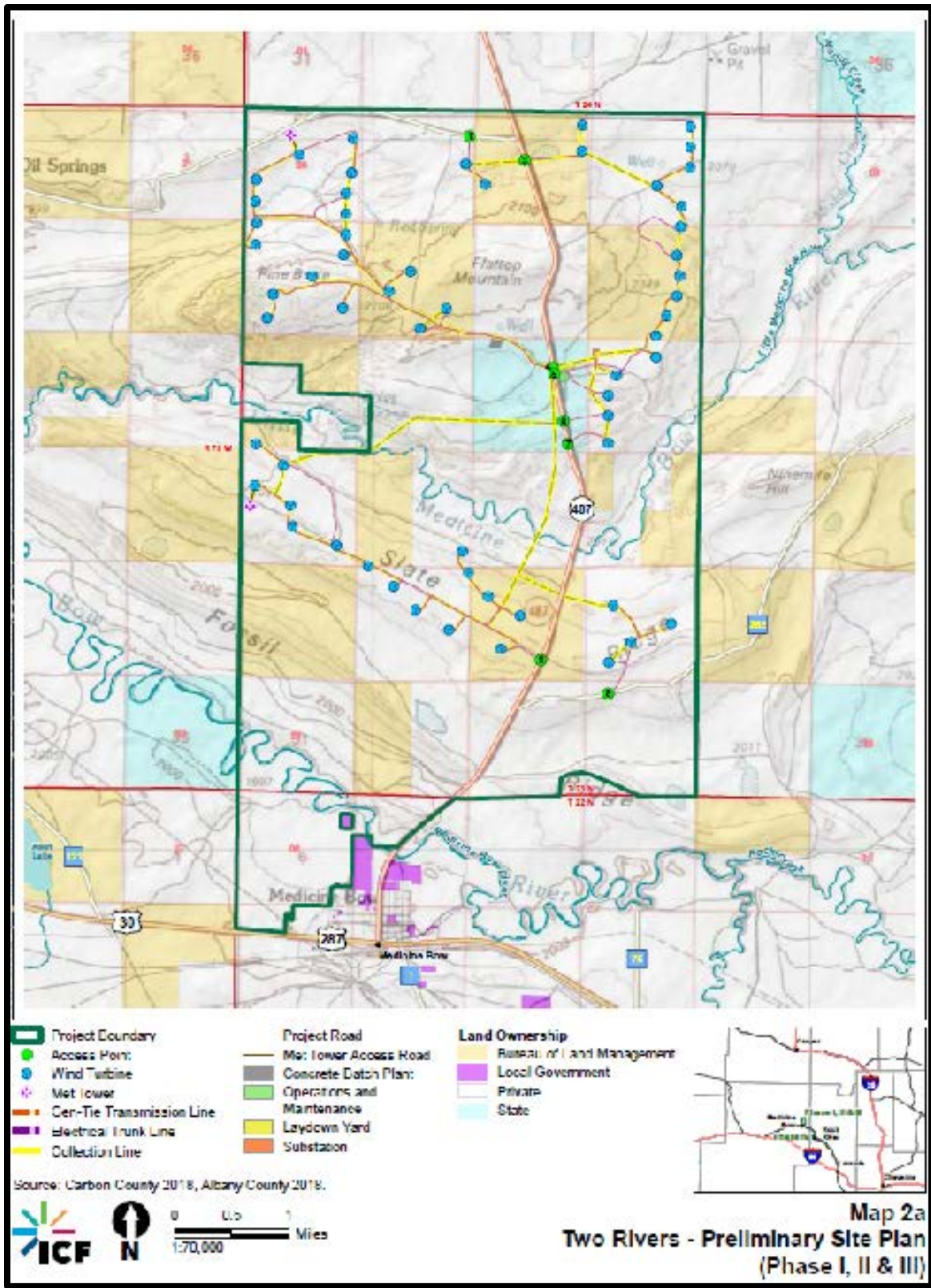


Figure 36. Location of Two Rivers Wind Project North of Medicine Bow

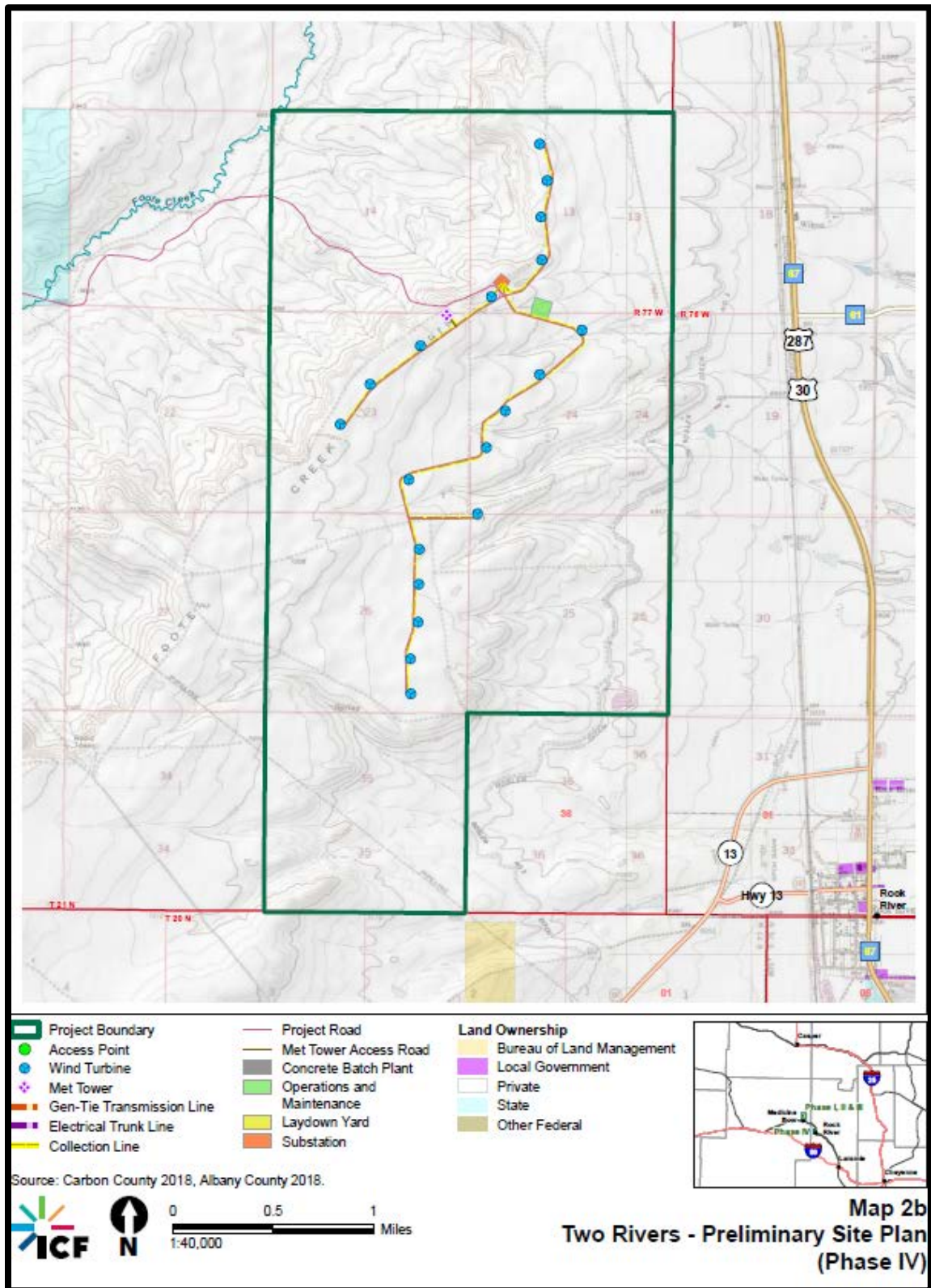


Figure 37. Location of Two Rivers Wind Farm West of Rock River

Infrastructure Improvements

There are two areas that will require construction activity on the state and county highway systems. First, the access points on the state highway system will require the construction of a radius that will accommodate the trucks hauling the wind turbine blades. Trucks will bring equipment to the project site by way of I-80 to WY 13, north to US 30, and west on US 32 Medicine Bow. From Medicine Bow, trucks will carry supplies south on CR 1 and north on WY 487.

In discussing this route with Wyoming Department of Transportation personnel, it was pointed out that other wind farms have hauled the large turbine blades through these intersections. No improvements to the radii should be necessary for the I-80 off ramps/WY 13 intersections, the WY 13/US 30 intersection, the US 30/CR 1 intersection, and the US 30/WY 487 intersection. It should be noted that the I-80 structure over WY 13 has a height limitation of 16 feet 3 inches, and there is a power line across CR 1 at the US 30 junction that should be checked for clearance height. All of the proposed access points from WY 487 will require construction of radii appropriate for the vehicles hauling the wind turbine components. New accesses will require cattle guards in the right-of-way fences. Wyoming Department of Transportation requests that at the end of construction phase of this Project, the access points be returned to their original radii or equivalent on new access points.

