Section 7.0 Haul Routes and Loads

Specialized trucks and trailers will used to deliver the major wind turbine components, construction equipment and materials to the Project Area. The material deliveries and equipment deliveries will be via Highway 310 to Loyning Ranch pasture entry road or to Quarry Road and then via Railbed Road to each of the project area staging locations at each project entrance. The wind turbine nacelle, tower components, transformers, blades and other large equipment will be transported to the site using semi-trucks and low boy transporters specially designed for heavy loads (i.e. multiple axles) and special configurations designed for long load wind turbine components. The range of load size of the components and truck requirements are summarized in **Table 2.** Several of these loads will have a gross vehicle weight of upwards of 200,000 pounds which exceeds the Montana Department of Transportation (MDOT) size and weight limits. All loads transported on MDOT and Federal rights of way will be within required legal size and load limits or must have a valid oversize and / or overweight permits for all oversized loads. The trucks will deliver the equipment to the Project Area either to the designated staging area or to the individual wind turbine sites. Movement of the transporters will have a short term impact on regional traffic along the access routes.

Table 2: Size of Wind Turbine Components and Truck Requirements

Maximum Height	16.4 ft
Maximum Width	16.4 ft
Maximum Load per Axle	17 tons
Maximum Weight	100 tons
Maximum Length	177 ft

1.

The planning scenaro for shipping involves a 2 MW turbine selection with 100 m towers for the site. The comprelhensive project contains three (3) adjoining prject areas each containing forty (40) wind turbine generators. Each project phase will requir the deliver to materials to construct the 40 wind turbine generators needed to generate the 80 MW per phase.

Approximately 10 truck loads will be required to deliver a complete wind turbine generator to each tower location. Towers to support the wind turbine genrators are subdivided into four (4) sections for delivery and installation. Each tower section is approximately 66 to 77 feet long and requires an individual transport truck. Similarly blades require an individual truck and transported one per truck Each wind turbine requires three (3) blades. The necelle, typically the heaviest of all loads, contains, the generator, gearbox, and main shaft. and requires a very heavy duty tractor trailer for individual delivery. Delviery of turbine coponents for each wind turbine will require approximately 10 truck loads or 20 truck trips (in and out) per wind turbine. This would result in 400 in-bound heavy load truck trips and 400 outward bound empty truck loads just for wind turbine component deliveries per 80 MW project area.

Any MDOT permitted super loads will be required to use the I-90, US Highway 212 and Highway 310 aceess route to project entry points at Quarry Road and the Loyning Ranch access road off Highway 310. In total, the project estimates that there will be approximately 1,200 super loads associated with the 240 MW of wind turbine and crane component deliveries. Many of the trucks will sorten up the long load trailers to standard lengths before exiting the project areas. In addition to these primary loads, several hundred additional loads will be required for miscellaneous supplies such as cable spools, construction equipment, rebar and other construction material delivered to the project site. These trucks will rely on

Quarry Road and Railroad Bed Road for ingress and egress to the project area. Construction related traffice will occure between 7:00 Am and 5:00 PM Monday through Saturday. Approximately 1,956 heavy duty truck deliveries are anticipated during the 12 month construction period with upto 20 trucks per day or 40 daily truck trips on Railroad Grade Road (inbound and outbound from the south) during peak construction and upto 10 standard weight vehicle trips per day on Pryor Mountain Road from the north . In addition to the Quarry Road entrance into the project area, a third private road entry off Highway 310 will be used to construction approximately 20 wind turbines in Phase III. This entry is approximately 1,600 feet north of Quarry Road. This road is an existing driveway entry off Highway 310. This road will have a lockable gate.

Three instersections with State Highway 310 will be utilized to access the project area. There will be no modifications to the Pryor Mountain Road intersection. MDOT approach permits will be obtained for the other Highway 310 intersection improvements that may be necessary. Acces to the project area will be via the following intersections:.

