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Acronyms/Definitions

BLM – U.S. Bureau of Land Management

CAC – Community Advisory Committee

KING – King Transmission Station, located in Hagerman

kV – kilovolts (thousands of volts). 1,000 volts = 1 kV; 138 kV = 138,000 volts

kW – kilowatts (thousands of watts). 1,000 watts = 1 kW

MPSN – Midpoint Substation, located south of Shoshone

MW – megawatt (millions of watts). 1,000,000 watts = 1 MW

SNRA – Sawtooth National Recreation Area

Station – A facility that provides transmission line switching *without* electrical transformation (voltage reduction) to distribution voltages that serve local area loads.

Substation – A facility that provides transmission line switching *with* electrical transformation (voltage reduction) to distribution voltages that serve local area loads.

USFS – U.S. Forest Service

WDRI – Wood River Transmission Station, located north of Hailey

WREP – Wood River Electrical Plan

Relationship between Power and Voltage – There are two quantities referred to in this report when describing the electrical system; Power and Voltage.

> **Power**: the amount of energy or work performed in one second. The term is used to express the electrical workload of the Wood River Valley and the capability of a transmission line to move electricity. Power is measured in watts (kilowatts and megawatts).
>
> **Voltage:** A component of power that enables the power to flow on a transmission line. It is the "push" behind the power. In general, a higher voltage line can carry more power than a lower voltage line. Voltage is measured in volts at your household (110 and 220-v) and kilovolts in the transmission network (138-kV).

Executive Summary

Current Conditions

The Wood River Valley (the Valley) is a vibrant year-round recreation and resort community that depends on a full-time, reliable electric power system. The tourism-based economy focuses on making the Valley a highly desirable place to live, work, play and visit. Electricity is a vital component required to maintain and enhance the unique experience of living in and visiting the Valley. Whether it is powering the furnace fan and lights in your home, the high-speed chairlifts and snowmaking on the mountain, or your computer or internet-based small business, electricity has become a necessity of life in today's modern society. Additionally, as residents and visitors become more and more dependent on electricity charge-based technology such as smart phones, tablets, and computers any interruption in electrical service has negative consequences for the desirability and future of the Valley. This is especially true in the cold winter months when a power outage could create a public safety emergency as residents have difficulty heating their homes and water pipes freeze.

Today's maximum electrical demand in the Wood River Valley occurs in the coldest part of the winter months each year during the height of tourist season. Cold temperatures drive up heating demands and the peak of the ski and tourism season creates a surge in population and user-related power needs. Also, as population in the Valley and the resort community continues to grow over time, the corresponding electrical demand will increase. Recent major emergency events in the area including the summer 2007 Castle Rock fire and the 2009 Christmas Eve power outage emphasize the need for a reliable power system. Idaho Power is proactive in working with the community to plan for reliable new infrastructure to serve the electrical needs of the Wood River Valley today and into the future.

The Need

The primary need for any power system improvements in the Wood River Valley is to provide a reliable electric service to all customers. The existing power transmission system does not adequately meet the Valley's current need for reliable power.

The transmission system lacks sufficient reliability due to these factors:

- The electrical system serving the North Valley (from Hailey to Sun Valley and Ketchum) has only one transmission line which provides no redundancy should an outage occur on that line.
- The transmission line between Hailey and Sun Valley/Ketchum is 49 years old, having been built in 1962. While this line has been relatively dependable in the past, the risk of a major outage continues to increase due to its age.
- The remote location of large portions of the line between Hailey and Sun Valley/Ketchum makes access very difficult, especially in the winter. A failure on the line in the coldest part of winter could result in a long term outage. It could potentially be days before the line could be repaired and power restored to the Sun Valley/Ketchum resort area.

- The electrical system south of Hailey has two transmission lines, but neither line has the capability to provide 100% of the electricity needed for extreme peak loads in the Wood River Valley without rotational power outages. The Christmas 2009 outage was a dramatic reminder of the limitations of the existing system.

In the future, the system will lack sufficient capacity to satisfy projected electricity needs:

- Current power demands in the Wood River Valley at peak load are approximately 100 MW and future demands at build-out are projected to be approximately 320 MW, using current usage patterns to project future use.
- The current system capacity is about 120 MW.
- The system will need 200 MW of increased capacity and delivery infrastructure to serve the Wood River Valley's build-out needs. Any growth-related system upgrades will be built only when required by increased system demands.

Purpose of the Wood River Electrical Plan

The purpose of the Wood River Electrical Plan (WREP) is to outline and prioritize improvements and additions to the high voltage transmission and substation infrastructure to address the Valley's power needs from now through build-out. The development of the Plan was accomplished through a cooperative effort with the Community Advisory Committee (CAC). The CAC consisted of 19 members representing Blaine County, the cities of Sun Valley, Ketchum, Hailey, Bellevue, Picabo and Carey, Blaine County planning administrators, Lincoln County, private business/developers, area residents, the BLM, USFS and the Nature Conservancy. The Plan specifies locations for major transmission lines serving the Valley for many years to come and provides direction for the location of a new distribution/transmission substation to serve the southern part of the Valley. Individual projects resulting from this Plan will still require jurisdictional approval and will be subject to a public siting process. This plan gives the jurisdictions and citizens a "heads-up" as to where high-voltage transmission equipment may be located and allow**s** them to plan accordingly.

In preparing the WREP, Idaho Power and the CAC considered the effect that demand-side management could have on future load in the Wood River Valley. Demand-side management includes energy efficiency efforts that reduce total energy consumption and peak response programs that reduce the maximum demand on the power system. Idaho Power is committed to reducing electrical load through the use of demand-side management at all customer levels. In conjunction with activities outside Idaho Power's control – such as expected improvements in Idaho building standards, customer involvement, and energy efficiency technology advancements – Idaho Power expects new electrical load can be reduced by 20 to 30 percent. Actual reduction in power consumption will be taken into account as infrastructure improvements are implemented. However, even if new electrical load is reduced by 30 percent, new electrical infrastructure is still required to reliably and dependably serve existing and new load.

Renewable power sources are an important component of the total resource portfolio that provides energy to the Wood River Valley. Small scale development of renewable resources (mostly solar) has occurred throughout the Valley while much larger wind, solar and geothermal

resources have been and continue to be developed in the region around the Wood River Valley. The power system infrastructure, including transmission lines and substations, enables access to these regional resources for the residents of the Valley. Once brought in to the Valley, the electrical power from renewable resources still require transmission lines, substations and distribution lines to bring the energy to the consumer. A dependable transmission system that serves as the primary full-time power source will continue to be required to reliably meet the power demands of the Wood River Valley.

Because of the high cost, limited potential, significant space requirements, visual impacts and intermittent nature of any large scale renewable resources, it is impractical to assume the transmission system could be replaced by renewable resources in the Valley. Significant additional energy resource development in the Valley could mitigate the need for some of the growth related upgrades outlined in the Plan. However, the need for reliability driven projects such as the second transmission line into Ketchum does not change with more renewable development.

The Committee's Recommendations (see recommendations map; Figure 1)

Through the consensus agreement of the CAC, the WREP recommends the following infrastructure improvements and additions: *(Items are labeled on the map in Figure 1 by letter)*

South Valley – South of Timmerman

(A) Develop a new substation along Highway 75 near Burmah Road to serve the south Valley load and to act as a switching station for new transmission.
(B) Construct a new 138 kV transmission line from Midpoint Station (near Shoshone) to the new Burmah substation. This line would be installed in parallel with Highway 75.
(C) Construct a new 138 kV transmission line from the new Burmah substation to Moonstone Substation (located east of Fairfield).
(D) Construct a new 138 kV transmission line from Burmah substation to Silver Substation (located near Picabo).
(E) Upgrade the existing King (near Hagerman) to Moonstone 138 kV transmission line to 230 kV.

Mid Valley – Timmerman to Hailey

(F) Improve the capability of the existing transmission lines from Silver Substation and Moonstone Substation into the Wood River Transmission Station in Hailey using higher capacity wire while maintaining the current 138 kV operating voltage.

North Valley – Hailey to Ketchum

(G) Construct an additional 138 kV transmission line between Wood River Transmission Station and Ketchum Substation to improve the reliability to the north end of the Valley. The CAC recommended that the new line run parallel with and adjacent to Highway 75. This route was considered the most sensible option because it follows the Valley's main transportation corridor.

The Wood River Electrical Plan was formed after a series of meetings of the Community Advisory Committee (CAC) held throughout 2007. The CAC met two more times in 2010 and

one final time in the spring of 2011 to further refine their recommendations and review additional transmission line design details specifically for the new Hailey to Sun Valley/Ketchum transmission line (item G above). The consensus CAC recommendation is to build an overhead 138 kV transmission line from Wood River substation north to the St. Luke's hospital area. This new line would be in place of existing overhead distribution power lines along Buttercup Rd and Highway 75. From the hospital area north to the Ketchum substation, an underground 138 kV transmission line is preferred by the CAC. The underground option is contingent on local community funding.

The Idaho Public Utilities Commission requires the costs of underground transmission lines that exceed the cost of the overhead line be paid by entities other than Idaho Power and its customers in general. For any underground transmission line between Hailey and Sun Valley / Ketchum, the local community must pay the difference in cost between the underground line and the equivalent overhead transmission line. Preliminary funding options are currently being developed. This funding issue is expected to be a significant part of the public siting and permitting process in the near future for the new line between Hailey and Sun Valley/Ketchum.

Idaho Power extends a heartfelt thank you to every member of the CAC. The time and effort the committee gave to this project was tremendous. Their work has provided Idaho Power and the affected communities with a framework from which to begin the public siting process to build the power system that corrects the present deficiencies and addresses future requirements of the power system serving the Wood River Valley.

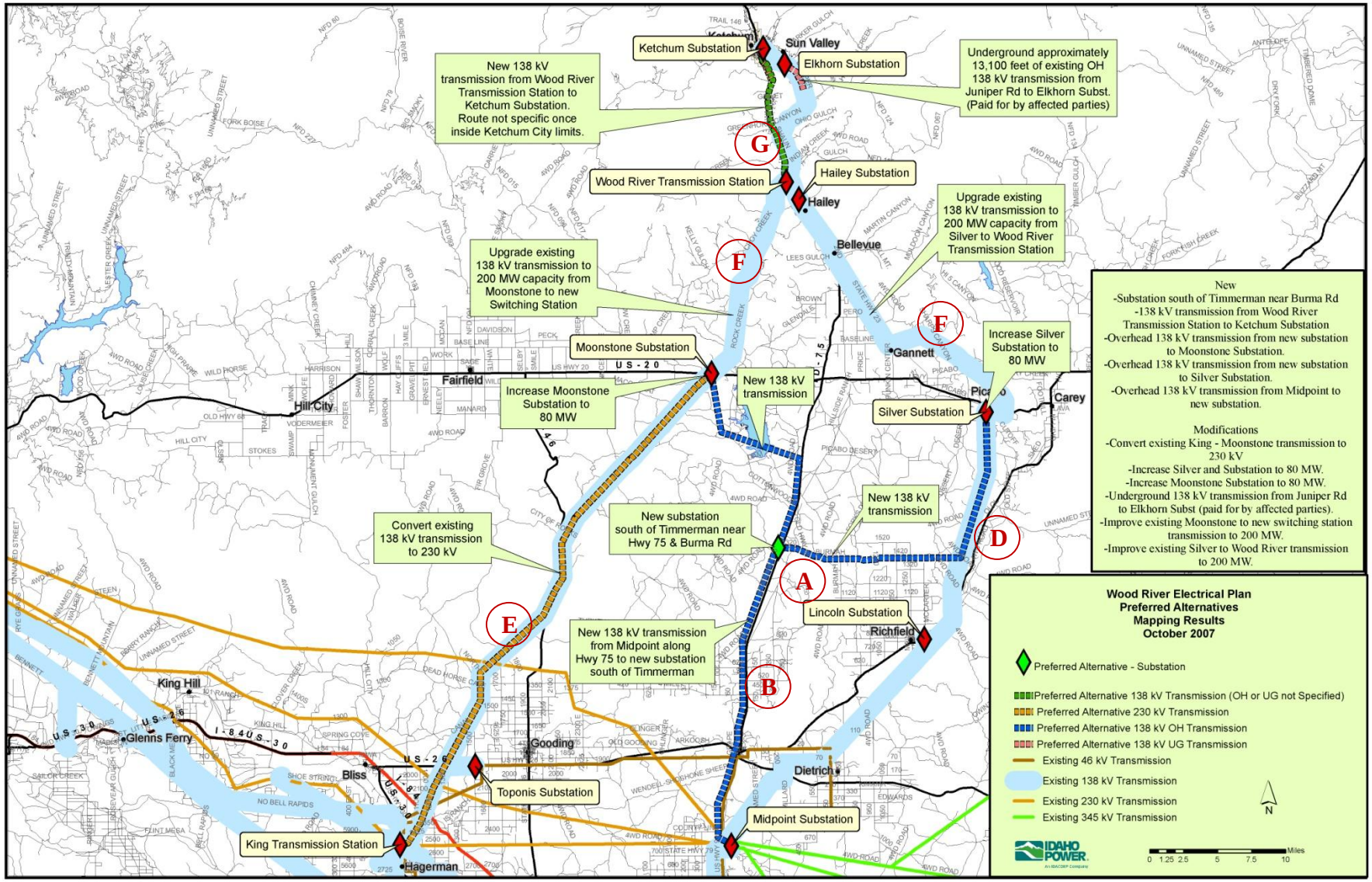


Figure 1. Committee Recommendations Map

Introduction

Located in South-central Idaho, the Wood River Valley is a vibrant area that includes the cities of Ketchum, Sun Valley, Hailey and Bellevue. The economy of these communities has become more and more dependent upon electricity as both businesses and residents install increasing amounts of electrical technology. The Valley's increasing reliance on electricity makes it important that Idaho Power improve its infrastructure serving the Valley to provide reliable and dependable electrical service throughout the Valley. Future growth in electricity demand also makes it important that plans be made for additional power system capacity to the Valley prior to the existing transmission lines reaching their full capability.

