PLAN OF DEVELOPMENT

FOR THE

ADVANCED RAIL ENERGY STORAGE REGULATION
ENERGY MANAGEMENT SYSTEM PROJECT

Submitted to:

Bureau of Land Management
Southern Nevada District Office
Renewable Energy Coordination Office

Submitted by:

ARES Nevada, LLC

Updated December 2014
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCC</td>
<td>Aluminum Conductor Composite Core</td>
</tr>
<tr>
<td>ATV</td>
<td>All Terrain Vehicle</td>
</tr>
<tr>
<td>AREMA</td>
<td>American Railway Engineering &amp; Maintenance-of-Way Association</td>
</tr>
<tr>
<td>ARES</td>
<td>Advanced Rail Energy Storage</td>
</tr>
<tr>
<td>BLM</td>
<td>Bureau of Land Management</td>
</tr>
<tr>
<td>CAISO</td>
<td>California Independent System Operator</td>
</tr>
<tr>
<td>ECN</td>
<td>Energy Communications Network</td>
</tr>
<tr>
<td>FWS</td>
<td>U. S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers</td>
</tr>
<tr>
<td>IHHA</td>
<td>International Heavy Haul Association</td>
</tr>
<tr>
<td>kV</td>
<td>Kilovolt(s)</td>
</tr>
<tr>
<td>MOW</td>
<td>Maintenance-of-Way</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatt(s)</td>
</tr>
<tr>
<td>MWH</td>
<td>Megawatt Hour</td>
</tr>
<tr>
<td>NDOT</td>
<td>Nevada Department of Transportation</td>
</tr>
<tr>
<td>NDOW</td>
<td>Nevada Department of Wildlife</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
</tr>
<tr>
<td>OPGW</td>
<td>Optical Ground Wire</td>
</tr>
<tr>
<td>POD</td>
<td>Plan of Development</td>
</tr>
<tr>
<td>REM</td>
<td>Regulation Energy Management</td>
</tr>
<tr>
<td>ROW</td>
<td>Right-of-Way</td>
</tr>
<tr>
<td>RUS</td>
<td>Rural Utility Services</td>
</tr>
<tr>
<td>VEA</td>
<td>Valley Electric Association</td>
</tr>
<tr>
<td>WECC</td>
<td>Western Electricity Coordinating Council</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

ARES Nevada, LLC (ARES) is submitting this updated Plan of Development (POD) to the Bureau of Land Management (BLM), Southern Nevada District Office, Renewable Energy Coordination Office, in support of the Standard Form 299 Application (N-092514) for Transportation and Utility Systems and Facilities on Federal Lands previously submitted, for the construction, operation, and maintenance of a proposed Advanced Rail Energy Storage Regulation Energy Management (REM) project. This system is a gravity-based energy storage system utilizing electric shuttle trains operating on a single, steep-grade railroad track to store electric energy in the form of potential energy. The goal is to assist in electricity supply management on a regional electrical grid. The system accomplishes this by using electricity from the grid when electricity is abundant to power the locomotives uphill, then returning electricity to the grid when electricity is needed as the locomotives descend, their motors operating as generators. This system is designed to operate at greater than 80% efficiency for up to 40 years.

ARES proposes to locate this project in the Carpenter Canyon area, east of Pahrump, in Nye and Clark Counties, Nevada (see Figure 1). This project will access the regional electrical grid via a transmission interconnection line to the existing Valley Electric Association (VEA) Gamebird Switch Station approximately 800 feet east of Nevada State Highway 160 and 2,000 feet west of the existing VEA 230kV transmission line. Figure 2 illustrates the alignment of the proposed project relative to Pahrump and Nevada State Highway 160. ARES will construct and operate the project in conformity with the approved POD that will be included as part of the Right-of-Way (ROW) grant.

![Figure 1. Proposed location of the ARES REM facility.](image-url)
2.0 PROPOSED ACTION

The proposed action is to construct a 50 Megawatt (MW) capacity, gravity-based energy storage system on approximately 150 acres of BLM managed land east of Nevada State Highway 160, east of Pahrump, Nevada. The construction and operation of the project will provide 12.5 MW hours (MWH) of fast response energy storage necessary to assist in the balancing of electrical daily and seasonal supply and demand, as well as assist in balancing the highly and unpredictably variable renewable energy expected to be connected to the transmission grid, increasing renewable energy penetration while maintaining grid reliability. The system operates on a closed low-friction automated steel rail line to transport weighted shuttle trains (electric locomotives and rail cars) between different elevations. The upslope (northeast) end of the ROW will begin in Township 20 South, Range 55 East, Section 22. The ROW will run southwest (down-slope) and intersect an operations and maintenance area which would include a new substation (ARES Substation). A new 230kV transmission line (gen-tie) will run northwest from the substation to connect with the existing VEA (N-057100) 230kV transmission line ROW in Township 21 South, Range 54 East, Section 01. The ROW will then intersect, and become part of, the existing VEA transmission line for approximately 7,200 feet. Once integrated with the existing transmission line, the new line will run generally west and connect with the existing VEA Gamebird Switch Station (N-059100), located in Township 21 South, Range 54 East, Section 3. The Switch Station will be expanded within the already granted ROW. A new line will be constructed north from the Switch Station to connect with the existing VEA (N-057100) 230 kV transmission line. Approximately 5,400 feet of the existing 230kV transmission line will be removed (see Figure 2).
2.1 Purpose and Need

The purpose of the proposed action is to assist in electricity supply management and transmission system stability and reliability on the regional electrical transmission grid. The system accomplishes this by using electricity from the transmission grid when electricity is abundant (e.g. low energy usage times) to power locomotives uphill. Electricity is returned to the transmission grid when needed (e.g. high usage times) as the locomotives descend, the electric motors operating as generators.