- Quarry Road off Highway 310 which has turning lanes for trucks access the cement plant and limestone quary. This intersection will not require any major modifications for delivery of major components.
- Pryor Mountain Road off Highway 310 which will be used only as a secondary access route for construction crews and small loads of construction material and an exit route for shortened load after delivery of compoenents.
- Private Entry Road off Highway 310, south of Quarry Road, which has an existing entry onto Montana Limestone Company's property. This road is located south of the overhead converor belt that crosses Highway 310. This private road will be used for some long loads to facilitate entry onto Railbed Road..
- Private Entry Road Off Highway 310 at Warren Trucking, which has a truck turn off from Highway 310 onto Warren Trucking's truck yard. This private road will be used for some loads coming from the south on Highway 310.

7.1 Construction Trips Generation

The project will generate significant traffic flow during the construction period and much lower traffic volumes related to project operations. The following section describes the anticipated traffic levels for project construction and ongoing long-term project operations.

Project construction is expected to take two years to complete. It is anticipated that most of the construction will occur in 2015 and minor reclamation and cleanup work occurring in the 2016. The construction labor is expected to travel to the site from within a 75 mile radius of the Project via one of the two major access routes. The roadway network involving US Highway 310, Railbed Road and Pryor Mountain Road will be the primary public roadways used by construction vehicles traveling to and from the Project Area. Railbed Road would likely receive the greatest impact from construction vehicles and workers as it will be the designated primary access route for all heavy equipment and material deliveries. It is anticipated that some labor, equipment and materials will also access the project from the Northern access route via Pryor Mountain Road and up to 20% of the total traffic consisting of construction workers, and empty material delivery trucks will exit the project via Pryor Mountain Road to Highway 310.

It is anticipated that the majority of the construction workforce traffic will originate in Billings Montana and Powell Wyoming areas. The majority of the workforce will access the project site from the State Route 310 via the northern or southern access routes. Additionally, it is expected that a significant percentage of that workforce will temporarily relocate to the project vicinity and therefore travel on the same routes. The wind turbines, towers, transformers and other large equipment will be transported to the

site using a semi-truck and lowboy transporter configuration designed for heavy loads (i.e. multiple axles). The trucks will deliver the equipment to the Project Area via one of the designated routes. All oversized, extra-long, and overweight deliveries will be delivered to the site via the South access routes via Rail Road Grade Road.

At the peak of construction during the spring and summer months there will be an onsite workforce at Mud Springs Wind Ranch project area of approximately 95 to 120 workers. The average workforce over the entire construction period will be from 60 to 75 workers. This work force could generate as many as 80 imbound trips during the AM peak hours and 80 outbound trips during the PM peak hours. The workforce transportation trips are well within the capacity of the local road network and would not significantly affect existing levels of service. Estimated round-trip construction vehicle trips (trucks) associated with material deliveries are presented in **Table 3**. The specific wind turbine has not yet been selected. The size of each of the project phases is limited by its PURPA contract with PacifiCorp to 80 MW. The projects anticipate using a 2 MW wind turbine generator on 93 meter to 100 meter (305 to 328 feet) towers. Therefore the number of turbines would be 40 per project phase area and 120 wind turbines for the entire Mud Springs Wind Ranch. The following transportation assumptions are based on 2.0 MW turbines with 50 meter rotor blades and 100 m towers, which will require the greatest number of round trip vehicle trips for delivery of equipment per turbine.

Table 3:
Construction Round Trip Loads on Public Roads

Materials	**Total Number of Load Trips**
Loads for 120 WTG Installation	Assumes one trip inbound and one trip outbound
Nacelles (one per WTG)	240
Rotors (one per WTG)	240
Hubs (one per WTG)	240
Blades (assumes 1 blade / truck worse case	720
Towers (assumes 4 sections / WTG	960
Rebar (assumes 2 loads per WTG)	480
Concrete Redi-mix (assumes 44 loads / WTG)	5,280[1]
2 Batch Plants	20
Crane #1	64
Crane #2	16
D-9	12
Graders	12
Scrapers	12
Off Road Dump Truck Delivery	20
Transmission Poles	44
Auger Delivery	24
Conductor Wire	28
Insulators	20
Power Cable Spools	120
WTG Switch Gear / Transformers 2 per load	120
230 kV Substation Transformer	2
Collection Substation Meter /housing	40
Collection Substation Steel	16
Collection Substation Gravel	100
Collection substation Fence	8
Total	8,838

(1) Conservative estimate of 60% of redi-mix round trip traffic is expect to use Railbed and Pryor Mountain Road.