The electrical needs of the Wood River Valley can be described using two separate, though interrelated concepts: *dependability* and *adequacy*. In the first case, the electrical system must be dependable. When you flip a light switch, you expect it to turn on a light. When you push the power button on your computer, you expect it to turn-on. And you expect that to happen every time you flip the switch or push the button. To maximize its dependability, an electrical system must be redundant. That is, it must have more than one transmission line serving an area so that if one transmission line is damaged, the other can still provide the electricity. This is not the case in the north end of the Wood River Valley today. To date, the single transmission line that serves Sun Valley and Ketchum has been very dependable, but it was built in 1962 and needs more and more maintenance to maintain that dependability. And to a great extent, this line's dependability is reliant upon the forces of nature. A major winter storm or summer brush fire could damage the line to the extent that the north end of the Valley could be without power for a day or more.

The second concept is adequacy. As the electrical load in the Wood River Valley grows, the two transmission lines feeding into Hailey from the south will soon not have the capability to serve the Valley adequately while maintaining the dependability of the Valley's electrical supply. While the Valley doesn't need more transmission lines feeding into Hailey from the south, the existing capability of the two transmission lines will have to be increased. A new transmission line and upgrades to existing transmission lines are also planned from the Magic Valley up to the Wood River Valley to improve reliability and provide additional capacity to the Valley.

Idaho Power invited members of the Wood River Valley community to be involved in a Community Advisory Committee (CAC) to help layout the Wood River Electrical Plan to address the dependability and adequacy of the Wood River Valley's electrical supply. The Plan specifically outlines the electrical infrastructure needs of the Valley from today through the Valley's population and load buildout. The committee was made up of city and county planning representatives, local politicians, environmental interest groups, Forest Service and BLM representatives, major land-owners and community activists. Idaho Power also invited representation from Lincoln County because any new transmission infrastructure built into the Wood River Valley would likely cross through Lincoln County. A complete list of members can be found in Appendix A. This report documents the study process and the committee's consensus recommendations pertaining to the power system serving the Wood River Valley.

Background

Population and Electrical Load Projections

Idaho Power uses future population to estimate the long-term power needs for the Wood River Valley. For the area of Blaine County from Timmerman Hill to SNRA Headquarters north of Ketchum, Idaho Power estimates the 2006 population to be 21,600. During the winter of 2006, this population consumed 99.5 megawatts (99,500,000 watts) of electricity at peak. The peak electricity demand in the winter of 2010-2011 was about 102 MW for the Wood River Valley.

Using two different methods to determine the population at Valley buildout, the projected population will be nearly 76,000 people and the electrical power requirements will be around 320 megawatts, or about 320% of what is used today. That is, when the Valley has reached population saturation, it will require 3 times as much power as it uses today. Of course this is assuming that present consumption is representative of future consumption. Idaho Power, along with the Community Advisory Committee hopes that consumption will decrease as energy efficiency measures become more effective but the present trends are not positive. While new appliances, lighting and equipment continually become more efficient, individual homes and businesses have more of them and people are finding new ways to use electricity.

Existing Wood River Valley Electrical Supply System

The Wood River Valley is served entirely by transmission lines. There are no electrical generation facilities located within the Valley. Figure 3 shows the transmission system feeding the Valley.

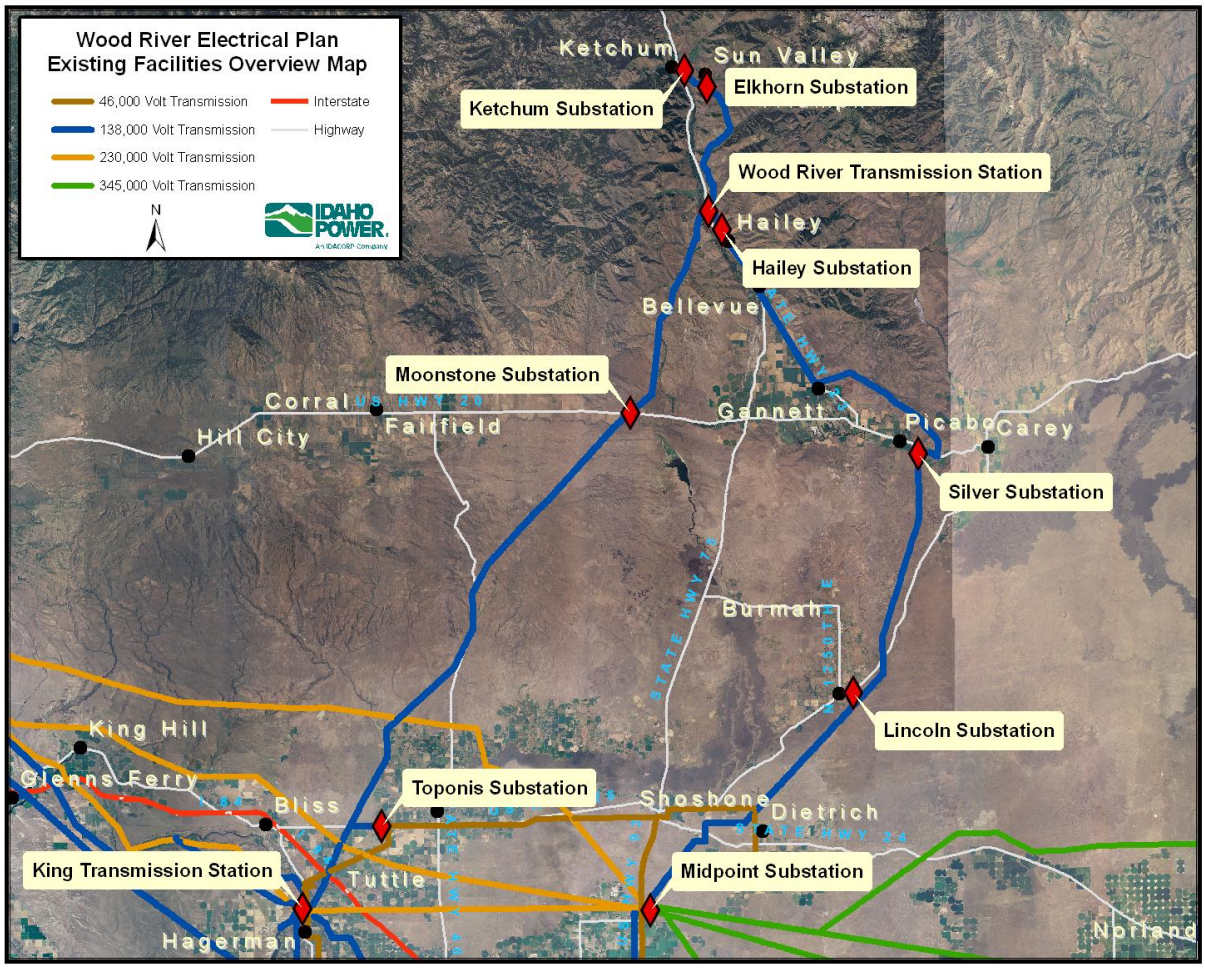


Figure 3. Wood River Valley Electrical Supply Overview Map.

There are two 138 kV transmission lines serving the Valley up to Hailey (blue lines running north on the drawing),

- King Transmission Station to Wood River Transmission Station
- Midpoint Substation to Wood River Transmission Station

The King to Wood River transmission line was built in 1962 and enters the Valley northwest of Hailey. The Midpoint to Wood River transmission line was built in 1989 and has the higher capacity of the two lines; its wires are larger so it can carry more power. It enters the Valley east of Picabo. Idaho Power refers to these two lines combined as the *Wood River loop*.

From the Wood River Transmission Station in Hailey to the Ketchum/Sun Valley area, there is one transmission line. This line was built in 1962.

There are five substations within the Wood River Valley that reduce the transmission voltage to a lower distribution voltage and route the power onto smaller lines for delivery to end users. These substations are:

- Ketchum Substation – Located in Ketchum on Sun Valley Road
- Elkhorn Substation – Located in Sun Valley near the intersection of Elkhorn and Juniper
- Hailey Substation – Located in Hailey on Carbonate Road
- Moonstone Substation – Located along Highway 20 about 18 miles east of Fairfield
- Silver Substation – Located just east of Picabo

Note the Wood River Transmission Station in Hailey does not reduce voltage to directly serve customers; it is only used to control the transmission lines feeding into the Valley from the south and the transmission line feeding north from Hailey toward Ketchum/Sun Valley.

Existing Dependability

The southern half of the Wood River Valley, from Hailey south, is served by two transmission lines, giving it redundant power service a majority of the year. However, the northern part of the Valley is served by a single transmission line. When a storm, accident or brush fire damages the line, there is no alternative way to provide power to the Ketchum/Sun Valley area. Idaho Power maintains and patrols this single line to a higher standard than most other transmission lines in its service territory for just this reason. The line is, however, over 49 years old and will require even greater care in the future.

The two transmission lines serving as far north as Hailey provide better dependability than would a single transmission line. Presently, the combination of these two lines can serve the most extreme peak usage in the Valley at any time. However, the lines individually do not have the capability to serve the entire valley load at winter peak. This means that if one of the lines was to be taken out-of-service during the winter when Valley loads are the highest, the remaining line would not be able to carry the entire Valley load. The load would have to be reduced through the use of rotational outages for the duration of the outage. Depending on the cause and extent of the damage that caused the line to go out-of-service, the rotational outages could extend for several days.

Obviously, if the transmission line serving from the Wood River Transmission Station north to Ketchum/Sun Valley is taken out-of-service at any time of year, there would be no way to serve most of the load in the north end of the Valley. As mentioned before, because of the potential hardships an outage of this line could cause to the citizens and businesses of the north Valley, Idaho Power maintains and patrols this line to a significantly higher degree than it does most other transmission lines in the Idaho Power system. But as this line ages, it will become more and more difficult to maintain its dependability. The line was built in 1962 and as the years go by, it can be expected that more failures will occur. And no matter how much maintenance is done on this line, forces of nature can cause it to fail.

Committee Process and Input

Idaho Power engaged KMP Planning of Twin Falls to facilitate the Community Advisory Committee meetings. The meetings started in January 2007 with a bus tour of Idaho Power facilities, beginning a series of primarily educational meetings that were held monthly through March 2007. Through these educational sessions, the CAC was introduced to electrical generation, substations, transmission, demand-side management, and regulatory affairs. Additionally, the CAC was presented with a view, from production to delivery, of Idaho Power's electrical system. Using the education gained from the meetings held from January through March, the CAC set to work in April and May to lay out proposed Wood River Valley transmission line routes and substation sites.

Alternative Energy Generating Technologies

During the initial committee meeting, a presentation was given by Idaho Power that outlined various alternative energy generation technologies that could deliver energy to the Wood River Valley and thus decrease the need for additional power lines. The technologies discussed included wind turbines, geothermal generators, photovoltaic (solar), combustion turbines and fuel cells. A number of small-scale solar (roof mounted photovoltaic) have been installed by private citizens and businesses in the Wood River Valley. These small scale projects and others such as residential sized fuel cells could offset some of the power demands of the Wood River Valley and potentially delay the need for growth driven power system upgrades. A detailed description and discussion concerning alternative energy generating technologies can be found in Appendix C.

The amount of energy produced by renewable resources and delivered into Idaho is increasing at a rapid pace. Idaho Power is currently contracting for all the energy from the wind turbines currently operational in the Magic Valley, a large scale wind facility in eastern Oregon and all the energy from the Raft River geothermal project in eastern Idaho. Additional small to mid-sized wind turbine facilities are proposed for the Magic Valley and construction on some of them should start soon. Idaho Power, in a joint venture with PacifiCorp, is planning 500,000-volt transmission coming into Idaho from Wyoming which will enable the wind resources in Wyoming to be developed. However, all these resources will still require transmission infrastructure and equipment in order to deliver energy to end users.

Energy Efficiency

Another way to reduce the need for additional transmission resources in the Wood River Valley would be to aggressively pursue energy efficiency technologies or in utility terms, demand-side management (DSM). Idaho Power is currently providing many programs funded by a Customer Conservation Charge to customer bills that promote the use of DSM to reduce electricity usage. Idaho Power's 2004 Integrated Resource Plan (IRP) called for an average of 41 megawatts of energy savings due to DSM by 2014. The 2006 IRP calls for an average of 90 megawatts of energy savings due to DSM by 2024. Table 1 shows the current Idaho Power programs. The Idaho Power Website at www.idahopower.com contains full descriptions of these programs.