The operation of the project will provide 12.5 megawatt hours (MWH) of fast-response energy storage necessary to assist in the balancing of electrical supply and demand to counter highly variable energy usage and unpredictably variable renewable energy supplies, while maintaining grid reliability.

The system, as proposed, would have an energy return efficiency of greater than 80% and could increase the amount of renewable energy resources added to the electric grid without compromising grid efficiency, reliability, or requiring additional impacts to the environment.

2.2 Requested of the BLM

New land leases and ROW will be required for the proposed project. A grant for the use of up to 150 acres of federal lands administered by the BLM has been requested. No additional permanent access requirements are anticipated. No state or private lands will be accessed.

As a result of the proposed action, VEA will be required to upgrade the existing transmission line from where the ARES REM 230 kV gen-tie meets the existing VEA 230kV transmission line and travels to the Gamebird Switch Station (Existing Substation), approximately 3.5 miles northwest of the project operations facility (see Figure 3).

The proposed ROW alignment crosses through the West Wide Energy Corridor (Section 368) at the down-slope (southwestern) end. The facilities area and a portion of the transmission interconnection line lie within the corridor (see Figure 2).
2.3 Authorizations, Permits, Reviews and Approvals

ARES has signed a funding agreement with VEA, and is currently in the planning phase with VEA to develop an interconnection agreement to tie this project into their existing Gamebird Switch Station. This will allow ARES and VEA to utilize the existing Gamebird Switch Station and control facility for location and control of the ARES REM Substation transformer and interconnection.

Permits required and being pursued by ARES are listed in Table 1.
Table 1. Required Permits, Authorizations and Approvals

<table>
<thead>
<tr>
<th>Action Requiring Permit</th>
<th>Permit/Approval</th>
<th>Accepting/Approving Agency</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project construction, operation, maintenance and abandonment</td>
<td>Right of Way (ROW) Grant</td>
<td>BLM</td>
<td>FLPMA 1976 (PL 94-579); 43 USC 1761-1771; 43 CFR 2800</td>
</tr>
<tr>
<td>National Environmental Policy Act compliance to grant ROW</td>
<td>Environmental Assessment</td>
<td>BLM</td>
<td>NEPA 42 USC 4321, CEQ 40 CFR Part 1500-1508</td>
</tr>
<tr>
<td>Potential direct or indirect impacts to federally listed Threatened and Endangered Species and/or habitat.</td>
<td>Endangered Species Act Section 7 Consultation with US Fish and Wildlife Service (USFWS) and Biological Assessment</td>
<td>USFWS</td>
<td>Endangered Species Act, Section 7(a)(2)</td>
</tr>
<tr>
<td>Construction sites with greater than five acres of land disturbance</td>
<td>General Permit for Storm Water Discharges from Construction Activities (Section 402 National Pollutant Discharge Elimination System)</td>
<td>U.S. Environmental Protection Agency (USEPA)</td>
<td>Clean Water Act (33 USC 1342)</td>
</tr>
<tr>
<td>Potential pollutant discharge during construction, operation, maintenance activities</td>
<td>Spill Prevention Control and Countermeasure Plan</td>
<td>USEPA</td>
<td>Oil Pollution Act of 1991 (40 CFR 112)</td>
</tr>
</tbody>
</table>
## STATE

| Potential disturbance of historic properties | Section 106 Consultation | State Historic Preservation Office | National Historic Preservation Act of 1966 (16 USC 470) (36 CFR 800) |
| Construction of a potential energy project | Energy Planning and Conservation Fund | NDOW | Nevada State Assembly Bill 307 (NRS 701.600 - 701.640) |
| Disturbance of wildlife and/or wildlife habitat for the entire project | Special Purpose Permit | NDOW | NRS 503.597 and applicable Nevada Administrative Code (NAC) Not specific to endangered species |
| Activity that will disturb one acre or greater, and will discharge storm water runoff from the construction site into a municipal separate storm water sewer system, or waters of the US. | NPDES General Stormwater Permit for Construction | Nevada Division of Environmental Protection (NDEP) – Bureau of Water Pollution Control (BWPC) | 33 USC 1318; 40 CFR 125.27; 40 CFR 122.26(b)(14) |
| Environmental issues related to the construction of utility facilities. | Utilities Environmental Protection Act (UEPA) | Nevada Public Utilities Commission | NRS 704.8905 |

## CLARK COUNTY

Initial introductions have been made; formal consultation with Clark County will begin January 2015
### 2.4 Project Components

A spatial layout of the project components can be found in Figures 2 and 3.

**Rail Line Corridor:** The rail line corridor will consist of a permanent linear ROW approximately 5.5 miles long by 150 feet wide, for a total 100 acres. Construction width for the corridor is expected to be up to 185 feet, but averaging 140 feet, to accommodate cut/fill areas. The corridor includes the rail line, an access road, an electricity regulation system (parallel overhead catenary transmission line), a mid-slope spur rail to be used as a turnout, and drainage management features. Multiple 48 inch storm culverts (see Figure 4) will be installed at significant wash crossing encountered at the upper elevation.