Rock loads are assumed to be sourced from existing pits near Quarry Road, and/or other adjacent sources on local ranches rather than sourced from outside of Project Area. Concrete loads (redi-mix trucks) will be sourced from batch plants within each phase's project area, close to the turbine foundations. Loaded redi-mix trucks will be traveling between the construction batch plant and foundation locations on project roads. A conservative assumption used in the traffic plan is that 50% of redi-mix truck traffic will be between phases and use Railbed Road and those segments of Pryor Mountain Road within the project area. The primary impact of rock and concrete loads will be to Railbed Road and have limited impact on the Quarry Road and Highway 310 intersection. Approximately 3,570 deliver truck vehicle trips (round trip estimate) associated with deliveries of equipment and materials will affect regional roads primarily the intersection of Highway 310 and Quarry Road. Approximately 20% of the truck traffic that uses Railroad Grade road to access the project or approximately 595 vehicle trips are assumed to use Pryor Mountain Road as an exit route from the project area.

At the peak of construction, workers will generate approximately 160 daily trips (80 of which will occur during the evening peak hour). This trip estimate does not include any reduction from carpooling. In addition to worker traffic, there will be an estimated 20 heavy load and light duty delivery trucks per day during the peak of the construction period, resulting in 40 daily trips. Therefore the total number of vehicles during the peak construction period will generate approximately 200 daily trips. Construction related traffic will consist of deliveries of project equipment and construction materials such as steel and concrete. The major truck traffic impact to Railbed Road within the project area will be from redi-mix trucks traveling between the batch plant and the various wind turbine foundation sites. Approximately 5,280 loads of concrete mix will be necessary to complete construction of the 120 wind turbine foundations resulting in approximately 10,560 trips of which approximately 50% may involve travel on Railbed Road and 50% on internal project roads.. The majority of truck deliveries of materials entering via Quarry Road are anticipated to occur between the hours of 7:00 AM and 5:00 PM on weekdays. Some deliveries will occur on Saturday due to transportation scheduling requirements for some super loads. These truck deliveries will include:

- Major equipment (e.g. tower sections, nacelles, blades, hub, and rotor);
- Concrete dry mix and reinforcing steel;
- Mechanical equipment;
- Electrical equipment and materials, transformers, cables, poles, etc.;
- Miscellaneous steel, trailers, modular buildings and fencing;
- Construction consumables;
- Contractor mobilization and demobilization;
- Gravel for site access roads and substation;
- Construction equipment delivery and pickup;
- Water trucks to wet the road for dust control and during construction for compaction.

For the purposes of estimating trip generation, the most conservative scenario assumes construction of the larger 100 meter towers and the 2 MW turbines. This combination will require more turbine locations and loads per wind turbine generator, larger cranes and a larger foundation. It can take as many as seven to ten trailers to transport components for one turbine and from 8 to more than 16 trailers to transport the large-capacity crane. Turbine and crane components are transported in compliance with Federal and various MDOT requirements for both size and weights. Gravel for the site access roads and project concrete batch plant is expected to come from existing sources near Quarry Road and existing pits in the project area..

7.2 Large and Oversized Loads

Extra large loads for each wind turbine generator will require approximately 13 oversize or large loads, including:

- 6 loads for towers segments;
- 3 loads for rotor blades;
- 3 loads with nacelle, hub and drive train;
- 1 load with tower transformer, switch cabinet, small parts and other containers.

Representative weight and dimensions of these oversized loads are listed in Table 4. Loaded truck weights and heights will vary by the type of load and the equipment supplier's shipping and packing requirements as well as the type of transporter chosen to carry the load. Loaded truck weights may be greater than those shown in Table 4 depending upon the final configurations. All major wind turbine components will be transported to the project site via State Route 310.