Residential	*Commercial/Industrial/Irrigation*
A/C Cool Credit	Irrigation Peak Rewards
Weatherization Assistance	Irrigation Efficiency
Rebate Advantage	Building Efficiency
Energy Star® Homes	Easy Upgrades
Energy Star® Lighting	Customer Efficiency
Energy House Calls	

Table 1. Idaho Power Demand Side Management Programs

Additionally, Idaho Power currently has rates that vary by season, with summer electricity rates being higher than winter rates in order to encourage lower energy use in the summer when the overall electricity usage on the Idaho Power system is highest. In the Wood River Valley, these seasonally varying rates do nothing to reduce power usage when the reduction is needed most…in the winter.

Idaho Power is also investigating using time-of-day pricing and critical peak pricing that would encourage customers to use less energy during the peak times (such as late afternoon and early evening).

Idaho Power Company Energy Efficiency activity and Programs in the Wood River Valley
Idaho Power offers ten distinct Energy Efficiency programs in the Wood River Valley as well as throughout most of its service territory. A listing of each program follows with a brief description of each. More information of each of the programs can be found at www.idahopower.com/energycenter.

Residential Programs:

- **ENERGY STAR® Homes Northwest**
  A $750 incentive is paid to builders for each home built to the ENERGY STAR® standards. These standards are 30 percent more efficient than one built to the Idaho building code.
- **Energy House Calls**
  This program offers a free package of services (inc. duct sealing) designed to help save energy for residents of manufactured homes heated by an electric furnace or heat pump.
- **Rebate Advantage**
  This program offers $500 payment to Idaho Power customers who purchase a new ENERGY STAR® manufactured home.
- **Weatherization Assistance for Qualified Customers**
  This program offers free weatherization measures for electrically heated homes of qualified customers to help them maintain a comfortable and efficient home environment.
- **ENERGY STAR® Lighting**
  This program is a specialty bulb promotion offered in conjunction with BPA (Change a Light, Change the World) to provide a buy-down of bulbs at large retailers. Future programs offer promotions of other bulbs at various retailers.

- **Heating and Cooling Efficiency Program**
  This program provides cash incentives to residential customers (and HVAC contractors) for choosing and installing qualified energy-efficient heating and cooling equipment and services through approved HVAC contractors

Commercial and Industrial Programs:

- **Custom Efficiency**
  This program offers financial incentives for large commercial and industrial energy users with large and complex projects to improve the efficiency of their electrical systems or process.
- **Building Efficiency**
  This program offers incentives of up to $100,000 designed to offset part of the additional capital expenses for more efficient lighting and cooling designs in small and mid-size commercial construction projects
- **Easy Upgrades**
  This program offers Incentives of up to $100,000 for a menu of simple commercial, industrial building retrofit projects. Incentives are available for lighting, HVAC, motors, building shell, plug loads and grocery refrigeration and are based on each measure's assumed energy savings.

Agricultural Programs:

- **Irrigation Efficiency Rewards**
  This program offers an incentive which pays up to 75 percent of the cost for irrigation customers who improve the energy efficiency of an existing pump system or up to 10 percent when installing a new efficient system.

- **Irrigation Peak Rewards**
  This program offers a demand credit for specific irrigation customers who allow Idaho Power to use electric timers to turn off their pumps for a few hours on selected summer days reducing afternoon peak demand and lowering the customer's electric bills.

Wood River Valley projects:

Although Idaho Power doesn't commonly track Energy Efficiency programs specifically by area or city, a manual examination of the Energy Efficiency incentive records show that from 2005 to October 2007 Idaho Power has identified 24 individual projects completed in the Wood River Valley area. These projects were completed in Ketchum, Bellevue, Hailey, Sun Valley, Fairfield, Carey, and Picabo. Four projects were under the Custom Efficiency Program. One project was completed under each of the Building Efficiency, Easy Upgrades and Rebate Advantage programs and seventeen projects were completed under the Irrigation Efficiency Rewards program. Idaho Power paid a total of $130,290 dollars in incentives for an annual energy savings of approximately 1,342,602 kilowatt hours (kWh) and 155 kilowatts (KW) in demand savings for the non-irrigation programs. Under the Irrigation Efficiency Rewards program, Idaho Power paid $28,637 in incentives for an annual savings of approximately 205,717 kWh and about 57 savings in KW.

There are many other activities in addition to those sponsored by Idaho Power that customers could undertake to reduce their energy use and, like the alternative generating resources discussed previously, it will be up to the local residents, businesses and governments to make them a reality.

Goals Document

The first step in developing proposed solutions to the electrical needs of the Wood River Valley was to develop a Goals Document that could be used to guide the committee's efforts to develop and evaluate alternatives. The committee spent a significant amount of time refining the Goals Document to ensure it represented their desires for a responsible, reliable and affordable electrical system. Much discussion took place concerning the preservation and improvement of view corridors, cost issues and comparing new lines to existing lines. The goals were divided into 6 areas:

- **Reliable Power:** Provide reliable power to the entire Wood River Valley
- **New Infrastructure Design:** Develop new transmission and delivery infrastructure as appropriate when providing for current and future power needs
- **Energy Conservation:** Implement programs that reduce demand for additional energy
- **Environment:** Cause no or minimum impacts to the natural, physical, cultural, historic, social and aesthetic environment due to development and operation of power facilities and delivery systems
- **Political Support:** Develop solutions that are politically supported throughout the Wood River Valley
- **Cost Effectiveness:** Develop solutions that are cost effective and provide associated benefits

The CAC developed a number of bullets describing the goals more fully. These can be found in Appendix C, Page 6.

The CAC also came up with a list of siting criteria. These criteria may not all be completely achievable, but they are measures to be strived for when developing and evaluating alternatives.

- **North of Wood River Transmission Station (WDRI)**
  - *Provide both redundancy and capacity to meet electrical needs north of WDRI*
  - *Do not use the existing 138 kV transmission corridor without new technology to avoid new impacts*
  - *Preserve the scenic corridor*
  - *Maintain the ordinance-required 150 ft setback from residences when using overhead transmission lines*
  - *Conform to existing hillside ordinances*
  - *Install underground lines in locations where the necessary additional funding is available.*
- **South of Wood River Transmission Station (WDRI)**
  - *Provide electrical infrastructure and systems that meet Lincoln County electrical needs*
  - *Improve structures and transmission lines in Lincoln County as needed to accommodate future growth*
  - *Maintain scenic corridors*

- *Cause no environmental impact to wetlands and habitat*
- *Use existing corridors and transmission equipment where possible*
- *The use of overhead lines and infrastructure is acceptable until the affected community can afford to fund a different proposal*
- *Maintain or reduce pole size in Bellevue*

Mapping Exercise

Using the education provided in January through March and the goals developed in March and April, the CAC set to work in April laying out proposed Wood River Valley transmission routes and substation locations. The CAC also used the load block diagrams developed by Idaho Power personnel to aid them in determining the size of lines needed to support the Valley's load. The exercise was divided into three sub-areas for planning: South of Timmerman, Mid Valley and North Valley.

The committee was broken into three groups. Each group was given a large aerial photograph showing the terrain from Ketchum in the north to Midpoint and King Substations in the south. Using the goals and siting criteria as a guide, each group developed feasible alternatives to meet buildout requirements. The following guidelines were used in forming the small groups:

- Groups were designated A, B and C for alternative discussion purposes
- Each group included committee members from throughout the planning area
- Each group included an Idaho Power representative to provide technical support and a facilitator to capture the details for each of the alternatives

The three groups came up with a total of 6 alternatives covering various parts of the Valley. To aid in screening the alternatives developed by the three groups, a screening matrix was developed that each CAC member could fill in to see numerically how each alternative ranked. It must be noted that a numerical screening of alternatives was just an initial tool to evaluate the alternatives against one another. The final decision as to which alternative or alternatives to designate as the most feasible going forward is a consensus decision reached within the CAC and the matrix was just part of this decision process. Appendix C contains detailed results of the screening matrix exercise.

Committee Consensus on Alternatives

Using the results of the scoring matrix as a basis for discussion, the committee went on to reach consensus on each of the three sub-areas of the Plan; South of Timmerman, Mid Valley and North Valley. Figure 3 is a combination of the preferred alternatives for each of the three Valley sub-areas. This figure is also in Appendix D, page 8 in a larger, more readable size.

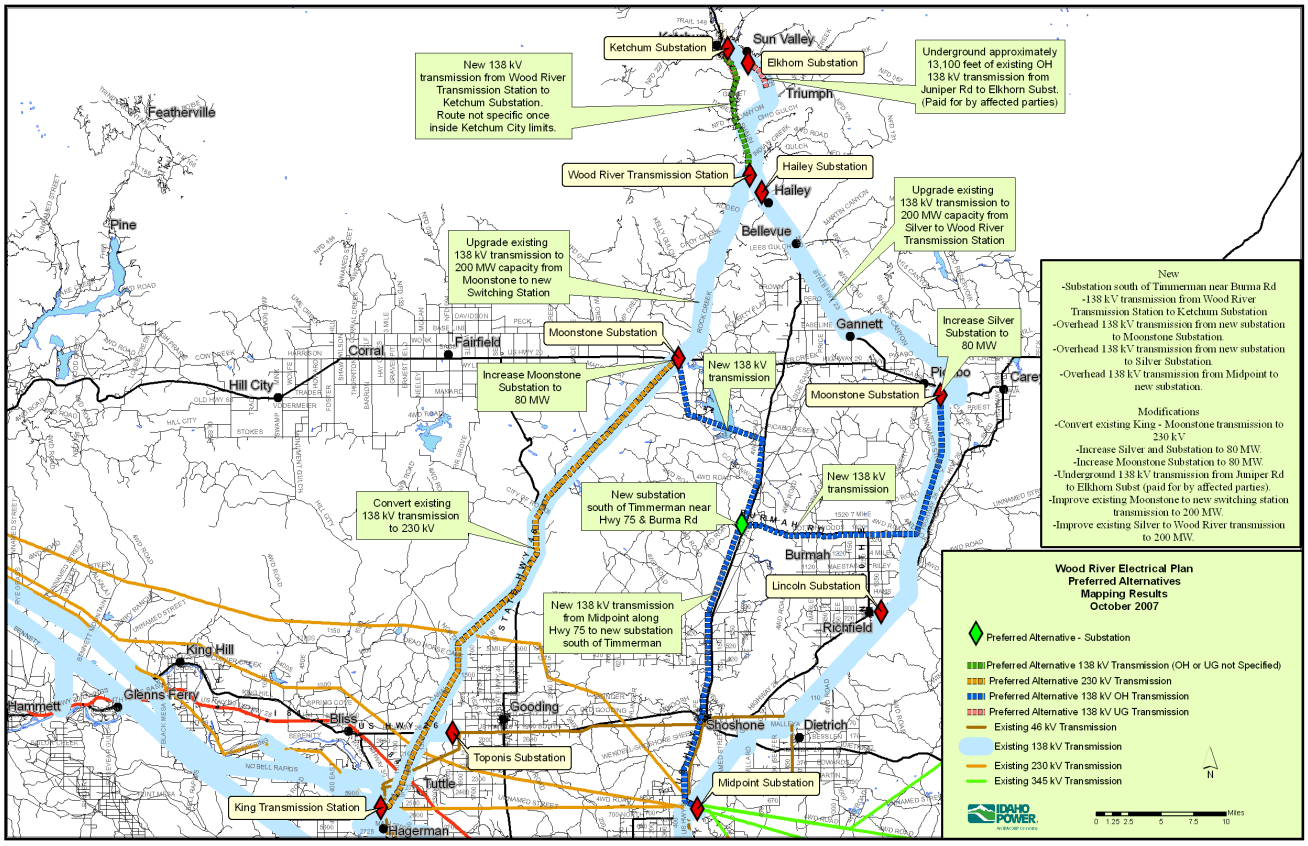


Figure 4. Preferrerd Alternatives

South Valley

For South Valley, the preferred alternative would convert the existing 138 kV transmission from King Substation to Moonstone Substation to 230 kV. It would install a new Substation south of Timmerman Hill along Highway 75 near the intersection of Highway 75 and Burmah Road (depending on land availability). For reference, this new substation will be referred to as Burmah Substation. It would then install a new 138 kV transmission line from Midpoint Substation to the new Burmah Substation and a 138 kV transmission line from the new substation to Moonstone Substation. It would also install a new 138 kV transmission line from the new Burmah Substation to Silver Substation routed along Burmah Road until it reached the existing 138 kV line. The new circuit would then be run on common towers with the existing 138 kV circuit until it reached Silver Substation.

The preferred alternative designates that both Silver and Moonstone substations be upgraded to 80 MW capacity. It is noted that the existing 138 kV transmission from Juniper Road near Sun Valley to Elkhorn Substation is to be placed underground (paid for by affected parties).