**Rail Vehicles:** Shuttle trains, each comprised of two electric locomotives and seven cars (see Figure 5), will ascend and descend the rail line at slow speeds (average 18.8 mph, but not more than 25 mph), to either take electricity off the grid (on the ascent), or supply electricity to the grid (on the descent). The movement will depend on the immediate electrical demands being placed on VEA by their customers and the transmission system operator, California Independent System Operator (CAISO). Some of the shuttle train cars will be filled with topsoil from the site removed during construction, to act as ballast weight. Concrete masses may be used if not enough topsoil is collected from the site to fill all of the cars.
Operations, Control and Maintenance Facility (O&M Facility): A facility will be constructed at the southwestern end of the rail corridor to provide operations, control, and shuttle train maintenance support (see Figure 6). This area is approximately 250 feet at the widest point and 550 feet long (just over three acres). Temporary construction areas are expected to expand this area to 350 feet at the widest point and 700 feet long, less than six acres.
Transmission Interconnection (gen-tie): To connect the ARES project to the electric grid includes the following components:

- A new substation (ARES Substation) located adjacent to the ARES Operations, Control and Maintenance Facility (included in the 3.7 acre estimation).
- A new 230 kV transmission line (gen-tie) installed and operated by VEA to connect the ARES Substation to the Gamebird Switch Station (N-059100). (This new line will run parallel to the new O&M Facility access road.)
- The addition of a circuit (line), resulting in the need to upgrade the existing 230 kV line (N-057100), between ARES Substation and Gamebird Switch Station. The addition of this circuit will require the replacement of existing transmission poles between the gen-tie connection and connection to the new transmission connection to the Gamebird Switch Station.
- Removal of the section of transmission currently bypassing the Gamebird Switch Station (approximately 5,435 feet).
• New transmission connections to the Gamebird Switch station. This will include two new legs, one running due east from the Gamebird Switch Station to intersect the existing 230kV line being upgraded, and a second leg running due north from the Gamebird Switch Station, along the Pahrump Speedway eastern boundary, to intersect the existing 230kV line.

• Expansion of the Gamebird Switch Station. This expansion will remain within the existing Gamebird Switch Station ROW grant.

**Access Road:** A new access road connecting the proposed ARES O&M Facility at the western end of the O&M facility with an existing VEA transmission maintenance road will be constructed, running parallel to the new gen-tie. The ARES facilities and the new VEA interconnection line will be accessed from this road during construction and operation phases of the project. The existing transmission line will continue to be accessed via an existing road running parallel to the line. All existing roads will need to be upgraded to type II gravel roads, with drainage features, to accommodate construction vehicles.

**Temporary Construction Areas:** Laydown yards and other temporary ROW areas will be required and identified prior to the submission of the Final Environmental Assessment. These areas will be determined by the construction contractor.

For the construction of the transmission interconnection a total of five temporary pulling/tensioning sites, approximately 300 feet by 150 feet (one acre), will be needed.

The approximate dimension for each of these ROW components is listed in Table 2.

ARES is coordinating with Clark and Nye Counties to identify any required local permits, easements or dedications. Additional permits required by other local, state, and federal agencies are being investigated. ARES has set up an Energy Planning and Conservation Fund (Assembly Bill 307) with the Nevada Department of Wildlife (NDOW).
## 3.0 PROJECT DISTURBANCE

Table 2. Proposed Disturbance

<table>
<thead>
<tr>
<th>Component</th>
<th>Permanent</th>
<th></th>
<th></th>
<th>Temporary</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length</td>
<td>Width</td>
<td>Acreage</td>
<td>Length</td>
<td>Width</td>
<td>Acreage</td>
</tr>
<tr>
<td>Rail, Transmission and Maintenance Road*</td>
<td>5.5 miles</td>
<td>80 feet</td>
<td>53.3</td>
<td>5.52 miles</td>
<td>70 feet</td>
<td>46.8</td>
</tr>
<tr>
<td>Maintenance and Control Facilities*</td>
<td>1,280 feet</td>
<td>250 feet</td>
<td>7.3</td>
<td>1,280 feet</td>
<td>75 feet</td>
<td>2.2</td>
</tr>
<tr>
<td>Laydown Yard (possibly contained within the O&amp;M Facilities area)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>To be determined</td>
<td>To be determined</td>
<td>To be determined</td>
</tr>
<tr>
<td>ARES Substation – this unit is already included in the O&amp;M facility calculations</td>
<td>Already included</td>
<td>Already included</td>
<td>Already included</td>
<td>Already included</td>
<td>Already included</td>
<td>Already included</td>
</tr>
<tr>
<td>New 230kV gen-tie to interconnect with the existing VEA 230kV transmission line, with access road*</td>
<td>3,866 feet</td>
<td>100 feet</td>
<td>8.9</td>
<td>3,866 feet</td>
<td>50 feet</td>
<td>4.4</td>
</tr>
<tr>
<td>New 230kV transmission lines from the existing VEA 230kV transmission line to connect to and from the Gamebird Switch Station (new east/west and north/south lines)*</td>
<td>6,251 feet</td>
<td>100 feet</td>
<td>14.4</td>
<td>6,251 feet</td>
<td>50 feet</td>
<td>7.2</td>
</tr>
<tr>
<td>Temporary disturbance for the upgrade of the existing VEA 230kV transmission line*</td>
<td>existing</td>
<td>existing</td>
<td>existing</td>
<td>7,100 feet</td>
<td>50 feet</td>
<td>8.1</td>
</tr>
<tr>
<td>Temporary construction roads</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>To be determined</td>
<td>50 feet</td>
<td>To be determined</td>
</tr>
<tr>
<td>Five temporary pulling and tensioning sites</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>300 feet</td>
<td>150 feet</td>
<td>1</td>
</tr>
</tbody>
</table>

*Bold denotes major components described below.
4.0 COMPONENT DESCRIPTIONS

The following section provides additional information on the major components of the project. In some cases, the details are yet to be developed and will be updated as development of the project progresses.