This Project will require existing county roads to be widened to accommodate the increased traffic associated with construction. A portion of CR 1 has been widened in conjunction with an earlier project in this area. The widened section starts at the edge of Medicine Bow and continues south 2.5 miles to CR 3. This portion of CR 1 is 26 to 30 feet in width. The remaining 3.6 miles to the point of access to the Project is approximately 22 feet in width. Carbon County has requested that this 3.6 miles be constructed to a width of 30 feet similar to the first 2.5 miles of CR 1. Side slopes should be in the range of 3:1 to 4:1 or flatter. Carbon County would propose to leave this widened section in place after the wind farm is complete, and they would maintain the 30-foot roadway.

CR 262 and CR 294 are narrow and not appropriate for the increased traffic during the construction phase. There are reference sources that provide guidance for the selection of an adequate roadway width. The American Association of State Highway and Transportation Officials (AASHTO) provides guidance resources. The 2011 edition of *A Policy on Geometric Design of Highways and Streets* recommends that a roadway with less than 400 vehicles per day and the design speed of 55 mph have two travel lanes that are 11 feet wide with two feet wide shoulders. (Table 5-5. Minimum Width of Travel Way and Shoulders). This provides for a total roadway width of 26 feet. The 2001 addition of the AASHTO publication *Guidelines for Geometric Design of Very Low Volume Local Roads (ADT less than 400)* recommends a roadway width of 24.5 feet for an industrial/commercial access with the design speed to 50 mph. (Exhibit 1. *Guidelines for Total Roadway Width for New Construction of Very Low-Volume Local Roads and Rural Areas*). Another source is *The County Road Fund Manual State and Federal Programs* found on the Wyoming Department of Transportation website. This source

would recommend ten-foot-wide travel lanes with two-foot-wide shoulders for total width of 24 feet. Because of the extremely long loads consistent with hauling wind turbine blades into the sites, it is recommended that CR 262 and CR 294 be widened to a 26-foot width. After construction, Carbon County will require that CR 262 and CR 292 roadway widths be reduced to 22 feet.

The radii for all access points from county roads will need to be constructed to the requirements of the company hauling in the wind turbine components.

The existing cattle guards on the Carbon County roads are 24 feet in width. This will be adequate for the 26-foot roadway, but the edges of the cattle guards should be delineated.

Sight Distance

A primary purpose of this traffic impact study is to quantify the sight distance associated with each of the proposed access points from either the state highway system or the Carbon County road system. The measured sight distance is then compared to the requirements shown in Table 1.

ICF International provided GIS coordinates for all of the access points. These points were then located on the ground and the intersection sight distance measured. Each site is listed and the sight distance noted. Pictures were taken at each site and are included. While GIS coordinates are an appropriate way to locate access points on the ground, many agencies use a milepost designation. Milepost locations were measured and are noted. On the state highway system, the mileposts for access points were measured from known locations on the existing milepost system. On the county roads, a zero milepost was assumed at the right-of-way line with the adjacent state route.

Based upon observations in the field, some access points should be adjusted slightly to increase sight distance and overall safety. A general “rule” used in compiling sight distance and recommendations at the various access points on the state highway system was to try to locate all accesses where there are no passing restrictions. The Wyoming Department of Transportation places no-passing barriers on roadways where the sight distance is less than 1,200 feet. By placing accesses at locations where there are no passing restrictions marked on the highway, adequate sight distance for an access is ensured.

Existing Intersections

The current intersections that will be used in this Project were reviewed in the Existing Conditions section of this report. The I-80 ramps with WY 13, the intersection of WY 13/US 30, the intersection of US 30/CR 1, the intersection of US 30/WY 487, and the intersection of WY 487/CR 294 all have sight distances that exceed the minimum values in Table 1.