Mid-Valley

The preferred alternative for Mid-Valley would upgrade the existing Moonstone to Wood River Transmission from 105 megawatts to 200 megawatts and upgrade the existing Silver to Wood River Transmission from 120 megawatts to 200 megawatts. The Moonstone to Wood River

transmission structures would have to be rebuilt, but the net result will be that the visual impact of this line will not change.

North Valley

The preferred alternative for the North Valley region constructs an additional 138 kV transmission line between Wood River Transmission Station (located in Hailey) and Ketchum Substation to increase the dependability of the electrical supply to the north end of the Valley. Today there is only one transmission line feeding north from Hailey to Ketchum. The committee recommended that this line run in parallel with and immediately adjacent to Highway 75. This route was considered the most sensible option because it follows the Valley's main transportation corridor. The committee as a whole did not specify whether this line should be installed overhead or underground. There was a preference among a few members that this line be placed underground if cost wasn't an overriding factor. Photographic overlays showing an example of a new 138 kV overhead transmission line along Highway 75 south of Ketchum can be found in Appendix J of this report.

Overhead vs Underground Transmission

By far the most challenging issue the committee addressed was overhead vs underground transmission, particularly for new transmission from Hailey to Ketchum/Sun Valley. As regulated by the Idaho Public Utilities Commission (IPUC), Idaho Power is obligated to build its infrastructure in the most cost effective manner possible. Based on past experience, underground transmission is generally 10 times more expensive than overhead transmission. Idaho Power cannot construct underground facilities unless there are extenuating circumstances that would require it. These circumstances could include environmental issues or land availability issues. If a community wishes that transmission be placed underground for aesthetic reasons, the cost difference between overhead and underground transmission would have to be provided for by that community before the transmission could be placed underground.

One committee member discussed at length the belief that right-of-way costs for underground transmission in the North Valley would be significantly lower than for overhead transmission because landowners would be more willing to grant easements for underground transmission. The cost difference for the right-of-way could overshadow the material cost difference between overhead and underground transmission. The member also asserted that the political and legal costs would be quite high if Idaho Power were to attempt to install 138 kV overhead transmission in the North Valley. It was suggested that Idaho Power analyze this potential difference in right-of-way costs. While Idaho Power agrees that community acceptance for underground transmission would be greater, there is no valid method that can be used to estimate the cost difference for right-of-way between overhead and underground transmission short of actually going out and attempting to purchase the easements. It should be noted that some other committee members believed that there would actually not be a great difference between overhead and underground easement costs.

The committee as a whole did not specify whether this line should be installed overhead or underground. There was a preference among a few of the members that this line be placed underground if cost wasn't an overriding factor.

Implementation Plan

The recommendations of the Community Advisory Committee cover infrastructure improvements to the Idaho Power system that will deliver sufficient power at the Wood River Valley's buildout. Not all the facilities are needed in the near term and will be phased in as the Valley's load increases. The following is Idaho Power's recommended implementation plan:

5 Year

- Build a second 138 kV transmission line between the Wood River Transmission Station in Hailey and Ketchum Substation. This is the top priority project.
- Site and build the new Burmah Substation south of Timmerman Hill
- Build a new 138 kV transmission line from Midpoint Substation near Shoshone to the new Burmah Substation
- Build a new 138 kV transmission line from Burmah Substation to Silver Substation (near Picabo)
- Build a new 138 kV transmission line from Burmah Substation to Moonstone Substation (east of Fairfield)

10 Year

- Upgrade Moonstone to Wood River transmission line to 200 megawatts
- Add new 230 kV to 138 kV transformer at Midpoint Substation
    - The existing transformer capacity will be inadequate to serve the Wood River Valley load at this point.

15 Year

- Add new voltage control device at Ketchum Substation
    - Won't require new lines into Ketchum Substation
    - Won't require that Ketchum Substation be enlarged

20 Year

- Add distribution feeders from Wood River Transmission Station
    - Currently, this station only serves to switch the transmission, it doesn't directly feed any of the load around Hailey
    - This would relieve some of the load from Hailey Substation

30 Year

- Upgrade Silver to Wood River transmission line to 200 megawatts
    - This will provide more capacity to the growing Valley load
    - This will also help to support the voltage at Ketchum and Elkhorn substations

When load levels require, the King to Moonstone 138 kV transmission line will be converted to 230 kV. This will require that the line be completely rebuilt but it will likely be installed in the existing right-of-way. Moonstone Substation will also require improvements at this point to accommodate the higher voltage.

Conclusion/Results

The Wood River Valley is a vibrant, growing region that depends on a reliable electrical system to serve its tourism based economy. Along with growth-related increases in electricity demand, the businesses and residents of the Wood River Valley are more dependent on electricity today than ever before. Where 25 years ago, few owned a personal computer, now many residents have multiple PCs. Many people work from home and are dependent on their PC and home network to do business. Most, if not all, businesses now have electronic or even computer driven cash registers. New technology increasingly drives the need for electricity and it will continue on into the foreseeable future.

A dependable power system becomes especially important in the cold winter months. Residents of the valley, both permanent and occasional expect and require the power system to provide electricity to furnaces and water heaters for their homes. These heating loads drive the power demands to peak in the coldest winter months. A long duration outage in the winter due to a transmission line outage would be a public emergency and could result in frozen homes, and damaged water pipes throughout the Valley. The wintertime ski industry also depends on electricity for both chair lifts and snow making. The importance of a reliable electrical system to skiing operations was even evident in the summer of 2007 when snow making equipment was used to protect Bald Mountain facilities during the Castle Rock fire. For these reasons, Idaho Power must be proactive in planning for new infrastructure to serve the needs of the Wood River Valley.

The Wood River Electrical Plan (WREP) lays out high voltage transmission and substation infrastructure from now through Valley population and load buildout. In a cooperative effort with the Community Advisory Committee, the Plan determines locations for major transmission lines serving the Valley for many years to come and provides direction for the location of a new distribution/transmission substation to serve the southern part of the Valley. Individual projects resulting from this plan will still require jurisdictional approval and will be put through a public siting process. This first step, however, will give the jurisdictions and citizens a heads-up as to where high-voltage transmission equipment may be located and allow them to plan accordingly.

The Wood River Electrical Plan takes into account the effect that demand-side management will have on future load in the Wood River Valley. Idaho Power is committed to reducing electrical load through the use of demand-side management at all customer levels. In conjunction with activities outside Idaho Power's control – such as expected improvements in Idaho building standards, customer involvement, and energy efficiency technology advancements – Idaho Power expects new electrical load can be reduced by 20 to 30 percent.

Through the consensus agreement of the CAC, the WREP recommends the following:

- An additional 138 kV transmission line between Wood River Transmission Station (located in Hailey) and Ketchum Substation to increase the dependability of the electrical supply to the north end of the Valley. Today there is only one transmission line feeding north from Hailey to Ketchum. The committee recommended that this line run in parallel with Highway 75. This route was considered the most sensible option because it follows the Valley's main

transportation corridor. The consensus CAC recommendation is to build an overhead 138 kV transmission line from Wood River substation north to the St. Luke's hospital area. This new line would be in place of existing overhead distribution power lines along Buttercup Rd and Highway 75. From the hospital area north to the Ketchum substation, an underground 138 kV transmission line is preferred by the CAC. The underground option is contingent on local community funding.

- The location for a new substation south of Timmerman Hill near the intersection of Highway 75 and Burmah Road to serve the South Valley load and to act as a switching station for new transmission. For reference, this substation is named Burmah Substation.
- Construction of a new 138 kV transmission line from the new Burmah Substation to Moonstone Substation (located east of Fairfield).
- Construction of a new 138 kV transmission line from the new Burmah Substation to Silver Substation (located near Picabo).
- Increased power supply from south of the Wood River Valley to the Wood River Transmission Station in Hailey to serve the increasing electrical load in the Valley. This increased supply includes;
    - Construction of a new 138 kV transmission line from Midpoint Substation (near Shoshone) to Burmah Substation. This line would be installed in parallel with Highway 75.
    - Conversion of the existing King Transmission Station (located in Hagerman) to Moonstone Substation 138 kV transmission line to 230 kV. This will increase its capability.
    - Improve the capability of the existing 138 kV transmission lines feeding from Silver Substation (near Picabo) and Moonstone Substation into the Wood River Transmission Station in Hailey. This would be accomplished with larger wire installed on the existing structures if possible with the operating voltage remaining at 138 kV.

The cost for this infrastructure to serve the buildout projected load is about $78 million, in 2007 dollars. Future changes in technology may make some of these improvements unnecessary or, at least, delay their need. These types of shifts, however, are impossible to predict; therefore, Idaho Power can only monitor them and understand that no matter how good the present plans are, external forces can change them.

Appendix A – List of Community Advisory Committee Members

Lloyd Betts	Juniper Springs Home Owners
Len Harlig	Former Blaine County Commissioner
Rob Struthers	Real Estate and Ranching Former P&Z
Chuck Turner	Blaine County Emergency Planning
Kurt Nelson	USFS & Ketchum/Sun Valley Chamber Board
Julie Ingram	Hailey Chamber Executive Director
Tom Bergin	Director Blaine County Planning and Zoning
Tara Hagen	BLM Realty Specialist
Tom Hellen	City Engineer, City of Hailey
Chuck Carnohan	Idaho Dept. of Transportation
Tom Blanchard	City of Bellevue Administrator
Nils Ribi	Sun Valley City Councilman
Ron Le Blanc	Ketchum City Administrator
Jay Loesche	Lincoln County Commissioner
Leonard (Nick) Purdy Jr.	Rancher
Dayna Smith	Nature Conservancy Silver Creek Preserve
Wally Huffman / Dave Ziegler	Sun Valley Company
Rick Baird	Friedman Memorial Airport Manager and Carey City Mayor
Rod Kegley	Land Developer

Appendix B – Introduction and Technical Background

Introduction

Located in South-central Idaho, the Wood River Valley is a vibrant area that includes the cities of Ketchum, Sun Valley, Hailey and Bellevue. The economy of these communities has become more and more dependent upon electricity as both businesses and residents install increasing amounts electrical technology. The Valley's growth makes it important that Idaho Power improve its electrical infrastructure serving the Valley to ensure that reliability does not degrade. This growth also makes it important that plans be made for additional power supply to the Valley prior to the existing transmission lines reaching their full capability.

In 1973, the Idaho Public Utilities Commission approved Idaho Power's application requesting a Certificate of Public Convenience and Necessity for the construction of a second 138 kV transmission line between Hailey and Ketchum. In 1995, Idaho Power convened a Community Advisory Committee (CAC) to discuss installing this second 138 kV transmission line. The consensus of this committee was that Idaho Power should delay installing a new line and reconvene a committee in 10 years time to review the status of need. This decision resulted from the fact that the need for the line was to improve reliability and not because of a lack of capacity. As a result of the committee's recommendation and at the request of Idaho Power, the Idaho Public Utilities Commission amended its 1973 order, removing the authority for the construction of the second 138 kV transmission line from Hailey to Ketchum.

In accordance with the wishes of the 1995 Community Advisory Committee, Idaho Power once again formed a CAC in 2007 to evaluate the need for a second line feeding north from Wood River Transmission Station in Hailey to the Ketchum/Sun Valley area. In addition to evaluating the need for this second transmission line, the present Community Advisory Committee evaluated the *buildout* electrical infrastructure needed to serve the entire Wood River Valley from Ketchum in the north to the Timmerman Hill area in the south. The committee, comprised of area planners, city leaders, business interests, special interest groups, advocacy groups, and general citizens, met monthly over a period of six months. A list of CAC participants can be found in Appendix A. Representation from Lincoln County was also included to ensure their voice was heard in siting any transmission that must transit their county in route to the Wood River Valley.

This report documents the study process and the committee's consensus recommendations pertaining to the power system serving the Wood River Valley.

Existing Population and Electrical Load

For the area of Blaine County from Timmerman Hill to Ketchum, Idaho Power estimates the 2006 population to be 21,600. The peak historic electrical load consumed by this population was 99.5 MW, which represents the maximum recorded coincidental load fed from Hailey, Elkhorn, Silver and Ketchum Substations and the distribution serving into the Wood River Valley from Moonstone and Silver Substations.

Wood River Valley Growth

Electrical load growth calculations for the Wood River Electrical Plan were performed using two different methods. The first method was a spatial growth approach based on the comprehensive plans and current zoning for Blaine County and the cities of Sun Valley and Hailey. The second method was a population growth approach based on county economic development growth projections developed by Idaho Economics.

Spatial Growth Approach

The first method using the comprehensive plan approach and existing zoning laws assigned a load density in kilowatts-per-square mile (kW/mi^2) to each zoning area. The commercial zoning load density was estimated based on existing "buildout" areas in the Idaho Power service area. For residential zones, 5 kW per house was used to calculate the load density in areas south of and including the City of Hailey. It is assumed the average size of house is larger in Ketchum and Sun Valley so 6 kW per house was used for these cities.

