Section 3: Project Scope



SECTION 3: NEAC SCOPE & PROCESS

3.1 SECTION PURPOSE

The purpose of this Section is to discuss the scope and process of the investigation to route, perform conceptual design, and develop estimated costs for transmission projects that could provide export of renewable energy based generation located in Nevada to electric regional markets. This Section is intended to provide the basic chronological process that is later discussed in detail in the following Sections of this report.

Primary considerations are that the proposed transmission projects should be supplementary to the existing and proposed electric grid in Nevada; be integrated with neighboring interconnected electric grids; and be fully integrated and operated as part of the National American Electric Reliability Corporation's (NERC), Western Electricity Coordinating Council's (WECC) regional transmission grid.

3.2 PROJECT SCOPE

In February of 2011, the NEAC Board issued a contract to the Tri Sage Team to develop two high voltage transmission line routes into the California Market (specifically from the north and south regions of Nevada). In addition, the team was tasked with consideration of collection systems within the transmission line routing development.

The team has completed the original scoped routing, completed a third route to the east, and addressed the collection system requirements throughout the routing of each line. Additionally, the team included routing that would be necessary in the event all or some of the collection system within NV Energy defined as the RTI is not constructed. The details of these routes are presented throughout the report. The following summary highlights the process used to reach these conclusions.

3.3 EXAMINATION OF POTENTIAL EXPORT OPTIONS

The State of Nevada encompasses 110,562 square miles. The Nevada eastern border with Utah is 345 miles in length, the north border with Idaho and Oregon is 306 miles or approximately 153 miles with each Idaho and Oregon, the south border with Arizona is approximately 195 miles and the west border with California is 612 miles. While the breadth of geography is substantial, the options for transmission interconnections with other utility transmission electric grids are primarily driven by the location and electrical capacity of the existing

intrastate and neighboring interstate transmission infrastructure. Examination of the existing western grid is a prerequisite for the preliminary screening of viable new transmission alternatives. Technical review of existing transmission grids is critical to the process and narrowing of options is facilitated by focusing on the logical locations to interconnect with existing substantial electric systems. Section 4 - NEAC Transmission Strategic Discussion, of this report provides the detailed evaluation of the electrical grid implications and the project assumptions.

The existing electric grid in Nevada is presently interconnected with nine separate defined paths based on WECC, 2011 Path Rating Catalog (this issue is fully discussed in Section 4). There are presently five WECC rated and two unrated interconnected transmission paths in NV Energy's northern Nevada transmission system. The northern paths are theoretically capable (but not operationally viable) of providing approximately 1,050 megawatts of non-simultaneous firm export. NV Energy's southern transmission system has four WECC rated paths and is theoretically capable of providing (but not operationally viable) approximately 8,000 megawatts of non-simultaneous export transfer capacity.

The southern transmission paths are complicated by the allocation of existing transmission paths to various transmission subscribers other than NV Energy. In both the north and the south the Available Transmission Capacity (ATC) for new firm export transactions are nominally zero since the paths are already assigned to existing transmission users.

The technical issues regarding line ratings are more fully explained in Section 5 – Electric Grid Evaluation of this report. The ratings of transmission lines is complex and full evaluation will be required prior to initiating permitting or project financing. The purpose of this study is to investigate and recommend projects that would incrementally increase the transmission export capability. Final determination of new path ratings is beyond the scope of this report, but it is recommended that the NEAC Board consider the rating process as a next step.

To incrementally increase the export by routing and constructing new transmission interconnections, or enhancements to existing infrastructure, are options that are considered. Throughout the scope of the investigation effort, general practices of the transmission utility business have been considered. This is imbedded in the work scope of the study to minimize the costs of construction, and maximize electric transport capability for each identified project.