The intersection of WY 487 with CR 262 has a sight distance of 900 feet in both the north and south directions. This is less than the 965 feet required by the Wyoming Department of Transportation for stopping sight distance with large vehicles on a 70-mph roadway. However, the 900 feet of sight distance were measured from an eye height of 3.5 feet to an object

height of 3.5 feet. The eye height on a large vehicle is substantially higher than 3.5 feet, and intuitively, the stopping sight distance available for a large vehicle would be greater than 965 feet. The 900 feet of sight distance does not meet the Green Book intersection sight distance for a combination truck. Again, the height of the truck will help extend the existing sight distance. This is an existing county road location, and there is no negative crash history in the past five years. It would be difficult to move this access at the present time. The sight distances at this location are adequate, however, it is recommended that a 36-inch warning sign with a message such as TRUCKS ENTERING HIGHWAY be erected between 500 and 750 feet in advance of the intersection on both approaches.

Proposed Accesses on WY 487

Access 1

N 41.931953, W -106.177749

Milepost 2.97

Access to the west

There is an existing access at this location, and there is a corresponding break in the snow fence on the west side of the highway. The sight distance to the north at this location is slightly less than the 1,200 feet that the Wyoming Department of Transportation prefers. However, it does provide adequate stopping sight distance, and this location should be adequate. To put the access into a location with 1,200 feet of sight distance for both directions, it would have to be moved approximately 850 feet to the south. Therefore, it is not recommended that this access be moved.

The following is a series of photographs of each access point. The first photograph is an aerial view from Google Earth, and the second and third shots are at-grade photographs.



Figure 38. Aerial View Access 1



Figure 39. Photograph WY 487/Access 1 Looking North



Figure 40. Photograph WY 487/Access 1 Looking South

Access 2

N 41.959458, W -106.173649

Milepost 4.95

Access to the east

This access point has 1,100 feet of sight distance to the north, and the Wyoming Department of Transportation prefers 1,200 feet. By moving it 200 feet to the south, it falls out of the no passing barrier and provides 1,200 feet of sight distance in both directions. If moved, the coordinates of the new location would be N 41.95892, W -106.17350.



Figure 41. Aerial View Access 2



Figure 42. Photograph WY 487/Access 2 Looking North



Figure 43. Photograph WY 487/Access 2 Looking South

Access 3

N 41.962346, W -106.174437

Milepost 5.16

Access to the east

Access 3 has adequate sight distance from the north but only 1,100 feet towards the south. By moving the access approximately 100 feet to the south, there is 1,200 feet of sight distance in both directions. If moved, the coordinates of the new point would be N 41.96206, W -106.17446.



Figure 44. Aerial View Access 3



Figure 45. Photograph WY 487/Access 3 Looking North



Figure 46. Photograph WY 487/Access 3 Looking South

Access 4

N 41.968391, W -106.17608

Milepost 5.59

Access to the east

This access has adequate sight distance to the north and to the south. There is an existing access approximately 100 feet south of the proposed location, and there is another existing access that coincides with Access 5 approximately 250 feet to the north. The existing access to the south should be removed, and if possible, the location for Access 4 and Access 5 should be at the same point on WY 487. Whenever possible, accesses on opposite sides of the road should be aligned to prevent turning conflicts.



Figure 47. Aerial View Access 4



Figure 48. Photograph WY 487/Access 4 Looking North



Figure 49. Photograph WY 487/Access 5 Looking South

Access 5

N 41.96912, W -106.176333

Milepost 5.63

Access to the west

Access 5 has adequate sight distance to the north and to the south. This access point coincides with an existing field access. As noted in the discussion on Access 4, if possible, Access 4 and Access 5 should be at the same point on WY 487.



Figure 50. Aerial View Access 5



Figure 51. Photograph WY 487/Access 5 looking North



Figure 52. Photograph WY 487/Access 5 Looking South

Access 6
N 41.995476, W -106.181594
Milepost 7.53
Access to the east

This proposed access has adequate sight distance to both the north and to the south.



Figure 53. Aerial View Access 6



Figure 54. Photograph WY 487/Access 6 Looking North



Figure 55. Photograph WY 487/Access 6 Looking South

Proposed Access on CR 1

Access 7

N 41.818672, W -106.170035

Milepost 6.16

Access to the east

At this location, there is 580 feet of sight distance to the north and 510 feet of sight distance to the south. This location is in the middle of a ridge with vertical and horizontal curves to the north and to the south. A better location for this access would be to move it approximately 500 feet to the north, coordinates N 41.81980, W -106.17086. If moved, the sight distance to the north is excellent, greater than 1,200 feet, and there is 750 feet of sight distance to the south. Either access point provides adequate stopping sight distance, but moving the point north provides more sight distance in both directions.