Much of the zoned area in Blaine County is publicly owned land (BLM and US Forest Service) and is in the hills and mountains of the Wood River area. It was assumed that there would be no development on these publicly owned lands. Because there were no electronic maps of Bellevue zoning available, it was assumed that the zoning in Bellevue is similar to the zoning in Hailey. Multiplying the load density (kW/mi^2) for each zoning class by the total area associated with each zoning class (private land only) results in total load in kilowatts (kW) for each zoning class. The area of all the publicly owned land was not included in the load calculations for each zone. Finally, the total Wood River Valley build out load was calculated by summing the total load for all the zoning classes. This approach resulted in a total buildout load of 312 MW. Appendix I contains the load density numbers used in the calculations.

Population Growth Approach

The population growth approach utilizes county population growth projection numbers developed by John Church, President of Idaho Economics. Historic and projected Blaine County population and household growth rates are shown in Table 2. Continued growth is expected, but at a slower pace for the next 25 years compared to the previous 25 years as the amount of private, buildable land dwindles. The population for Blaine County is projected to be 13,896 households or 34,378 people in the year 2030. These growth projections result in an annual growth rate of about 1.8% for the time period 2006 to 2030. The current average power demand per person in Blaine County is about 10.3 kW per household or 4.2 kW per person. Assuming constant long term population growth of 1.8%, the projected "buildout" population (year 2080) for Blaine County is 76,161 people. Multiplying by a consistent 4.2 kW per person yields about 320 MW for the total Wood River Valley area buildout load.

Blaine County		*Population annual Growth*	*Households Annual Growth*
By Decade	1970-1979	5.49%	7.02%
	1980-1989	2.66%	2.85%
	1990-1990	2.99%	3.37%
	2000-2009	2.08%	2.09%
	2010-2019	1.41%	1.28%
	2020-2029	1.90%	1.93%
Previous 25 Years	1980-2004	3.05%	3.10%
Previous 5 Years	2001-2005	1.70%	1.67%
Next 5 Years	2006-2010	1.84%	1.85%
Next 25 Years	2006-2030	1.82%	1.78%

Table 2. Blaine County Population Growth

Both approaches to calculating the projected "buildout" electrical load in the Wood River Valley yielded very similar results giving a good level of confidence in the results. Potential variations in the spatial/zoning approach could result from future zoning changes, and developers choosing to develop at a lower density rather than at the maximum density allowed by the zoning laws. The population growth results will vary because of economic and political changes in the area and other potential limits such as limited water or transportation limits.

Existing Wood River Valley Electrical Supply System

The Wood River Valley is served entirely by transmission lines. There is no generation located within the Valley. Figure 4 shows the transmission system serving the Valley.

Figure 5. Wood River Electrical Plan Overview Map

There are two 138 kV transmission lines serving the Valley up to Hailey,

- King Transmission Station (KING) to Wood River Transmission Station (WDRI)
- Midpoint Substation (MPSN) to Wood Transmission Station (WDRI)

The KING to WDRI transmission line was built in 1962 and enters the Valley northwest of Hailey. It has a capacity of 105 MW. The MPSN to WDRI transmission line was put in-service in 1989 and is the stronger of the two lines, having a capacity of 120 MW. It enters the Valley east of Picabo. These two transmission lines combined are referred to as the *Wood River loop*.

From the Wood River Transmission Station in Hailey to the Ketchum/Sun Valley area, there is only one transmission line. This line was built in 1962 and has a capacity of 120 MW. Table 3 shows the technical details for these three lines.

Line	*Rating (MW)*	*Year Built*	*Historic Winter Peak Line Loading (MW)*	*Historic Winter Peak Line Loading (%)*	*Historic Summer Peak Line Loading (MW)*	*Historic Summer Peak Line Loading (%)*
MPSN-WDRI	120	1989	77	64	45	38
KING-WDRI	105	1962	58	55	36	34
WDRI-EKHN	120	1962	62	52	26	22

Table 3. Wood River Transmission System Technical Details

Note that the peak line loadings shown in Table 3 are non-coincident values. That is, these are the maximum values recorded on each individual line and were not necessarily recorded at the same instant in time. Thus, one cannot simply add the values in each column to come up with the whole Valley's peak load.

There are five substations connected to the 138 kV transmission serving the Wood River Valley. These substations reduce the voltage from 138 kV to either 12,470-volt or 34,500-volt and route the power onto distribution feeders for delivery to end users. Table 4 shows the existing peak loads on each of these six substations. Like the transmission lines shown in Table 3, the peak loads shown in the following table are non-coincident values. It should be noted that Toponis Substation near Gooding and Lincoln Substation near Dietrich are also connected to the 138 kV transmission lines serving the Wood River Valley and add to the load carried by the transmission lines. The load added by these two substations is included in the line loading shown in Table 3. There is no distribution from Wood River Transmission Station and therefore does not directly serve any load. It is purely a transmission switching station so is not included in the following table.

Substation	*Historic Winter Peak Load (MW)*	*Historic Summer Peak Load (MW)*
Ketchum (KCHM)	48	18
Elkhorn (EKHN)	12	6
Hailey (HALY)	31	18
Moonstone (MOON)	8	12
Silver (SLVR)	4.5	6.5

Table 4. Existing Substation Peak Loads

Figure 5 shows the service boundaries for the five substations serving the Wood River Valley. The boundaries described in this figure aren't static. As population and loads shift within the Valley, the load may be transferred to a substation with excess capacity to relieve a more heavily loaded substation.

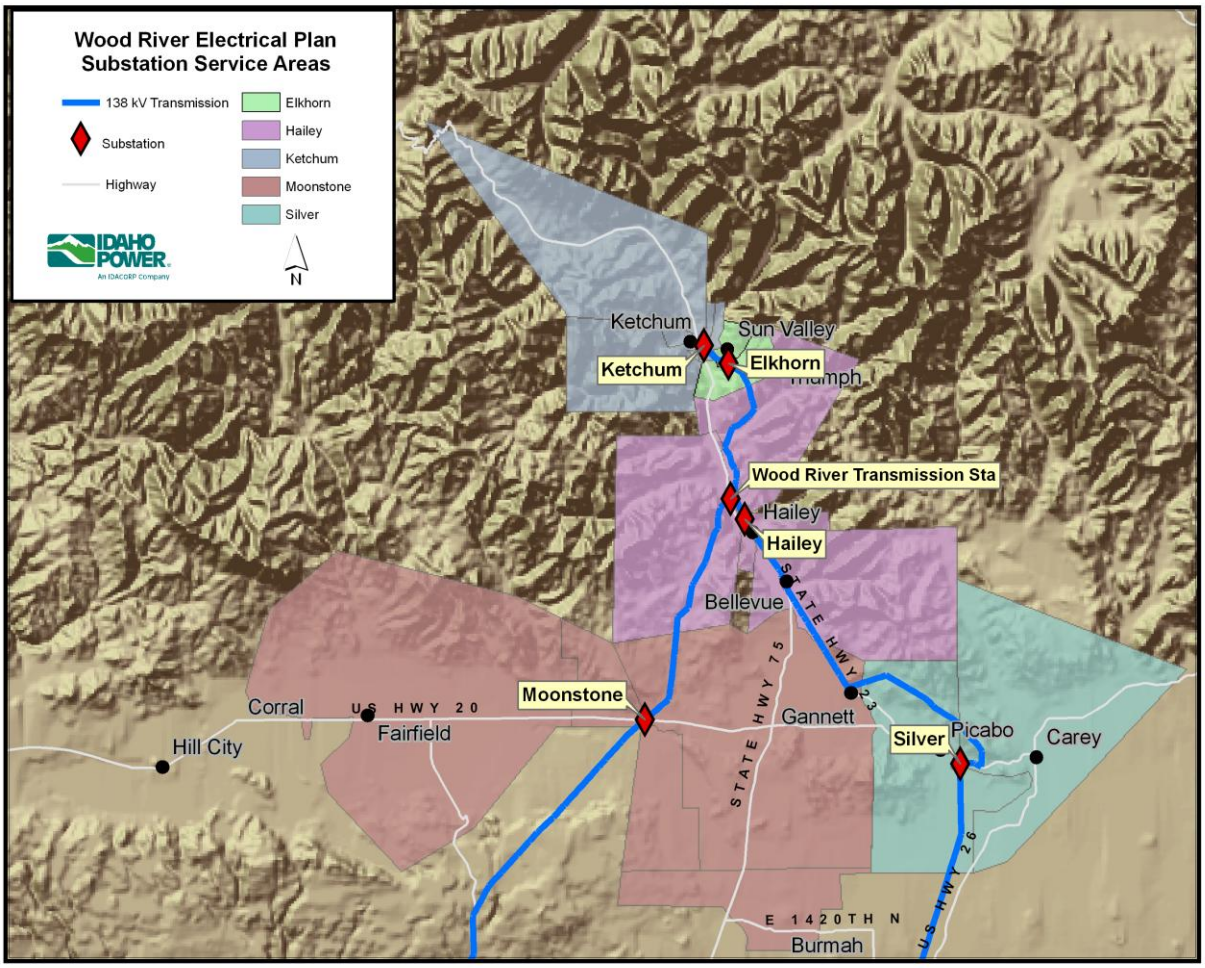


Figure 6. Existing Substation Boundaries

Existing Dependability

The southern half of the Wood River Valley, from Hailey south, is served by two 138 kV transmission lines; giving it redundant power service a majority of the year. However, the northern part of the Valley is served by a single 138 kV transmission line. When a storm or accident damages the line, there is no ability to provide power to the Ketchum/Sun Valley area. To minimize the risk of a catastrophic long term outage and to serve increasing population and electrical demand, it is increasingly important to provide a second power source to the northern part of the Wood River Valley in order to maintain electrical dependability.

Because the transmission lines serving the Wood River Valley are not part of the bulk power system, Idaho Power is not mandated by federal or state regulators to provide a fully redundant power supply. However, in accordance with Idaho Power's internal planning standards, the Wood River transmission supply is designated as an *improved radial* system. This means that:

- If both 138 kV transmission lines serving from the south into Hailey are in-service, they must be able to serve the most extreme peak at all times.

- If the weaker line is out-of-service (King Transmission Station to Wood River Transmission Station), the remaining line must be able to serve a load level that is experienced, or exceeded, less than 10% of the time.

- If the stronger line is out-of-service (Midpoint Substation to Wood River Transmission Station), the remaining line service capacity may limit the ability to serve the load. If this were to occur when loads in the Valley were high (a cold winter day), it would likely result in some Valley electrical load being interrupted via rotational outages.

Figure 6 is a load duration curve that gives an hourly breakdown of the recorded load values for the Wood River transmission loop for an entire year: March 1, 2006 through February 28, 2007 or 8,760 hours.

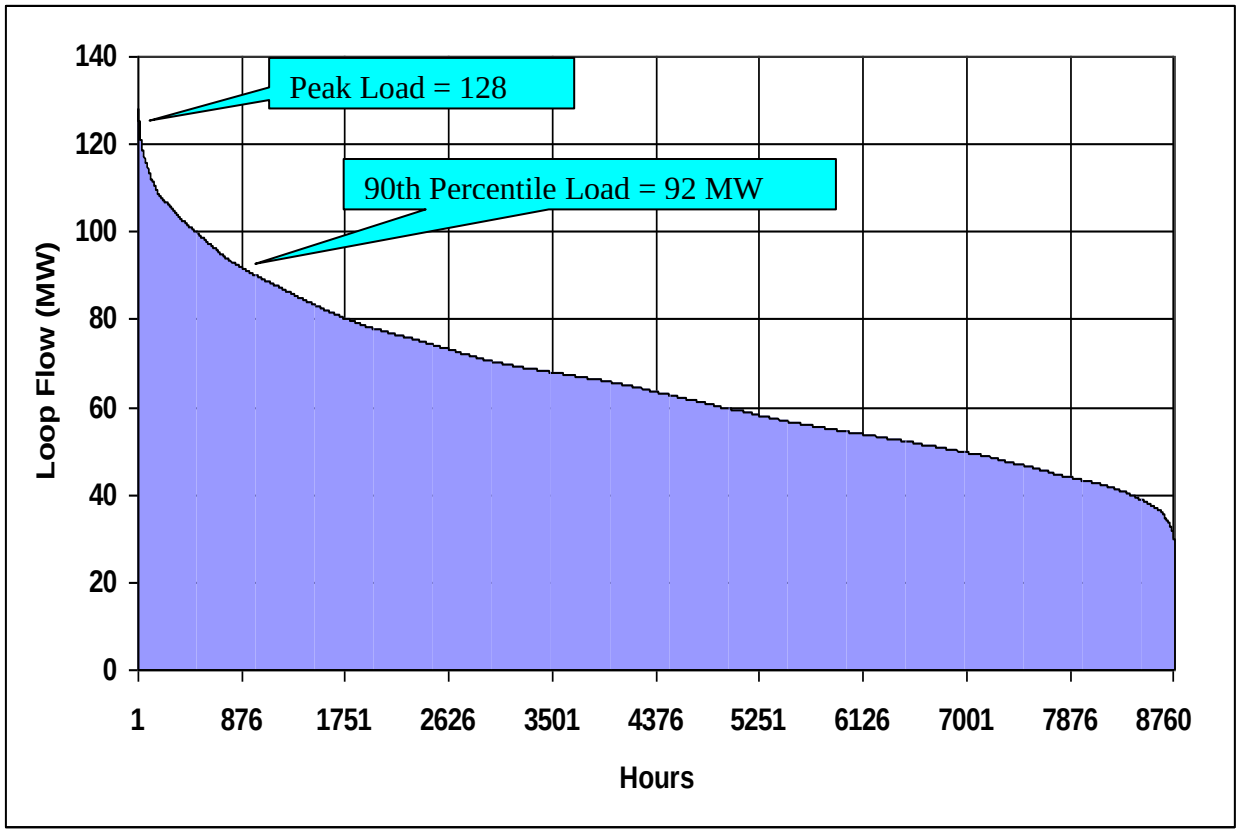


Figure 7. Load Duration Curve for Wood River Loop Transmission

In accordance with the second bullet above, the Midpoint Substation (MPSN) to Wood River Transmission Station (WDRI) line must be able to serve the entire load 90% of the year since it is the stronger line. The peak load recorded on both the lines serving the Valley combined between March 1, 2006 and February 28, 2007 was 128 MW (includes load outside the Wood River Valley served by these two transmission lines). As can be seen in the above figure, the load is 92 MW or less for 90% of the year. This is the load the Midpoint Substation to Wood River Transmission Station line must be able to carry by itself. Currently, the Midpoint to Wood River line has sufficient capacity to meet Idaho Power's improved radial reliability criteria since it has a capacity of 120 MW and the 90% load is only 92 MW. However, it will not be long

before it will not meet the reliability criteria due to Valley load growth. In fact, the 90th percentile load grew from 88 to 92 MW in just one year's time. Since 2006, the MPSN – WDRI transmission line (stronger line) has not had enough capacity to serve the entire electrical load should the weaker line be out-of-service during the extreme peak loads of winter, though this only occurs for a very few hours.