The proposed project can be broken down into five distinct components (see Figure 3 and Table 2):

- The rail line corridor with single rail line, shuttle trains, parallel road, drainage features, overhead (catenary) power line, and mid-grade siding or turnout rail.
- Substation and maintenance, control, and support facilities.
- A transmission interconnection line (gen-tie) to connect the ARES substation to the existing 230kV transmission line, and associated maintenance and project access road.
- Upgrades to (replacement of) the existing VEA 230kV transmission line.
- New north/south and east/west transmission lines to connect the existing 230kV line to Gamebird Switch Station.

The legal land description for each component is listed within each section below.

4.1 Rail Line Corridor and Vehicles

4.1.1 Single Track Rail Line Corridor

The rail line corridor will include the rail line, a maintenance road, overhead catenary line, drainage management features, and a mid-grade spur line. Remote monitoring of the rail corridor will be installed to protect and monitor the system for maintenance issues and from outside interference. The legal land description for the extent of the rail line corridor is included in Table 3.

Table 3. Rail Line Corridor Legal Land Description

<table>
<thead>
<tr>
<th>Township and Range</th>
<th>Section Number</th>
<th>Aliquot Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. 21 S, R. 54 E.</td>
<td>1</td>
<td>SE ¼</td>
</tr>
<tr>
<td>T. 21 S, R. 54 E.</td>
<td>12</td>
<td>NE ¼</td>
</tr>
<tr>
<td>T. 21 S., R. 55 E.</td>
<td>7</td>
<td>NW ¼</td>
</tr>
<tr>
<td>T. 21 S., R. 55 E.</td>
<td>6</td>
<td>SE ¼ and NE 1/4</td>
</tr>
<tr>
<td>T. 21 S., R. 55 E.</td>
<td>5</td>
<td>NW ¼</td>
</tr>
<tr>
<td>T. 20 S., R. 55 E.</td>
<td>32</td>
<td>SW ¼, SE ¼ and NE ¼</td>
</tr>
<tr>
<td>T. 20 S., R. 55 E.</td>
<td>33</td>
<td>NW ¼</td>
</tr>
<tr>
<td>T. 20 S., R. 55 E.</td>
<td>28</td>
<td>NE ¼</td>
</tr>
</tbody>
</table>

The exact length of the rail line will be determined after geotechnical site surveys are completed and engineering designs are refined, but is anticipated to be 5.5 miles, as indicated in the above figures and tables. The elevation differential will be approximately 2,000 feet, providing an average rail grade of 7%. The permanent width of this portion of the ROW will be approximately 100 feet, to accommodate all components. Temporary construction disturbances will expand the rail corridor to 185 feet in some areas (included in the ROW request) to accommodate areas of necessary cut and fill (see Figure 7). The rail
system will consist of 136 pound rails mounted on steel tensioned concrete rail ties, supported by track ballast comprised of three inch crushed granite or equivalent wear resistant rock. An overhead catenary line, running above the shuttle trains, will be constructed as per ARES final electrical design specification.

Figure 7. Typical road and rail cut and fill section for the ARES project.

In order to not impede stormwater flows from the Spring Mountains, 12 culverts will be installed under the rail. The exact dimensions of the culverts will be determined during engineering; typical culvert cross sections are shown in Figures 8 and 9.

Figure 8. Typical cross section, looking side-long at the rail, for rail corridor areas including 48 inch culverts.
Standard rail crossings will be installed where the rail line crosses dirt roads to maintain access to public lands. The Carpenter Canyon road crossing will include lights as well as warning signs. Other minor crossings (see Figure 3) will include signage, but not lighting. To further improve public safety by minimizing track crossings, Loop Boundary Road, which would cross the rail corridor in multiple locations at the northeast end of the corridor, will be rerouted to reduce the necessary crossings from three to one (see Figures 10 and 11).

Movement of most wildlife (i.e. wild horses, burros, reptiles, rodents, birds, etc.) is not expected to be impeded by the rail line or associated components. The desert tortoise, however, may encounter issues crossing the rails. For this reason, tortoise crossings will be included in the design of the rail line. Besides...
the road crossings, there will be areas where the embankment will be built up and a ‘bridge’ installed between the two rails, to allow a tortoise to cross to rail line. Should a tortoise fall from the ‘bridge,’ tortoise escape passages will be installed in multiple locations to allow the tortoise to exit from between the rails (see Figure 12).

![Figure 12. Proposed tortoise escape passages from between the rails.](image)

A rail line siding, or spur line, to allow shuttle cars to be re-sequenced on the main rail line, will be included. The siding rail will be located between the existing fence line road and Carpenter Canyon Road, and be approximately 960 feet in length (see Figures 13 and 14).
The catenary power distribution line (see Figure 15) will be designed in accordance with the published standards of the Rural Utility Services (RUS) as a Distribution System. Dependent upon final configuration determination, it may consist of wooden poles no taller than 50 feet, spaced at approximately 325 foot intervals, carrying 4-wire 24.9kV circuits in a wishbone cross arm configuration.
supporting four - 954 Aluminum Conductor Composite Core (ACCC) wires as well as an optical ground wire (OPGW) for facilities communication requirements. Span lengths will vary in areas presenting terrain restrictions. The power distribution poles will be wood with brown fiberglass cross arms supporting ACCC wire.

![Figure 15. Preliminary design of the catenary power distribution line.](image)

The design, construction, operation and maintenance of the 230kV transmission interconnection line will meet or exceed the requirements of the National Electrical Safety Code (NESC), U.S. Department of Labor, Occupational Safety and Health Standards and ARES’s requirements for safety.