Figure 56. Aerial View Access 7



Figure 57. Photograph CR 1/Access 7 Looking North



Figure 58. Photograph CR 1/Access 7 Looking South

Proposed Access on CR 262

Access 8

N 41.92775, W -106.166182

Milepost 0.83

Access to the north

This access is located on a flat, straight section of CR 262, and there is good sight distance in both directions.



Figure 59. Aerial View Access 8



Figure 60. Photograph CR 262/Access 8 Looking West



Figure 61. Photograph CR 262/Access 8 Looking East

Proposed Access on CR 294

Access 9

N 41.998437, W -106.191123

Milepost 0.41

Access to the south

There are no horizontal or vertical curves in the vicinity of this proposed access point to cause a site restriction. The sight distance is good in both directions.

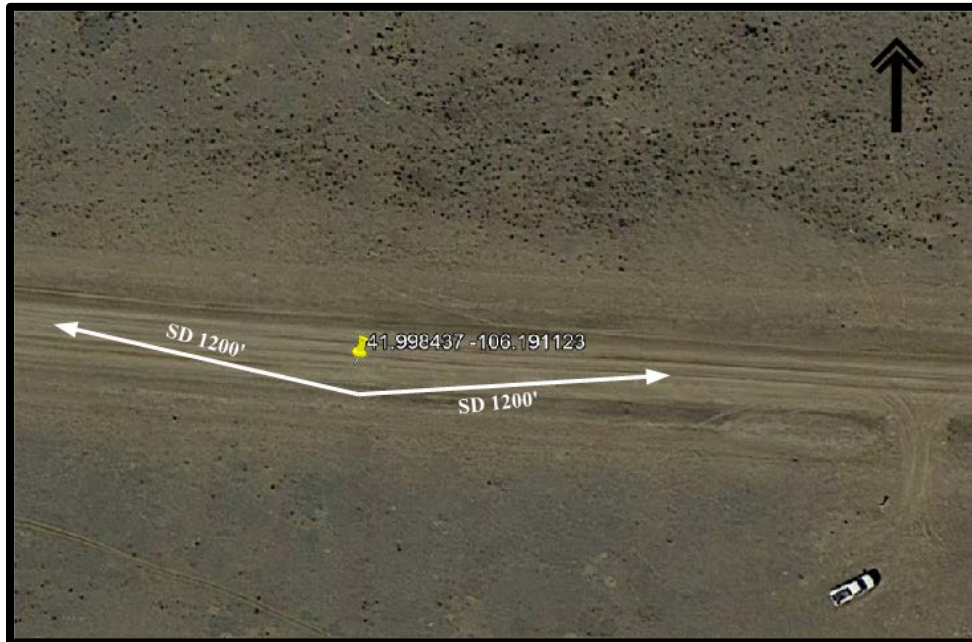


Figure 62. Aerial View Access 9



Figure 63. Photograph CR 294/Access 9 Looking West



Figure 64. Photograph CR 294/Access 9 Looking East

Access Spacing

The Wyoming Department of Transportation criteria for the spacing of accesses is based on the functional classification of the highway and by the classification of the access. The only accesses that will be new or modified are on WY 487. WY 487 is classified as a minor rural arterial, and the spacing requirements by class of access are found in Table II-1 in *the Traffic Program Access Manual, 2014 Edition*. The access categories are field, residential, commercial, and major. During construction of the Project, the proposed accesses would fall into the major category, but after construction they would be classified as commercial. Therefore, the long-term spacing requirements for the access would be commercial to field access, commercial to residential access, or commercial to commercial/major access. There is only one conflict with existing accesses. Access 4 is within 100 feet of an existing access to the east. The existing accesses should be combined into one access point, and if possible, the location for Access 4 and Access 5 should be the same point on WY 487.

	Milepost	Existing Field Accesses Within 660'	Existing Residential Accesses Within 1320'	Existing Commercial/Major Accesses Within 2640'
Access 1	2.51	None	None	None
Access 2	4.95	None	None	None
Access 3	5.16	None	None	None
Access 4	5.59	One 100 ft to the south	None	None
Access 5	5.63	None	None	None
Access 6	7.53	None	None	None

Table 3. Existing Accesses Adjacent to Proposed Access

Traffic Control

All of the new accesses that connect with the state highway system will need to be controlled with STOP signs. Most of the current access or intersection points on the county roads do not have any type of intersection control, but because of the higher volume of traffic associated with the new proposed accesses, it is recommended that STOP or YIELD signs be installed for traffic entering the county roads from the new access roads.