Up to 13 MW of load would have to be curtailed in the case where the MPSN – WDRI line is out-of-service during extreme winter peak because the weaker line (KING – WDRI line) can only carry 105 MW. Again, with the peak load growing, the amount that would require curtailing goes up every year.

Obviously, if the transmission line serving from Wood River Transmission Station north to Ketchum/Sun Valley (KCHM) is taken out-of-service, there would be no way to serve most of the load in the Ketchum/Sun Valley area. A small amount of load could be served via distribution feeders from Hailey Substation. If this line was out in the middle of the winter, it could take a significant amount of time to repair, resulting in a long power outage to the Ketchum/Sun Valley area. Because of the potential hardships an outage of this line could cause to the citizens and businesses of the north Valley, Idaho Power maintains and patrols this line to a significantly higher degree than it does most other transmission lines in the Idaho Power system. Table 5 gives a breakdown of outages that have occurred on all three Wood River Valley transmission lines during the past 10 years (1996 – 2006)

Type and Cause of Outage	***MPSN-WDRI***	***KING-WDRI***	***WDRI-KCHM***
Total Sustained Outages	**13**	**24**	**4**
Caused by Weather	8 (62%)	5 (21%)	1 (25%)
Caused by Range Fires	3 (23%)	1 (4%)	0
Caused by Maintenance	2 (15%)	18 (75%)	2 (50%)
Caused by Equipment Failure	0	0	1 (25%)
Total Momentary Outages	**26**	**46**	**4**
Caused by Weather	8 (31%)	12 (26%)	4 (100%)
Caused by Range Fires	0	2 (4%)	0
Caused by Maintenance	1 (4%)	20 (43%)	0
Unknown Cause	17 (65%)	12 (26%)	0

Table 5. 10-Year Outage History for Transmission Lines in the Wood River Valley

Appendix C – Committee Process and Input

Community Advisory Committee meetings started in January 2007 with a bus tour of Idaho Power facilities. The bus tour began a series of primarily educational meetings that were held monthly through March 2007. Through these educational sessions, the CAC was introduced to electrical generation, substations, transmission, demand-side management, and regulatory affairs. Additionally, the CAC was presented with a view, from production to delivery, of Idaho Power's electrical system. Using the education gained from the meetings held between January and March, the CAC set to work in April and May to lay out proposed Wood River Valley transmission line routes and substation sites. Idaho Power engaged KMP Planning of Twin Falls to facilitate the CAC meetings.

Alternative Energy Generating Technologies

During the initial committee meeting, a presentation was given by Idaho Power that discussed various alternative energy generation technologies that could deliver energy to the Wood River Valley and thus displace the need for additional power lines. The technologies discussed included wind turbines, photovoltaic (solar), combustion turbines and fuel cells.

Wind Turbines – While wind turbines are becoming an important resource throughout the United States, their use in the Wood River Valley is probably not viable:

- The wind speed in the Valley is generally too low to allow the turbines to produce much usable energy.
- There is very limited space in the Valley for wind turbines.
- Even if the turbines were useable in the Wood River Valley, electrical transmission would still be required to deliver the energy to the end users.

In the Hagerman area, about 60 miles southwest of Hailey, there is a 10 MW wind turbine plant that went into operation in 2005. There are also many other wind turbine power plants proposed and in the process of being installed in southern Idaho. Of course, to receive the energy produced by these facilities requires transmission so they do nothing to reduce the need for transmission infrastructure.

On a smaller scale, residential size wind turbines mounted on houses and businesses could provide energy that could displace utility infrastructure, though again, the wind speed and its constancy is very low in the Wood River Valley. It would be up to the local residents and governments to make small scale wind turbines a reality in the Valley.

Photovoltaic – The number of sunny days that the Wood River Valley sees every year would seem to indicate that it would be an ideal location for photovoltaic use. On a large scale, however, solar energy sites would suffer from the same negatives that wind turbines do:

- There is very limited space in the Valley for a large solar generating plant.
- Even if a large solar plant were useable in the Wood River Valley, electrical transmission would still be required to deliver the energy to the end users.

But, like wind, residential and commercial size photovoltaic panels could certainly be installed and could displace the need for more utility infrastructure. Again, this would be up to the residents, businesses and local governments to bring it to fruition.

Geothermal – There are credible geothermal resources within the Wood River Valley and the immediate vicinity. While much of the geothermal is a lower temperature and thus not usable for power generation, there is some that likely is. In fact, there is at least one proposed geothermal power generation project located near to the Valley. The nearest developed geothermal power generating resource is the Raft River Project located near Raft River, Idaho. Idaho Power purchases the output from this plant.

If a geothermal facility was developed near the Wood River Valley, it would still require electrical transmission to deliver the energy to Valley residents.

Fuel Cells – Used in a distributed manner among homes and businesses, fuel cells could displace the need for additional transmission in the Wood River Valley. There are some drawbacks that will take a few years to overcome:

- Residential-size fuel cell systems are not currently commercially available, though there are a number of companies aggressively working towards that goal.
- Fuel cells require an outside fuel source, whether it is natural gas, methanol or pure hydrogen. Unless the fuel cell is fueled by pure hydrogen, there are some emissions that result from making electricity using a fuel cell.

Like the other alternative generating resources mentioned above, it will be up to the local population and governments to enable widespread use of fuel cells in the Wood River Valley.

Combustion Turbines – Based on the same technology used in aircraft jet engines, combustion turbines could certainly be used to provide energy to the Wood River Valley. Idaho Power installed a 50 MW combustion turbine that was fueled by natural gas and oil in Hailey in the early 1970s and was used primarily for dependability purposes to back up the then single transmission line serving the Wood River Valley. Once the second transmission line to Hailey was built in 1987, the combustion turbine was deemed unnecessary and was removed. By that time, it was becoming difficult to operate the turbine due to emissions limits for air quality purposes and the difficulty in fueling the turbine. The community was also unhappy about the noise this turbine emitted while operating.

Through the early meetings, the Committee was opposed to siting a new combustion turbine generator in the Wood River Valley to meet the electrical needs. In April, a committee member did bring up the idea that Idaho Power should investigate installing a natural gas fired combustion turbine in the Ohio Gulch area. After a lengthy discussion, the Committee determined that a combustion turbine generator would not be feasible for use in the Valley for the following reasons:

- The cost of a generating station adequate to provide full redundancy to the existing transmission would be over $50M. This number would more than double to provide redundancy at buildout.
- A combustion turbine for use in the Wood River Valley would need to be fueled by natural gas (for emissions purposes). The existing natural gas supply to the Valley is inadequate to fuel a turbine and a new pipeline would be needed. Even using natural gas, the Idaho Department of Environmental Quality would likely impose severe operating limits on the turbine due to the inability for the emissions to dissipate given the small width of the Valley. It was suggested that perhaps methane gas produced by the dairies in the Magic Valley could be piped into the Wood River Valley.

- A natural gas-fired combustion turbine experiences significant reduction in efficiency as the altitude increases. Unlike a liquid-fueled jet engine (aircraft engine), natural gas must be compressed for use in the turbine and at higher altitudes it takes more energy for the compression process.
- While quieter than many generating technologies, there would still be noise issues in the Wood River Valley that would have to be overcome.
- A large combustion turbine has some water requirements and it might be difficult to obtain water rights in the Wood River Valley.

Energy Efficiency

Another way to reduce the need for additional transmission resources in the Wood River Valley would be to aggressively pursue energy efficiency technologies or in utility terms, demand-side management (DSM). Idaho Power is currently providing many programs funded by a Customer Conservation Charge to customer bills that promote the use of DSM to reduce electricity usage. Idaho Power's 2004 Integrated Resource Plan (IRP) called for an average of 41 megawatts of energy savings due to DSM by 2014. The 2006 IRP calls for an average of 90 megawatts of energy savings due to DSM by 2024. Table 1 shows the current Idaho Power programs. The Idaho Power Website at www.idahopower.com contains full descriptions of these programs.

Residential	***Commercial/Industrial/Irrigation***
A/C Cool Credit	Irrigation Peak Rewards
Weatherization Assistance	Irrigation Efficiency
Rebate Advantage	Building Efficiency
Energy Star® Homes	Easy Upgrades
Energy Star® Lighting	Customer Efficiency
Energy House Calls	

Table 6. Idaho Power Demand Side Management Programs

Additionally, Idaho Power currently has rates that vary by season, with summer electricity rates being higher than winter rates in order to encourage lower energy use in the summer when the overall electricity usage on the Idaho Power system is highest. In the Wood River Valley, these seasonally varying rates do nothing to reduce power usage when the reduction is needed most…in the winter.

Idaho Power is also investigating using time-of-day pricing and critical peak pricing that would encourage customers to use less energy during the peak times (such as late afternoon and early evening).

Idaho Power Company Energy Efficiency activity and Programs in the Wood River Valley

Idaho Power offers ten distinct Energy Efficiency programs in the Wood River Valley as well as throughout most of its service territory. A listing of each program follows with a brief description of each. More information of each of the programs can be found at www.idahopower.com/energycenter.

Residential Programs:

- **ENERGY STAR® Homes Northwest**
  A $750 incentive is paid to builders for each home built to the ENERGY STAR® standards. These standards are 30 percent more efficient than one built to the Idaho building code.
- **Energy House Calls**
  This program offers a free package of services (inc. duct sealing) designed to help save energy for residents of manufactured homes heated by an electric furnace or heat pump.
- **Rebate Advantage**
  This program offers $500 payment to Idaho Power customers who purchase a new ENERGY STAR® manufactured home.
- **Weatherization Assistance for Qualified Customers**
  This program offers free weatherization measures for electrically heated homes of qualified customers to help them maintain a comfortable and efficient home environment.
- **ENERGY STAR® Lighting**
  This program is a specialty bulb promotion offered in conjunction with BPA (Change a Light, Change the World) to provide a buy-down of bulbs at large retailers. Future programs offer promotions of other bulbs at various retailers.
- **Heating and Cooling Efficiency Program**
  This program provides cash incentives to residential customers (and HVAC contractors) for choosing and installing qualified energy-efficient heating and cooling equipment and services through approved HVAC contractors

Commercial and Industrial Programs:

- **Custom Efficiency**
  This program offers financial incentives for large commercial and industrial energy users with large and complex projects to improve the efficiency of their electrical systems or process.
- **Building Efficiency**
  This program offers incentives of up to $100,000 designed to offset part of the additional capital expenses for more efficient lighting and cooling designs in small and mid-size commercial construction projects
- **Easy Upgrades**
  This program offers Incentives of up to $100,000 for a menu of simple commercial, industrial building retrofit projects. Incentives are available for lighting, HVAC, motors, building shell, plug loads and grocery refrigeration and are based on each measure's assumed energy savings.

Agricultural Programs:

- **Irrigation Efficiency Rewards**
  This program offers an incentive which pays up to 75 percent of the cost for irrigation customers who improve the energy efficiency of an existing pump system or up to 10 percent when installing a new efficient system.

- **Irrigation Peak Rewards**
  This program offers a demand credit for specific irrigation customers who allow Idaho Power to use electric timers to turn off their pumps for a few hours on selected summer days reducing afternoon peak demand and lowering the customer's electric bills.