### 4.1.2 Rail Line Vehicles

Approximately 12 shuttle-trains will be located on the single track. Each shuttle-train will be comprised of two electric locomotives weighing approximately 220 tons each, and seven cars with a weighted load of salvaged soil or concrete, weighing approximately 150 tons each. The shuttles are propelled by high-efficiency regenerative traction drive motors mounted on rail-car chassis. The facility will be compliant with Institute of Electrical and Electronics Engineers (IEEE) 519 generation equipment standards.
Rapid detection and remediation of failures via redundant speed, location, thermal, visual, and vibration sensors, will operate on each shuttle for safety control. Each locomotive will have three redundant breaking systems.

Although each shuttle has the potential to reach 25 miles per hour, the average speed for each will be 18.8 miles per hour.

The width of the rail line corridor section of the ROW may be reduced as construction plans are refined and site surveys are conducted.

4.2 Maintenance, Control, and Support Facilities

Operations, control, and maintenance facilities will be constructed in an area perpendicular to the southwestern end of the rail corridor to provide operational support, vehicle control, and shuttle train maintenance facilities. This area will be approximately 250 feet by 550 feet, approximately three acres, or 350 feet by 700 feet during construction (less than six acres of total disturbance). Specific components will include a Project Operations Facility, Control Facility, Maintenance Facility, a step-down substation, parking area, a spur storage rail, and potentially a construction lay-down yard and construction staging area (see Figures 16, 17, and 18). Table 4 contains the legal land description for the facilities location.
The control facilities will have the equipment necessary to respond to grid requirements by controlling the speed and number of shuttles in motion.

ARES will also provide additional administrative offices for project support staff off-site in Pahrump, Nevada. Office space would be leased from existing commercial office space in Pahrump. No other future on or off public land components are envisioned.

Communication facilities needed to integrate the ARES REM system into the VEA transmission system and the CAISO grid will require access to a T1 Energy Communications Network (ECN – for Internet services) Circuit and dedicated telephone line which are anticipated to be co-located with an Optical Ground Wire (OPGW) on the transmission interconnection line. Additional details of the communication system are currently being developed.

ARES will install a remote monitoring system at the facility to monitor the rail line and potentially the tortoise crossings, as well as provide an on-site security officer to monitor the support facilities 24 hours a day, 365 days a year.

Table 4. Operation, Control, and Maintenance Facilities Legal Land Description

<table>
<thead>
<tr>
<th>Township and Range</th>
<th>Section Number</th>
<th>Aliquot Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. 21 S. R. 54 E.</td>
<td>12</td>
<td>NE ¼</td>
</tr>
</tbody>
</table>

4.3 Transmission Interconnection Line and Gen-Tie

A single circuit 230 kV gen-tie will run directly from the down-slope (southwest) end of the ROW from the new ARES Substation, to the existing VEA 230kV transmission line. This component will be approximately 80 feet wide and 3,900 feet long. The gen-tie would then connect with the existing VEA 230kV transmission line. Since the support structures currently in place are unable to support an additional line, a 1.3 mile section of existing VEA 230kV transmission infrastructure will require tower upgrades to support the addition of the new line. A new transmission line would turn west (approximately 4,700 feet) to connect the project to the existing Gamebird Switch Station, as a double circuit 230 kV transmission line. Upgrades needed to accommodate terminating the new 230 kV line at the Gamebird Switch Station will be constructed within the existing Gamebird Switch Station ROW (N-059100); no new ROW is needed for the Switch Station upgrade. From the Switch Station a new single circuit line will run north for approximately 2,000 feet to connect again with the existing VEA 230kV line. With the proposed configuration, approximately 5,400 feet of the existing 230kV line (currently bypassing the
Gamebird Switch Station) will be removed. In addition to the above components a maintenance road will also be constructed along the ROW where existing roads do not already exist. The transmission interconnection line from the Gamebird Switch Station to the ARES Substation near the rail line corridor will be constructed, owned, operated and maintained by VEA; therefore, it is anticipated this will be permitted as a BLM Connected Action. Table 5 includes the legal land descriptions for the interconnection components.

Table 5. Transmission Interconnection Line Legal Land Description

<table>
<thead>
<tr>
<th>Township and Range</th>
<th>Section Number</th>
<th>Aliquot Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Transmission to be Upgraded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T. 21 South, R. 54 East</td>
<td>01</td>
<td>NW ¼ of the SW ¼, running to the SW ¼ of the NW ¼</td>
</tr>
<tr>
<td>T. 21 South, R. 54 East</td>
<td>02</td>
<td>NE ¼ of the S ½ of the NE ¼, through the N ½ of the NE ¼, running to the N ½ of the NW ¼</td>
</tr>
<tr>
<td>New Transmission Connection to Gamebird Switch Station</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T. 21 South, R. 54 East</td>
<td>02</td>
<td>N Section border of the NW ¼ of the NW ¼</td>
</tr>
<tr>
<td>T. 21 South, R. 54 East</td>
<td>03</td>
<td>N Section border of the NE ¼, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N Section border of the NE ¼ of the NW ¼</td>
</tr>
<tr>
<td>T. 20 South, R. 54 East</td>
<td>34</td>
<td>Running north/south in the E ½ of the W ½ of the SW ¼</td>
</tr>
<tr>
<td>Existing Transmission to be Removed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T. 20 South, R. 54 East</td>
<td>34</td>
<td>SE ¼ running to the NE ¼ of the SW ¼</td>
</tr>
<tr>
<td>T. 20 South, R. 54 East</td>
<td>35</td>
<td>SW ¼ of the SW ¼</td>
</tr>
</tbody>
</table>

The transmission line interconnection will be constructed using Single Circuit (see Figure 19) and Double Circuit steel poles.
4.4 Project Access Roads

4.4.1 Interconnection Access

Existing roads (transmission line maintenance access) will need to be upgraded to provide access for project construction and operation, as well as a new route constructed to provide access from the existing transmission line maintenance access roads to the proposed facilities area. This new road would be co-located with the transmission gen-tie.