The existing speed limit on the county road system is 55 mph. Many of the existing curves cannot be driven safely at 55 mph. Both CR 1 and CR 262 have sections with curves that need to be driven at safe and comfortable speeds below 55 mph. A safe and comfortable curve speed is a function of the radius of the curve and the super elevation on a curve. After the roads are upgraded/reconstructed, the curves should be appropriately and curve warning signs set accordingly.

Another possibility to handle appropriate speeds on curves on the county roads would be to use a construction speed limit of 40 mph. The speed limit would be put in place for the construction period, and appropriate construction speed limit signs installed. A 40-mph speed limit would negate the need for curve warning signs. A construction speed limit would also

reduce the sight distance needed for all of the access points on the county road system. The construction speed limit will be removed at the end of the construction period, and the road will revert to a 55-mph speed limit. However, it is recommended that the access points be constructed at locations where sight distance is appropriate for a 55-mph road. The access points will be used by maintenance vehicles during Project operations, and the longer sight distances would then be appropriate.

Other Developments

BluEarth Renewables is also planning a second wind power generation facility the Lucky Star Wind Farm, which will be constructed in this same general area as the Two Rivers Project. Men, equipment, and supplies for the Lucky Star Wind Farm will use WY 13, US 30, and CR 1 as the access routes for a large portion of the development.

Construction Projects

The Wyoming Department of Transportation has a pavement rehabilitation project scheduled on WY 13 between I-80 and US 30 for 2022. While not a part of the study area for this report, there are sections of I-80 that will be under construction in 2021 and 2022. There is a pavement rehabilitation project east of the Arlington interchange scheduled for 2021, and also a structure rehabilitation project west of the Arlington interchange scheduled for 2022.

Site-Generated Traffic

The developer anticipates that the majority of the required labor for the Project will be traveling to the site from outside the Project area. BluEarth Renewables intends to construct a man camp to accommodate the Project workforce. The location for the man camp is not yet finalized, however, the most likely location will be in Carbon County east of CR 1 or at the northern boundary of the town of Medicine Bow.

Manpower requirements estimates for the Two Rivers and Lucky Star projects are approximately 262 employees for the Project during the summer of 2021 and up to 400 employees for the Lucky Star Wind Project during the summers of 2022 and 2023. Roughly half the of employees are expected to be housed in a man camp. There will be travel restrictions placed upon these employees which will reduce traffic on CR 1. BluEarth Renewables is considering actions to minimize traffic on the state highways and the county roads. For example, BlueEarth intends to use buses to move workers from project area to project area to reduce the number of vehicles on the roads. BluEarth Renewables is committed to minimizing the impacts of traffic volumes resulting from the construction of the Project.

In addition to the traffic impacts attributed to the workforce, there will be construction traffic from gravel trucks, concrete trucks, construction supply delivery trucks, and other types of equipment. It is estimated that there will be approximately 100 construction trucks traveling to and from a particular wind turbine location. Those 100 trips are spread out over a number of

days/weeks. The number of trips associated with construction equipment will vary depending on how many wind turbine sites are under construction at any one time.

Recreational Traffic

During the fall there is an influx of hunters using the county roads to gain access to hunting areas. These volumes are not taken into consideration for the purposes of this study.

Distribution and Assignment of Traffic

The main route for equipment and supplies will be along I-80, to WY 13 at the Arlington interchange, then along WY 13 to US 30, and onto Medicine Bow. From Medicine Bow traffic will go south on CR 1 and north on WY 487. From WY 487 the traffic will go east and west on Carbon County roads and private roads.

As noted, estimates of number of additional vehicles associated with the wind farm construction are ongoing. Level of service calculations to describe the operation of highways and intersections is not appropriate at this time due to the lack of estimates of traffic volumes. It can be said, however, that there is excess capacity at all locations along the proposed routes for the traffic associated with this project. It is not anticipated there will be any major congestion. It is possible that at certain times construction traffic may cause some short-term queues. But this does not appear to be problematic at this time.

Auxiliary Lanes

Because the increased traffic volumes are short-term, the need for right-or-left-turn lanes was not investigated.

Maintenance Agreements

Carbon County will require maintenance agreements concerning the maintenance of specific county roads that will be impacted by additional traffic and construction equipment.