Identification of possible electrical interconnections is performed by initially examining the WECC system maps and online web based grid information, showing major substation and transmission line capacities and characteristics in Nevada and neighboring states. Based on the Tri-Sage team's knowledge of the western transmission grid, logical potential connection points at existing and/or proposed major substations are considered. Once alternatives are identified,

further concentrated evaluation is performed to provide preliminary analysis of potential network improvements provided by the selected proposed transmission projects.

Obtaining formal WECC ratings for any new transmission project is a lengthy and expensive process requiring extensive detailed computer based analysis and should be performed in the latter phases of any transmission development. The scope of this study and report is to offer those projects that should progress to formal transmission analysis and approval. Best evaluation was performed based on available existing information and experience.

The initial process for identifying possible terminus points in Nevada and neighboring transmission grids is a simultaneous evaluation of the technical options, existing constraints and possible routes. This was deliberately done in an iterative manner with the required technical project team members conducting a series of discussions and analysis that resulted in identifying proposed route alternatives. After initial examination and discussion of possible routes, the specific work was performed to conduct the detailed technical evaluation of the electrical system, the required mapping, Geographic Information System (GIS) database development, land use evaluation, detailed physical routing, conceptual design and structure spotting, and cost estimating which ultimately resulted in an evaluation matrix and route weighting. From this the final line route preferences were selected.

3.4 MAPPING & CONSTRAINTS

The identification of the significant constraints to route linear transmission projects to the west of Nevada and interconnected to the California electric systems is a major challenge. The geophysical constraints, land use, environmentally sensitive areas, and urban concentrations greatly limit options for constructing new electric transmission infrastructure. The constraints greatly affect potential options for transmission routing along the entire north to south length of the Nevada/California border. Similar constraints impact routing of transmission lines north, east and south out of Nevada but alternative transmission routes are more prevalent. Constraint mapping was developed and will be referenced and presented throughout this report.

The routing process requires the technical and experienced application of available mapping and information technology to simultaneously consider route alternatives that minimize line lengths and minimize impacts and estimated installed costs.

It was necessary to identify any critical or sensitive area. To establish this constraint data, extensive mapping was necessary to provide both preliminary information for routing avoidance, as well as follow-up mapping to capture the land and environmental constraints. Specific GIS mapping was used to identify specific constrains of avoidance, or mitigation.

3.5 ROUTING

The routing process is iterative and is performed substantially without requiring initial significant field investigation. Subsequent field verification to identify highly restrained sections of the lines is conducted using ground and air vehicles. Land use, land ownership, current constraint identification and topography are all considered when identifying viable line section alternatives. Where possible, environmental constraints, permitting concerns, sensitive land status, and extreme topography are avoided.

3.6 CONCEPTUAL DESIGN AND COST ESTIMATING

Once project routing and alignment nears completion, conceptual design of transmission structures and transmission line centerline profile provides sufficient data to determine the structure types and spans utilizing PLS CADD (A PC based software application) as a design tool. The installed cost of a transmission line is affected by the number and type of structures. PLS CADD provides a highly efficient means of optimizing the line design. Once the line is designed, the cost estimate is derived and integrated with a matrix of all project parameters to evaluate total estimated installed cost.

The entire process is iterative and requires significant human intervention and professional judgment to effect the final selection of routes, transmission line design, and the resulting estimated cost of installation. The most limiting factor is the electrical capability of the proposed lines and the ultimate effect on the total electric grid capability.

3.7 SUMMARY OF PROJECT COSTS AND MATRIX EVALUATION

In order to develop project costs, the conceptual design, along with route specific constraint data is used to develop the preliminary cost data. This costing is then used to support the final evaluation of each line segment, and ultimately determine which segments will be selected as the preferred routes. The matrix evaluation is a complex weighting that considers land impacts, permitting requirements, right of way acquisitions, and constructability. This evaluation process uses a numerical weighting of each consideration to allow for a levelized comparison of each segment. While this is a numeric process, it is highly subjective in the initial weight assigned to each constraint. This weighting is completed based on the individuals or team's experience with specific agencies, regions, terrain, and similar projects.