Wood River Valley projects:

Although Idaho Power doesn't commonly track Energy Efficiency programs specifically by area or city, a manual examination of the Energy Efficiency incentive records show that from 2005 to October 2007 Idaho Power has identified 24 individual projects completed in the Wood River Valley area. These projects were completed in Ketchum, Bellevue, Hailey, Sun Valley, Fairfield, Carey, and Picabo. Four projects were under the Custom Efficiency Program. One project was completed under each of the Building Efficiency, Easy Upgrades and Rebate Advantage programs and seventeen projects were completed under the Irrigation Efficiency Rewards program. Idaho Power paid a total of $130,290 dollars in incentives for an annual energy savings of approximately 1,342,602 kilowatt hours (kWh) and 155 kilowatts (KW) in demand savings for the non-irrigation programs. Under the Irrigation Efficiency Rewards program, Idaho Power paid $28,637 in incentives for an annual savings of approximately 205,717 kWh and about 57 savings in KW.

There are many other activities in addition to those sponsored by Idaho Power that customers could undertake to reduce their energy use and, like the alternative generating resources discussed previously, it will be up to the local residents, businesses and governments to make them a reality.

Transmission Characteristics

The Committee was provided with costing for various voltages of transmission. Table 7 shows these costs. Note that right-of-way widths provided are for total right-of-way requirements, not width from center line. Appendix J shows photographic examples of the types of overhead transmission towers referenced in Table 7. The transmission line cost on a per mile basis does not include right-of-way cost.

Voltage	*Type*	*$/mi*	*ROW (ft)*
230,000 V	Overhead, H-Frame	$350,000	120
230,000 V	Overhead, Single Pole	$400,000	70
138,000 V	Overhead Single Pole (low profile)	$200,000	50
138,000 V	Underground	$3,000,000	12
69,000 V	Overhead, Single Pole	$175,000	40
69,000 V	Underground	$2,700,000	12
35,000 V	Overhead, Single Pole	$150,000	30
35,000 V	Underground	$1,500,000	12

Table 7. Estimated Transmission Costs for Various Voltage Levels

A CAC member asked if the maintenance costs between overhead and underground transmission differed significantly. Since Idaho Power has no experience with underground transmission this question was asked of cable manufacturers and other utilities. Maintenance practices at the various utilities surveyed differed greatly and there was not much in common between them. In most cases, the maintenance is quite conservative because the effect of a catastrophic failure on an underground cable is so great. And the cable manufacturers also recommended an aggressive maintenance approach. This conservative approach is quite costly and causes the maintenance costs for underground transmission to be approximately equivalent to that of overhead.

Goals Document

The first step in developing proposed solutions to the electrical needs of the Wood River Valley was to develop a goals document that could be used to guide the committee's efforts to develop and evaluate alternatives. The goals were divided into 6 areas:

- **Reliable Power:** Provide reliable power to the entire Wood River Valley
  - *Provide redundant transmission facilities throughout the Wood River Valley*
  - *Provide sufficient reliable, quality power necessary to support the Valley's current and future business and economic activities*
  - *Include Lincoln and Camas counties' electricity needs*
- **New Infrastructure Design:** Develop new transmission and delivery infrastructure as appropriate when providing for current and future power needs
  - *Optimize the use of existing infrastructure; increase use or upgrade as feasible*
  - *Implement feasible mechanical alternatives to new transmission or delivery systems to provide redundancy*
  - *Identify and utilize alternative and renewable sources of power that minimize the need for new transmission/delivery infrastructure*
  - *Plan and implement infrastructure improvements that integrate with future system development*
  - *Explore and implement new power system technologies as feasible and appropriate*
- **Energy Conservation:** Implement programs that reduce demand for additional energy
  - *Implement feasible "Demand Side Management" programs to reduce power demand as a portion of an overall solution to meet the Valley's energy needs*
  - *Optimize the use of existing "conservation" programs as feasible to reduce power demand*
  - *Develop new "conservation" programs with education, as feasible and supported by Valley residents*
- **Environment:** Cause no or minimum impacts to the natural, physical, cultural, historic, social and aesthetic environment due to development and operation of power facilities and delivery systems
  - *Utilize existing/shared utility and transportation corridors where feasible*
  - *Site new corridors that have no or minimal impact on the environment*
  - *Preserve the Wood River Valley's aesthetic and scenic qualities*
- **Political Support:** Develop solutions that are politically supported throughout the Wood River Valley
  - *Address individual and collective political concerns for design, operation, siting and funding*
  - *Integrate WREP recommendation into local land use plans; comply with local plans if possible*
  - *Consider the least obtrusive and least objectionable option to enhance opportunity for public support and implementation*
- **Cost Effectiveness:** Develop solutions that are cost effective and provide associated benefits
  - *Implement solutions that are affordable to construct*
  - *Implement solutions that are affordable to operate and maintain*
  - *Cause no or minimum rate increases to support new infrastructure/system improvements*
  - *Minimize local public or private funding participation or support new or upgraded infrastructure*
  - *Implement solutions that have available public or private funding where required*

The CAC also came up with a list of siting criteria. These criteria may not all be completely achievable, but they are measures to be strived for when developing and evaluating alternatives.

- **Wood River Transmission Station (WDRI) North**
  - *Provide both redundancy and capacity to meet electrical needs north of WDRI*
  - *Do not use the existing 138 kV transmission corridor without new technology to avoid new impacts*
  - *Preserve the scenic corridor*
  - *Maintain the ordinance-required 150 ft setback from residences when using overhead transmission lines*
  - *Conform to existing hillside ordinances*
  - *Install underground lines in locations where the necessary additional funding is available.*
- **Wood River Transmission Station (WDRI) South**
  - *Provide electrical infrastructure and systems that meet Lincoln County electrical needs*
  - *Improve structures and transmission lines in Lincoln County as needed to accommodate future growth*
  - *Maintain scenic corridors*
  - *Cause no environmental impact to wetlands and habitat*
  - *Use existing corridors and transmission equipment where possible*
  - *The use of overhead lines and infrastructure is acceptable until the affected community can afford to fund a different proposal*
  - *Maintain or reduce pole size in Bellevue*

Load Blocks

The CAC was provided with a series of load blocks to help them determine the amount of transmission to allocate for buildout needs. Figure 7 is a geographic based depiction of these load blocks with no transmission lines connected.

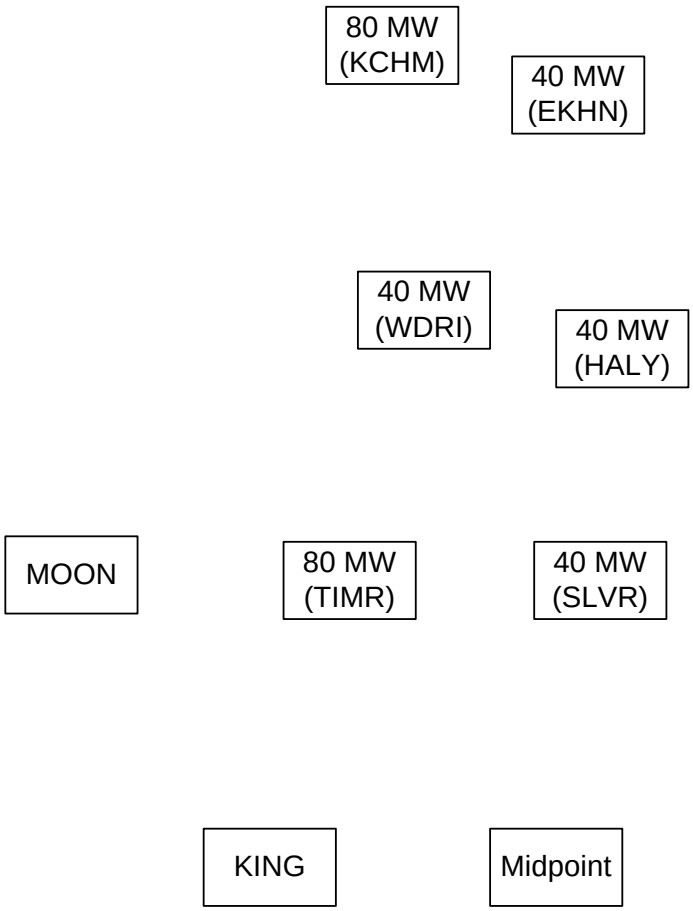


Figure 8. Load Blocks with no Transmission

Figure 7 shows a total of nine substations associated with the Wood River Valley. King and Midpoint Substations are shown for reference as the originating point for power fed to the Valley. A new substation called Timmerman Substation (TIMR) is shown with the assumption that at buildout, the Valley will require at least one additional substation in order to serve the load. In this figure, no load is assigned to Moonstone Substation (MOON) because at buildout this substation will only serve load in the area of Magic Reservoir and Camas County, thus it is not part of the committee's assignment other than to allocate sufficient southern transmission to serve it.

Figure 8 builds upon the previous figure by adding southern transmission sufficient to serve the entire Valley load from Timmerman Hill north. Note that the following figures or transmission configurations were only used as an example for discussion and not as a recommendation by Idaho Power. The committee was encouraged to be creative in how they recommended serving the Wood River Valley load at buildout.

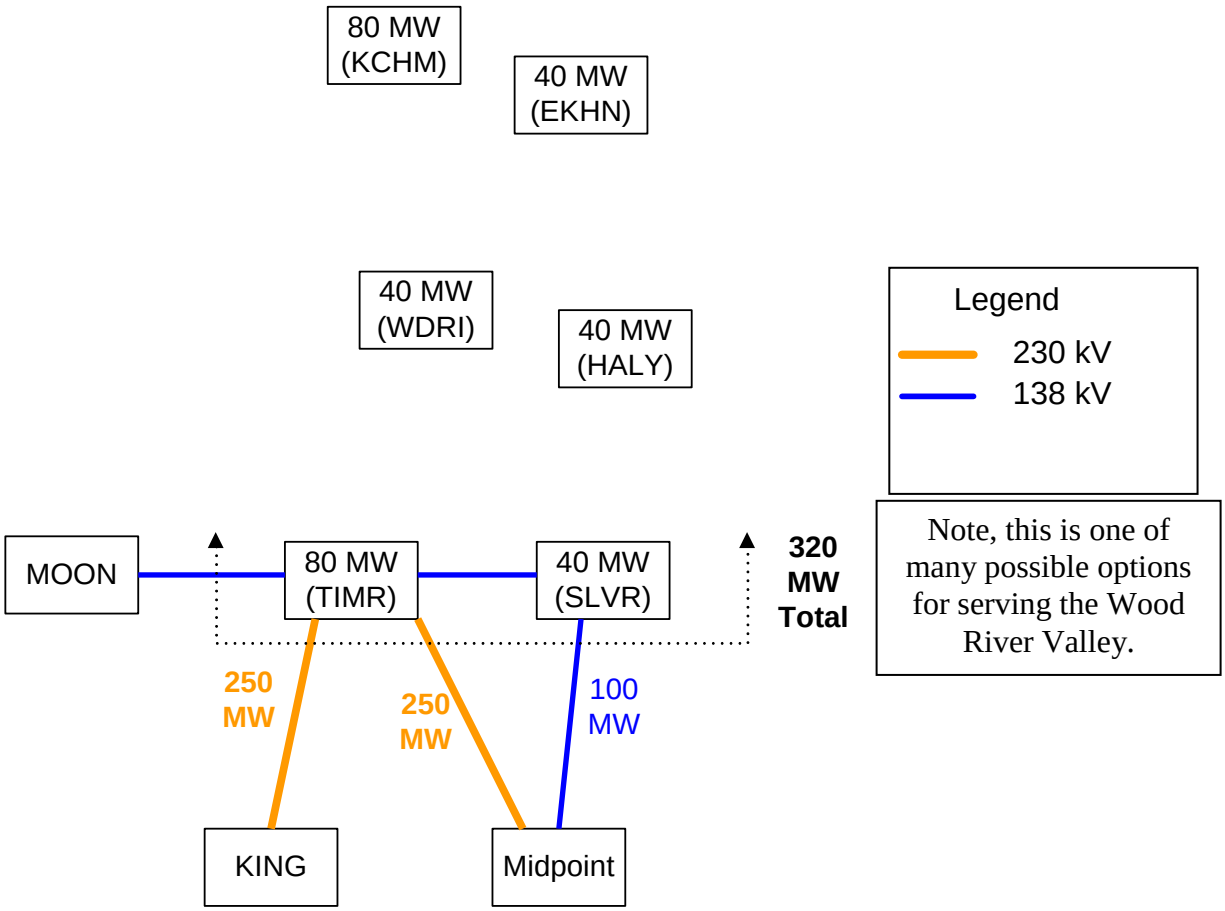


Figure 9. Load Blocks with Example Southern Transmission

In the figure above, two 230 kV transmission lines are constructed from King and Midpoint Substations to the new Timmerman Substation. Additionally, one 138 kV transmission is installed from Midpoint to Silver Substation. These three transmission lines would provide both adequate capacity and adequate dependability to serve the Wood River Valley load at buildout.

In Figure 9, a number of 138 kV transmission lines are added to provide for the entire 350 MW buildout load.