Post Construction

There will be a permanent operations and maintenance workforce in place after the construction phase is completed. It is anticipated 7-12 employees will be required to operate the windfarm. The employees will be tasked with the maintenance and operation of the wind turbine generators and associated infrastructure. Any additional traffic from the operational workforce will have a negligible impact on the state highway system or the county road system.

Traffic Analysis

The increased traffic volume on the highways under the jurisdiction of the Wyoming Department of Transportation and on the Carbon County road system will be notable but short-term.

Precise estimates of traffic volumes associated with the workforce and the construction equipment are ongoing. Based upon experiences with other wind farms in the area, both the state highway system and the county road system will be able to handle the increased traffic volumes associated with this Project. However, BluEarth Renewables is committed to minimizing these traffic volumes where practical. This includes a man camp for a portion of the workforce, using buses where appropriate, and planning efficient deliveries to the site.

There will be a residual workforce after the construction of the Project is completed. The impact of this workforce on the existing infrastructure will be negligible.

One of the principal objectives of this traffic impact study was to assess the sight distance at the proposed new access locations. At a minimum, adequate stopping sight distance needs to be provided for the motorist using the state highways or the county road system. It is preferable that access locations provide enough sight distance to allow a vehicle exiting the access onto the mainline to be able to pick a gap without impeding through traffic significantly. Each access point was evaluated using these guidelines, and recommendations were made pertaining to movement of several access points to provide better sight distance. Access points with specific recommendations are listed below.

It is recommended that CR 1 be widened from the junction of CR 3 to Access 7. The widening should be consistent with CR 1 between US 30 and CR 3. At completion of the Project construction phase, this widened section will be left in place.

CR 262 and CR 294 should be widened to 26 feet during the construction phase, and then the roadway width reduced to 22 feet at the completion of construction.

WY 487/Marshall Road
N 41.92593, W -1067.18193
Milepost 2.51
Access to the east

There is approximately 900 feet of sight distance in both directions at this location. It is recommended that diamond warning signs advising motorists of truck traffic be erected in advance of this intersection from both directions.

Access 1
N 41.931953, W -106.177749
WY 487, Milepost 2.97
Access to the west

There is adequate stopping sight distance at this location for both directions, but the sight distance to the north is slightly less than the preferred 1200 feet. Given that the access would need to be moved over 850 feet to achieve the desired sight distance, the proposed location is deemed to be adequate.

Access 2

N 41.959458, W -106.173649

Milepost 4.95

Access to the east

This location has 1100 feet of sight distance to the north and 1200 feet of sight distance to the south. If the access is moved 200 feet to the south, there would be 1,200 feet of sight distance in each direction.

Access 3

N 41.962346, W -106.174437

WY 487, Milepost 5.16

Access to the east

This access has adequate sight distance to the north, but 1,100 feet of sight distance to the south. If the access can be moved 100 feet to the south there would 1,200 feet of sight distance in both directions.

Access 4

N 41.968391, W -106.17608

WY 487, Milepost 5.59

Access to the east

The sight distance is adequate for an access at this location. However, there is an existing access to the east approximately 100 feet south of the proposed location. These two accesses should be combined. Additionally, there is another proposed access to the west approximately 250 feet to the north. If possible, both access points should be aligned opposite of each other.

Access 5

N 41.96912, W -106.176333

WY 487, Milepost 5.63

Access to the west

There is adequate sight distance at this location. As noted, if possible, Access 4 and Access 5 should be aligned opposite each other.

Access 7

N 41.818672, W -106.170035

CR 1, Milepost 6.16

Access to the east

This proposed access has adequate stopping sight distance, however, if the access were moved approximately 500 feet to the north it would increase the sight distance to the north. This will also increase the sight distance to the south to approximately 750 feet.

All access locations on WY 487 meet the Wyoming Department of Transportation minimum spacing requirements except for Access 4. As noted, there is an existing access approximately 100 feet south from the proposed location. It is recommended that these two access points be combined into one.

Both CR1 and CR262 have horizontal curves that are not consistent with the existing 55-mph speed limit. Currently no warning signs are erected for these curves. It is recommended that these curves be evaluated after road construction and appropriate warning signs be erected or a construction speed limit of 40 mph be imposed and signed during the construction phase

Carbon County will require a maintenance agreement for their county road system.

Mitigation and Recommendations

There are specific comments regarding access sight distance at several locations. These comments are included in the body of this report and in the Traffic Analysis section. In general, most access points have adequate sight distance, or can be altered slightly to provide more sight distance.