4.4.2 Rail Corridor Access

The preferred access route would follow the gen-tie transmission access road from the southwest terminus of the rail line corridor to intersect the existing VEA 230kV transmission line access road (see Figure 4). It would then turn to travel along the existing transmission maintenance road for approximately three-
quarters of one mile and connect to Carpenter Canyon Road, which has an established intersection with Nevada State Highway 160.

5.0 PROJECT CONSTRUCTION, OPERATION, AND MAINTENANCE

Section five generally describes the activities anticipated to occur before and during project construction and throughout operation and maintenance of the project. Mitigation measures and lease agreement stipulations developed in cooperation with the BLM will be included as Appendix A, and will be incorporated as part of the standard operating procedures.

5.1 Preconstruction Activities

5.1.1 Land Surveys

Multiple exploratory and environmental analysis surveys were conducted by ARES and their contractors during 2014. These surveys included botanical surveys, desert tortoise presence/absence surveys, preliminary no impact initial alignment measurements, and a potential construction contractor on site meeting.

5.1.2 Aerial Surveys

In July 2014, an aerial survey of the proposed alignment was conducted in order to develop a more refined alignment and aid in the development of the initial engineering drawings.

5.1.3 Engineering Surveys

The BLM National Environmental Policy Act (NEPA) process will determine the preferred alignment for the project. Preliminary surveys and other investigations will be completed after a preferred alignment is selected by the BLM during the NEPA process, and on-the-ground investigations will be completed to accurately locate the centerline of the ROW within the selected alternative. The exact centerline will be chosen to best implement design criteria, minimize environmental impacts, and satisfy the mitigation measures in the NEPA compliance document to be developed. Detailed surveying and final design drawings will be developed after the NEPA process determines the most appropriate alternative. Required permits to conduct surveys on federal lands will be obtained. ARES is preparing to conduct engineering site surveys in consultation with rail design civil engineering consultants J.L. Patterson & Associates, Inc. and TRAMMCO, LLC, or other qualified entities. These more precise and detailed surveys conducted after the NEPA review will establish the exact project centerline, locations of drainage features, and address soil and geotechnical considerations of hydrology and hydraulics, critical drainage areas, climate induced track stability issues, and the anticipated Carpenter Canyon Road crossing.

Prior to construction, the ROW and temporary access roads for construction and maintenance of the 230 kV transmission lines and ARES Substation, will be surveyed to locate the centerlines accurately. Additional ground-based land surveys will be required including structure location (structure staking) surveying, and access road layout. On-ground investigations will be completed to accurately locate the centerline of the approved ROW for the 230 kV transmission lines and ARES Substation, and access
roads for construction and maintenance. Construction survey work will consist of transmission line and access road centerline locations and ROW boundaries where necessary. Structure locations will be flagged and staked, and the proposed centerlines will be flagged and staked where needed.

5.1.4 Cultural Resource Surveys

A Class III cultural survey was conducted during the period November 4 – 8, 2014. The purpose of the cultural resources survey was to locate, document, and evaluate archaeological resources located within the area of potential effects for both routes that could potentially be impacted by the proposed project.

Prior to conducting fieldwork, a Class I records search and review was conducted through the Southern Nevada Archaeological Archive of the Desert Research Institute. Sixteen cultural resources projects have been conducted within one mile of the proposed project area. Six previously recorded archaeological sites have been documented within one mile of the project area; however, none of the sites are located within the project’s area of potential effect.

The archaeological survey failed to yield any cultural materials.

5.1.5 Biological Surveys

The Mojave desert tortoise will require special consideration in consultation with BLM, NDOW, and U.S. Fish and Wildlife Service (FWS). Specific mitigation measures for biological resources will be developed as part of the environmental evaluation. If necessary, additional surveys or Section 7 consultation will be supported through the BLM during the NEPA process. Desert tortoise surveys were conducted along the entire proposed ROW in May, September, and October of 2014. One live tortoise was observed, and multiple burrows were identified.

As requested by the BLM, disturbance of special status plants (e.g. cacti, yucca, etc.) will be avoided during construction to the extent possible. If requested by the BLM, native plants requiring special protections will be flagged in areas of potential surface disturbance prior to construction. Native plant surveys were conducted for the entire proposed ROW during the period April 27 – May 25, 2014. Per Nevada Revised Statutes, potentially impacted yucca and cacti will be mitigated for according to current BLM and/or Nevada Division of Forestry requirements. All other vegetation removed during construction will be disposed of in accordance with BLM guidelines.

5.1.6 Interconnection Geotechnical Investigation

Geotechnical investigation will be completed for the 230 kV transmission lines, the ARES Substation and the expansion of Gamebird Switch Station. The purpose of the geotechnical investigation is to collect information regarding subsurface stability and soil resistivity, which will be used in the final design of each transmission tower structure and foundation, and used in design of the grounding system for both the transmission line and substations. The geotechnical investigation will consist of the drilling and sampling of soils to a typical depth of 25 to 50 feet below the existing ground surface. The boreholes will have a diameter of approximately eight inches and will be backfilled with auger cuttings and on-site soils. Each location will be accessed using existing roads and the same access routes that will be used for
construction of the 230 kV transmission line and ARES Substation. Surface disturbance will be limited to the actual tracks left by the drill rig and support vehicles within the work areas and access routes. All areas on BLM lands that are disturbed by geotechnical testing activities will be restored per BLM guidance after construction of the 230 kV transmission line and ARES Substation has been completed.