Table 4: Length and Width of Oversized Loads

100 Meter Tower	Length	Diameter	Weight (Tons)
Section 1	39.2 ft	15 ft	75.4 Tons
Section 2	39.2 ft	14 ft	59.4 Tons
Section 3	51 ft.	14 ft	64.3 Tons
Section 4	58.7 ft	13 ft	58.2 Tons
Section 5	58.7 ft	13 ft	41.5 Tons
Section 6	68.9 ft	13 ft	35.9 Tons
Nacelle	34.7 ft	11.48 ft	54 Tons
Rotor Shaft / Gear box	15 ft	10 ft	43.7 Tons
Rotor blades (3 loads)	177 ft	10.5 ft	11.57 Tons
Switch Cabinet/ Transformer	7 ft	4 ft	2.97 Tons

Some of the trucks that will be delivering construction equipment and materials to the project site will have gross vehicle weights exceeding the MDOT legal load limit. Trucks in excess of the legal load limits, or "super loads," require special permits from MDOT for vehicles exceeding the state's maximum size, weight, and load limits. A MDOT's super load permit is required for a vehicle or combination with a non-divisible load having a gross weight exceeding 200,000 pounds and/or a total width or height exceeding 16 feet. Adequate axel weight distribution will be provided for on transport trailers to distribute the weight in order to meet the MDOT permitted load limits. The longest loads are the rotor blades, which are manufactured as single units and cannot be divided. The proposed south access route via Railbed Road has been designated as the primary route for these super loads. The primary intersections for these super loads will be:

- I-94 at Exit 434 and US Highway 310
- US Highway 310 and US Highway 212
- US Highway 310 and State Route 72
- US Highway 310 and Loyning ranch entry
- US Highway 310 and Quarry Road

The intersection of Quarry Road and US Highway 310 has adequate turning radius requirements of these super loads. Some minor shoulder reconstruction may be necessary at US Highway 310 and Quarry Road to replace and improve the shoulder gravel at the intersection and widen the turning radius within the existing county easement. The intersection of Railbed Road and Quarry Road will require widening for trailer drift in the turning radius. A private by pass easement has been obtained from the local ranch owner to create a truck turning radius east of the existing intersection, by passing the cell tower and creating an adequate turning radius onto Railbed Road.

The private ranch road access off of US Highway 310 will require shoulder improvements within the MDOT Right of Way. A separate MDOT Approach Permit will be obtained for these improvements. Approximately 20 of the 120 wind turbines component deliveries will use this private access road entry off Highway 310. All other deliveries will be made via the Quarry Road and Highway 310 intersection. Additional warning signs will also be installed as required by MDOT on State Route 310 at appropriate locations north and south of the private driveway entry, the Quarry Road intersection and the Pryor Mountain Road intersections.

7.3 Operations and Maintenance Traffic

The Project will operate continuously 24 hours per day, 7 days per week. It will employ approximately 8 to 12 full time workers during the initial warranty period (two years). The operations crew will normally work 8 hour shifts Monday through Friday with a smaller crew working weekends and nights. The maximum number of vehicle trips associated with workers commuting to and from the project on paved state and county roads will be approximately 40 during a 24 hour period. Traffic between the maintenance facilities and individual turbines will be on the private gravel roads located within the project area. During the operations life of the project there will be occasional need to replace blades or other equipment which will necessitate mobilization of crane equipment and spare parts into the Project Area. Major overhaul and maintenance work will be scheduled for the summer periods of July and August and may generate additional large loads and crew trips into and out of the project area. Overhaul and maintenance work may generate an additional 20 vehicle trips per day during the maintenance period. Vehicles used during the operations and maintenance of the project will primarily be from employees and contractors commuting to and from the project site and are not expected to exceed state or county legal roadway load limits. These trips are not expected to contribute to degradation of roadway conditions. Any super loads required during the operations and maintenance of the wind turbine facilities will require permits from MDOT for those loads. Carriers may also be required to hire pilot cars or police escorts. Oversize loads are also subject to hours of operation limitations to avoid peak traffic.

7.4 Hazardous Material Transport

No substantial quantities of industrial materials will be brought into or removed from the project site during project operations. The only materials that will be brought onto the site are those related to maintenance and/or replacement of Project facilities (e.g. nacelles or turbine components and electrical equipment). Hazardous materials transported to the site include minimal amounts of lubricating oils, hydraulic fluids, and mineral oil associated with equipment operations. Waste fluids will need to be changed infrequently (generally less than once per year and sometimes only once every five years). During the construction period, diesel fuel will be transported into the site daily to fuel construction equipment.