Curve warning signs should be erected on horizontal curves on the county road system at locations with safe curve speeds less than 55 mph. It is recommended that these curves If it is decided that curve warning signs are not appropriate, the speed limits should be reduced to 40 mph for the windfarm construction and signed appropriately.

All access locations will need to have the radii modified to be able to accommodate the large vehicles. A design will be provided by the turbine manufacturer, once ready.

It is recommended that cattle guards be installed where access roads pass through existing fences.

Carbon County will require a maintenance agreement for the road system.

Appendices

Traffic Volumes

Wyoming Department of Transportation

Annual Day of Week Summary for 2016

Site Names: 000107
 County: Albany
 Funct. Class: R Minor Arterial - Other
 Location: US 30 EAST OF MEDICINE BOW

Seasonal Factor Group: South East
 Daily Factor Group: South East
 Axle Factor Group: South East
 Growth Factor Group: Rural Other

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	MADT	MAWDT	MAWET	% POS
Jan	500	514	463	438	593	592	561	523	502	531	51
Feb	687	500	380	496	679	908	717	624	514	702	48
Mar	804	580	519	433	677	782	617	630	552	710	49
Apr	594	527	517	586	689	820	574	615	580	584	47
May	829	686	638	657	784	1,046	884	789	691	856	46
Jun	963	719	717	709	775	907	769	794	730	866	48
Jul	896	784	809	758	820	1,040	780	841	793	838	48
Aug	1,013	734	689	769	863	1,029	854	850	763	934	50
Sep	1,010	785	647	612	765	1,106	1,065	856	702	1,038	48
Oct	975	637	599	573	736	1,108	1,064	813	636	1,019	49
Nov	1,015	563	559	618	457	843	1,024	725	549	1,019	48
Dec	683	495	577	565	609	806	709	635	562	696	45

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	AADT	AAWDT	AAWET	% POS
2016	831	627	593	601	704	916	801	725	631	816	48
2015	761	612	626	563	631	837	737	681	608	749	47
2014	771	599	593	612	650	872	757	694	614	764	48
2013	735	595	554	583	652	861	757	677	596	746	48
2012	770	577	544	569	631	857	747	671	580	758	48
2011	783	629	613	628	712	929	755	721	646	769	48
2010	848	739	719	700	768	998	877	807	732	862	49
2009											
2008											
2007								730			

Crash Data

Highway Safety Segment Crash History Report

Roadway Name: US 85

County: LARAMIE

City: null

Note: This report was created from data extracted from multiple sources, which are considered to be reliable and up-to-date. However, some of the data sets are known to have some issues (these are consistency and location concerns with the signs focus in the location and nature of safety issues along the study segment. It is expected that on-site validation would be performed before any investment decisions are made.

Crash Details for Study Segment

DATE	STATE NO.	INI	KILL	MANNER	LIGHT	FHE	LOCATION	MILEPOST	SEVERITY
02/11/14 00:	201415171	1	0	Not a Collision w/2 Vehicles in Transport	Darkness	Overtum/Rollover	Intersection	300	NON- INCAPACITATI NG INJURY

LRS Route: ML85B

From RM: 25

To RM: 30

Highway Safety Intersection Crash History Report

Intersection ID: 23138 County: ALBANY City: null Years: 2014 to 2017
 Facility Type: RuUn3 Area Type: R Marked Crosswalk at Intersection Number of Legs: 3

Leg	Date	Time	Report#	# Inj	# Killed	Lighting	Junction Relation	First Harmful Event	Manner of Collision	Grid Cell
2014										
US 30	12/21/14	1215	17979	0	0	Daylight	01	Jackknife	Not a Collision w/2 Vehicles in Transport	Unknown
2017										
US 30	07/23/17	2245	06960	0	0	Darkness Unlighted	x	Deer	null	Unknown

Highway Safety Intersection Crash History Report

Intersection ID: 19937 County: CARBON City: MEDICINE BOW Years: 2013 to 2013
 Facility Type: RuUn3 Area Type: R Intersection w/o Marked Crosswalk Number of Legs: 3

Leg	Date	Time	Report#	# Inj	# Killed	Lighting	Junction Relation	First Harmful Event	Manner of Collision	Grid Cell
UTAH ST	02/09/13	1630	02425	0	0	Daylight	02	Utility Pole/Light Support	Not a Collision w/2 Vehicles in Transport	Unknown

2013