5.2 Rail Corridor Construction Activities

Construction will involve earth moving, drainage provisions, and placement of materials typical of service roadway and railway alignment construction, and the construction of operations buildings, power transmission line, and rail line. The railway track roadbed, track, overhead catenary, and parallel service road will be built simultaneously. Detailed site plans have not yet been completed; therefore, figures are currently estimates based on initial preliminary site plans. Preliminary site plans will be developed once initial centerline surveys have been completed. Detailed site plans will be developed after NEPA surveys and reviews have been completed.

Typical materials include Type 2 road gravel, concrete, asphalt and crushed ballast stone, to be obtained from commercial sources using existing, permitted sources.

5.3 Interconnection Transmission Line Construction

Construction of the power distribution and 230 kV transmission interconnection lines involve augering holes, pouring concrete or Type 2 foundations, erecting poles, installing insulators and hardware, stringing wire, installation of OPGW, testing and commissioning; the construction equipment required may include pickup trucks, bucket trucks, pole trailers, wire trailers, all terrain vehicles (ATVs), concrete trucks, flat bed trucks, excavators, loaders, dozers, cranes, backhoe, wire-stringing trailers, water trucks and a helicopter.

Construction of the ARES Substation and expansion of Gamebird Switch Station would include site grading, installation of a fence or block wall with access gates around the perimeter of the station, ground mat installation below grade, and application of gravel. The outdoor electrical equipment to be installed includes circuit breakers, switches, transformers and instrument transformers, electrical bus work, steel support structures, foundations, oil containment for the transformer, insulators, wiring and installation of a control building. Within the building protective relaying and control equipment, batteries, communication devices and fiber termination equipment would be installed. The construction equipment required may include similar equipment needed for construction of the 230 kV transmission line.

5.4 Interconnection Construction Access

Buildings will require normal foundation preparation, pouring of slab and footers, and erection of prefabricated steel buildings, using lifts, cranes, and fork trucks.

Temporary use areas inside the ROW such as temporary parking and construction lay-down yard(s), will be determined at a later date and will be provided by the construction contractor. No additional laydown yards outside the proposed ROW are anticipated.
The total workforce is dependent on scheduling, but a reasonable estimate if all construction activities occur simultaneously is 100 to 125 workers present at the jobsite. Temporary parking required for construction workers will be identified within the ROW, with the assistance of the construction contractor.

The clearing and grading plan has not yet been developed as it will depend on the detailed site development plans to be prepared by J. L. Patterson & Associates, or other qualified entities, and will follow the normal, approved BLM, Nye County, Clark County, and Nevada Division of Environmental Protection requirements regarding runoff, potential pollution issues, and disposal sites and methods. Engineering plans, as required by BLM, the Army Corps of Engineers, and others, will be developed by ARES. Grading will be minimized where possible to reduce mitigation requirements.

5.4.1 Materials

Sand, gravel and other materials generated from cut and fill activities within the project will be used for road construction to the extent possible. All necessary materials not collected from the site will be purchased from a permitted commercial source. Rail roadbed ballast and road material sourcing is still subject to engineering specification and procurement standards review.

5.4.2 Project Access Roads

Rail line and transmission line construction requires the movement of vehicles along the ROW. For the proposed project, existing access roads will be utilized whenever possible, although new access road construction will be necessary, as detailed in Section 3.0 Component Descriptions. Upon completion of construction, all access roads with the sole purpose of construction access will be reclaimed according to current BLM standards.

Site access and maintenance roads will be surfaced with Type 2 Gravel and constructed in accordance with Clark and Nye County requirements for Type 2 Gravel Road construction, dependent upon the type and number of anticipated construction vehicles necessary for completion of the project. Permitted commercial vendors will supply the materials for roadbeds. Mitigation measures to reduce impacts during construction and use will be implemented, as detailed in Appendix A. The maximum grade of the access road will be 8%. Requirements and general locations of drainage ditches and culverts will be determined during initial engineering site surveys to be evaluated and surveyed during the NEPA review process. Subsequent design drawings will be develop after NEPA evaluation and detailed engineering surveys.

To the extent that on-site native soil and rock from cut activities is not acceptable for use as crushed three inch rail roadbed ballast or Type 2 gravel road building aggregates, this material will be trucked in from existing permitted vendors in Nye, Clark or San Bernardino County.

5.4.3 Rail Line

The railway infrastructure will adhere to minimum standards per the Recommended Practices in the American Railway Engineering & Maintenance-of-Way Association (AREMA) Manual of Railway
Engineering (latest); the maximum engineering standards will be based on those recommended in the publication “Guidelines to Best Practices for Heavy Haul Railway Operations - Infrastructure Construction and Maintenance Issues,” published in 2009 by the International Heavy Haul Association (IHHA). ARES also expects to adopt promising practices presently under test at the American Association of Railroad’s Transportation Test Center, Inc., Pueblo, Colorado, related to rail and ballast/subgrade life. These improved practices are not as yet codified in any of the current published standards and/or recommended practices. The order of construction generally is:

- Prepare roadbed, spread base ballast (ballast spreader machine).
- Distribute and space ties (tie distributing).
- Weld and thread rail onto ties (rail threader, welding machine).
- Clip rail (clip applicator machines).
- Install turnouts (cranes).
- Spread additional ballast (special trailer and dump trucks).
- Raise transmission line and tamp the track (ballast tamping and dressing machines).
- Install third rail (trackside power distribution line) and brackets or overhead catenary lines, connect power wires.

Track construction uses common construction equipment such as boom trucks, low-bed trucks, high-lifts, rubber-tired loaders, rubber-tired hydraulic cranes, and dozers, plus specialized equipment such as tie distributing spreaders, rail threaders, a portable rail welding machine, and tamping and ballast handling/dressing equipment.

The existing native topsoil will be moved and/or removed, primarily with scrapers and other heavy equipment such as bulldozers, loaders and excavators, and stored for future use in the restoration of disturbed areas. Much of the remainder of this material will be recycled as road topping, parking lot surface, and fill. Topsoil will be salvaged for reclamation activities occurring at a later date. Hot-mix asphalt may be required along any areas of the railway roadbed that are subject to groundwater seepage (see Figure 20). Groundwater interactions are not expected due to the depth of the water table in this area, and will be confirmed through geotechnical surveys.
5.4.4 Catenary Power Distribution Line

Surveying and routing of the rail line and support structures for the overhead power distribution line will assist in identifying any areas of poor soil stability. If soil conditions are unsuitable for installation of poles at specified locations, ARES’s contractor will notify the Project Engineer and the BLM of the conditions present. If possible, the issue will be remedied through relocations of the pole up-line or down-line from the previously specified location.

At each structure site, areas will be needed to stage and facilitate the operation of equipment. A temporary construction disturbance area may be necessary within the proposed ROW. Excavations for poles will be made with power equipment. Where the soil conditions permit, a vehicle-mounted power auger or backhoe will be used. If necessary, the foundation holes may be excavated by drilling. After the hole is augered, poles will be set, backfilled, and tamped using existing soils. Remaining soils and salvaged topsoil will be spread on the ground, and BLM approved reclamation activities will be conducted. Tower and foundation materials will be determined based on final design specifications. Materials will likely consist of gravel or concrete. Alternatively, depending on final design, no foundation may be necessary.

5.4.5 Building and Support Facilities

Structures will be pre-fabricated steel frame buildings on reinforced concrete slabs. The clearing of natural vegetation will be required. Topsoil will be salvaged for future reclamation activities; unused topsoil will be disposed of as required. Selective clearing will be performed where necessary for electrical clearance, line reliability, and construction and maintenance operations. The ROW will not be chemically treated unless necessary to comply with requirements of a permitting agency.
A step-down substation will be located in this component of the ROW. Additional miscellaneous support service locations, including potable water, wastewater, outside lighting, emergency power, fire prevention measures, parking facilities, and storm drains will be detailed in subsequent updates to this POD to allow for NEPA review, and refined during the detailed site engineering survey stage. Outdoor lighting will be directed downwards to the extent possible to minimize the impact on dark skies while still meeting site safety requirements.

5.4.6 Cleanup

Construction sites, material storage yards, and access roads will be kept in an orderly condition throughout the construction period. Refuse and trash, including stakes and flags, will be removed from the sites and disposed of in an approved manner. No construction equipment oil or fuel will be drained on the ground. Oils or chemicals will be hauled to an approved site for disposal. No open burning of construction trash will occur on BLM managed lands.

5.5 Operation and Maintenance

It is anticipated that the facility will be staffed seven days a week, 24 hours a day, for the duration of the project, possibly up to 40 years. Weekday day shifts would be staffed by five personnel including a control/operator, a security officer, a general manager, maintenance workers and administrative worker. During the night, graveyard, and weekends, shifts may be staffed by up to three personnel including a control/operator and a security officer.

Inspection and maintenance schedules will be developed by the Maintenance Manager who, with their staff, will base the schedules necessary for the various elements of the operating system and on the recommendation of the various manufacturers and suppliers of the equipment, and best practices recommended by organizations such as the American Railway Engineering and Maintenance-of-Way Association, IHHA, American Association of State Highway and Transportation Officials, NDOT, Electric Utility Distributers Association, Institute of Electrical and Electronics Engineers, etc.

The track and roadway will be inspected daily, possibly employing robotic equipment that can work 24 hours a day, seven days a week, without direct manual control. The inspection criteria will be, at a minimum, based on Title 49 CRF 213 Track Safety Standards as published in the Federal Register (latest), supplemented by recommendations of the IHHA and in-house developed criteria based on best practices from a world-wide network of specialized, heavy-haul railroad operations. There will be an internal process for automatic evaluation of inspection results data, tied into a system to generate work orders that will direct the Maintenance of Way (MOW) Department to repair or replace any defective guideway elements. The MOW Department will operate on a proactive basis to minimize the possibility of guideway components slipping below the State of Good Repair, by grinding rail, correcting surface anomalies, ultrasound testing of rail, etc., based on the inspection data and a planning forecast program that prevents any serious exceptions from developing.

Rail vehicle inspection processes and procedures will be provided by the shuttle vehicle component manufacturers.
As part of standard operating procedures, standard mitigation measures (Appendix A) will be implemented throughout the construction and operation of the project in order to reduce potential adverse environmental impacts. Most of the impacts are short term and generally occur during the construction period. Project design and implementation of site-specific or selectively recommended mitigation measures will minimize the effect of the project where the potential for long-term adverse impacts may occur.

5.6 Reclamation

At the end of project life, all structures will be removed by ARES and disposed of using current standards for demolition and disposal in Nevada. Railways will be completely removed and the land reclaimed according to current agency requirements, including but not limited to BLM standards. The disturbed surfaces will be restored to the original contour of the land surface to the extent determined by the BLM. Appropriate site-specific seed mixes will be used where conditions vary. Salvaged native plants will be used for revegetation, if appropriate, along with seeding using BLM-recommended seed mixes. All materials will be stored and disposed of in an approved manner.
Appendix A

Mitigation Measures

(to be developed in cooperation with the BLM)