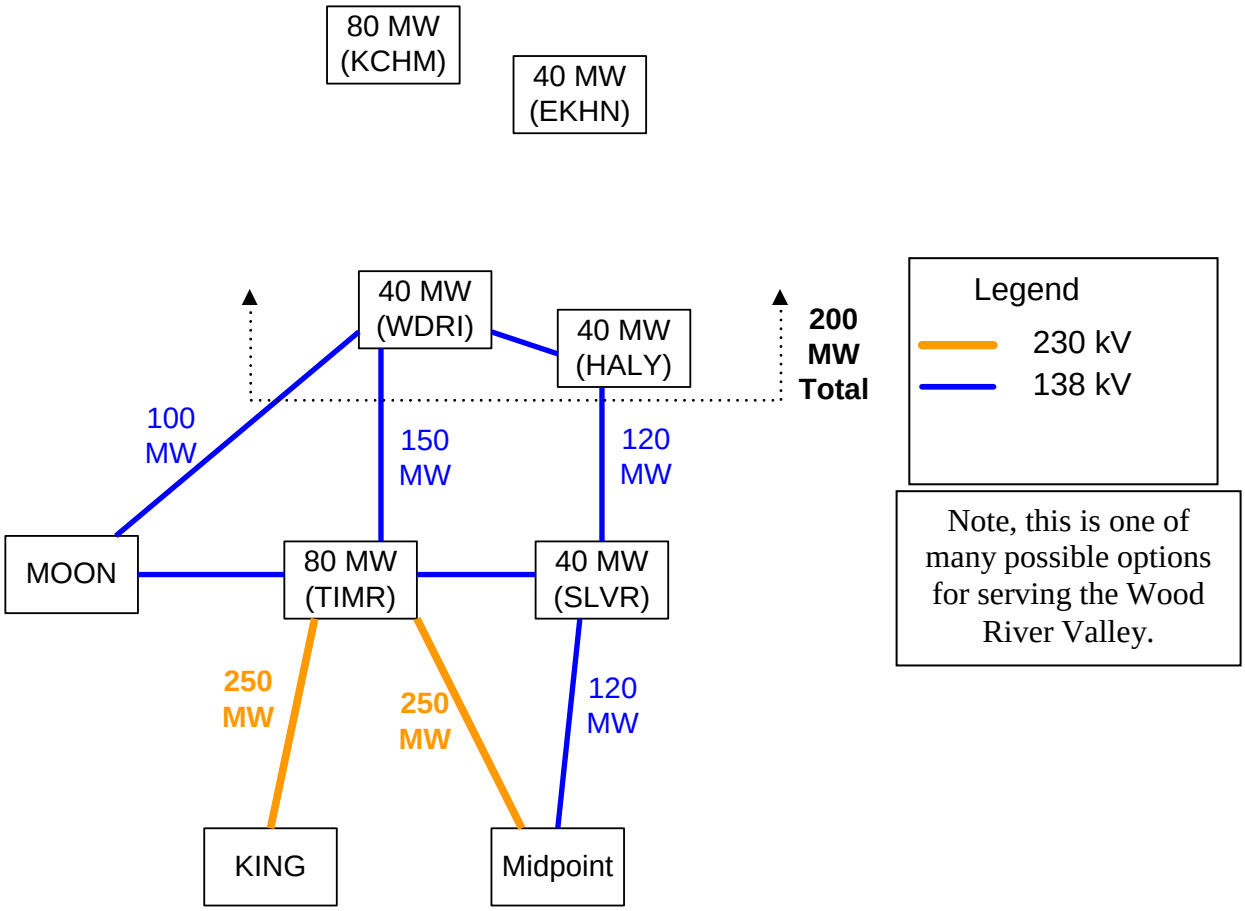


Figure 10. Load Blocks with Example Mid-Valley Transmission

The above figure shows 138 kV transmission interconnecting Moonstone, Timmerman and Silver substations and then serving into the Valley at 138 kV to Wood River and Hailey substations. Three transmission lines are shown serving into Wood River and Hailey substations to provide fully redundant supply to the Valley. That is, the three transmission lines provide sufficient capacity such that if one of the three is out, the remaining two transmission lines can carry the entire load.

Figure 10 adds two 138 kV transmission lines serving north from Hailey into the Ketchum/Sun Valley area. Again, these two transmission lines have sufficient capacity to provide fully redundant power to the buildout Ketchum/Sun Valley loads.

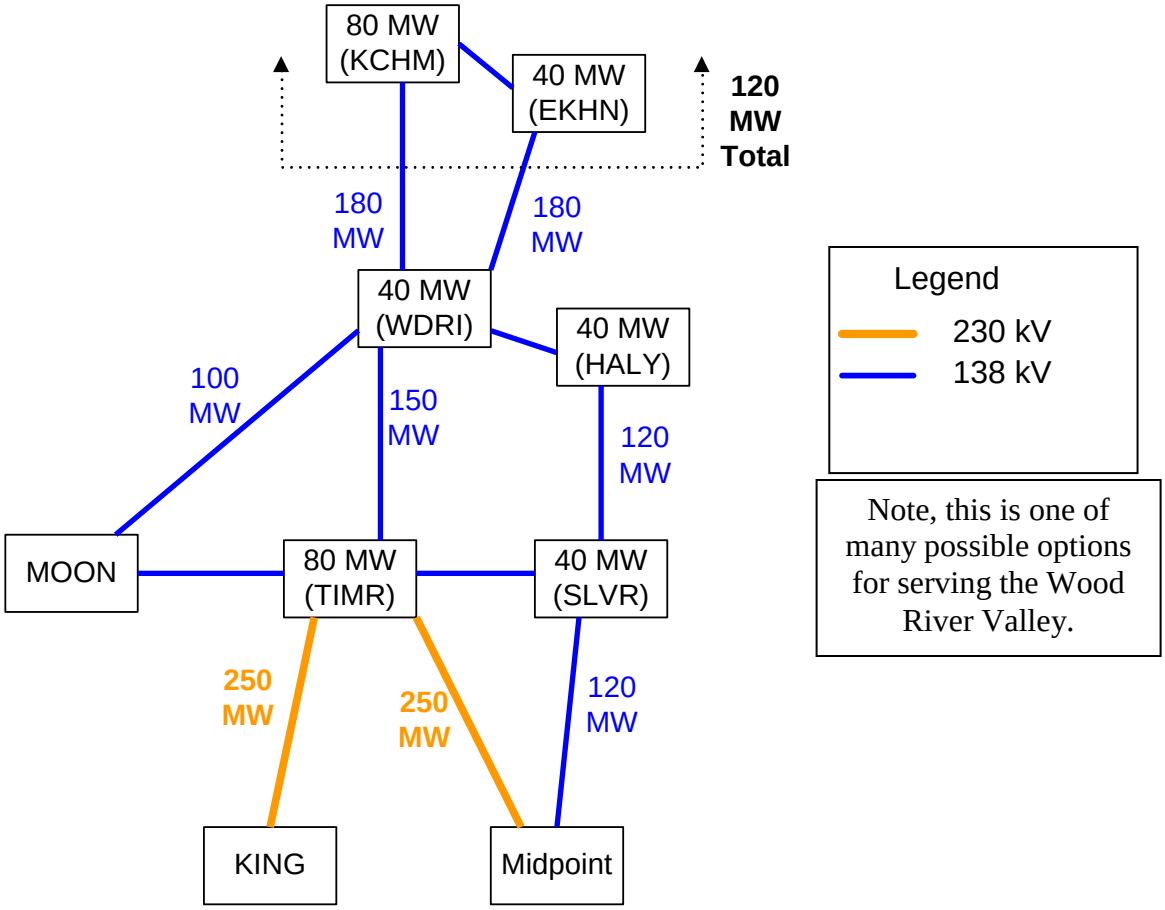


Figure 11. Load Blocks with Example North-Valley Transmission

Mapping Exercise

Using the education provided in January through March and the goals developed in March and April, the CAC set to work in April laying out proposed Wood River Valley transmission routes and substation locations. The CAC also used the load block diagrams to aid them in determining the size of lines needed to support the Valley's load.

The committee was broken into three groups; each group was given a large aerial photograph showing the terrain from Ketchum in the north to Midpoint and King Substations in the south. Using the goals and siting criteria as a guide, each group developed feasible alternatives to meet buildout requirements. The following guidelines were used in forming the small groups:

- Groups were designated "A, B and C" for alternative discussion purposes
- Each group included committee members from throughout the planning area
- Each group included an Idaho Power representative to provide technical support and a facilitator to capture the details for each of the alternatives

Group A Mapping Results

Group A, which consisted of five members, created a total of four alternatives. The first two alternatives covered the area from Timmerman Hill south while the second two alternatives covered from Timmerman Hill north. Appendix C contains notes taken from Group A during the mapping exercise. Appendix D contains larger, more readable versions of the following maps.

Group A – Alternative 1

This alternative covers transmission from Midpoint and King Substations in the south to Silver, Moonstone and Timmerman substations in mid-Valley and onto the Wood River Transmission Station in Hailey. It would build a new Timmerman Substation near the existing Idaho Transportation Department's Timmerman rest area and connect it to both Moonstone and Silver substations using 138 kV transmission. It would convert the existing Midpoint to Silver 138 kV transmission line to 230 kV and also convert the existing King to Moonstone 138 kV transmission line to 230 kV.

The 138 kV transmission from Moonstone Substation to Wood River Transmission Station and from Silver Substation to Wood River Transmission Station would be improved to increase their capacity each to 200 MW.

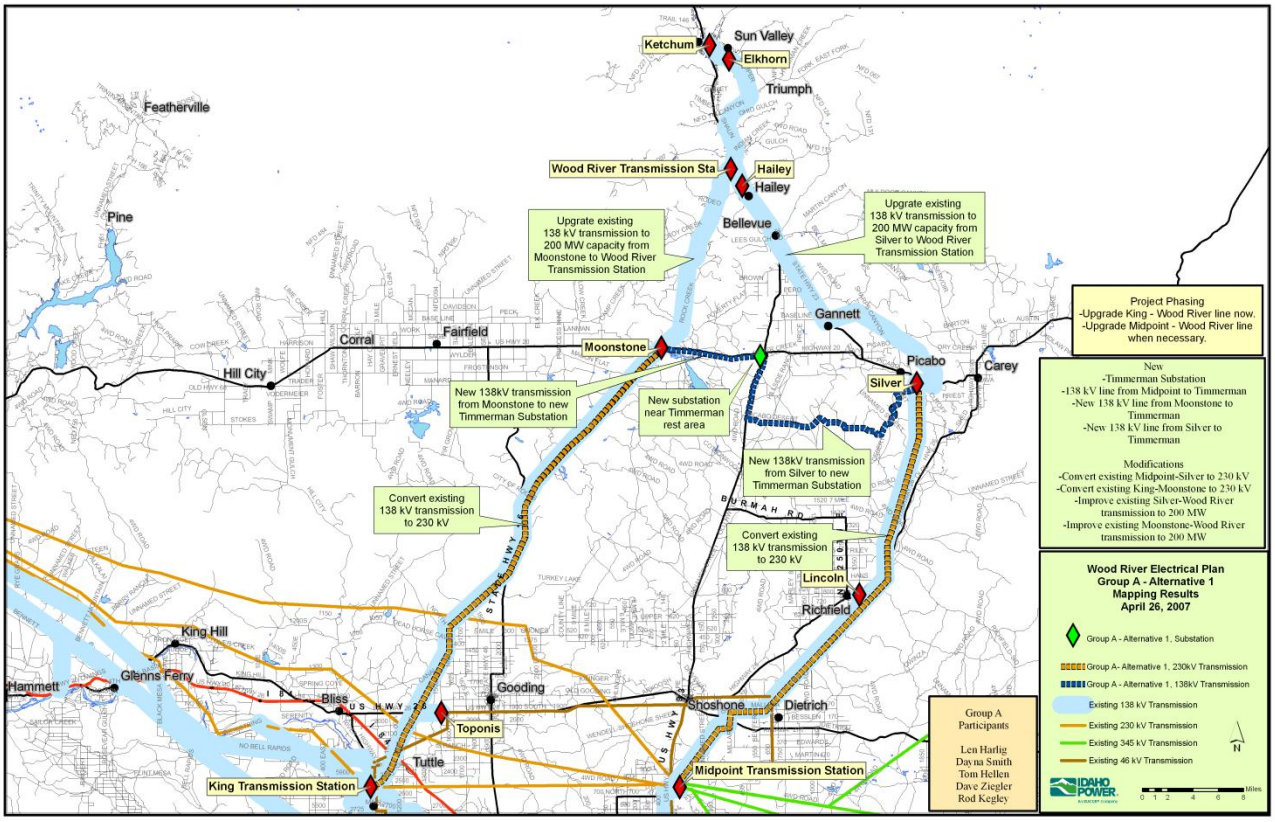


Figure 12. Group A - Alternative 1 Mapping Results

Group A – Alternative 2

Group A – Alternative 2 builds a new Timmerman Substation near the existing Idaho Transportation Department's Timmerman rest area and connects it to both Moonstone and Silver substations using 138 kV transmission. It would improve the existing King Substation to Wood River Transmission Station transmission line to 200 MW. The 138 kV transmission from Silver Substation to Wood River Transmission Station would be improved to increase its capacity to 200 MW.

This alternative would also build a new 138 kV transmission line from Midpoint Substation to the new Timmerman Substation routed approximately parallel to Highway 75.

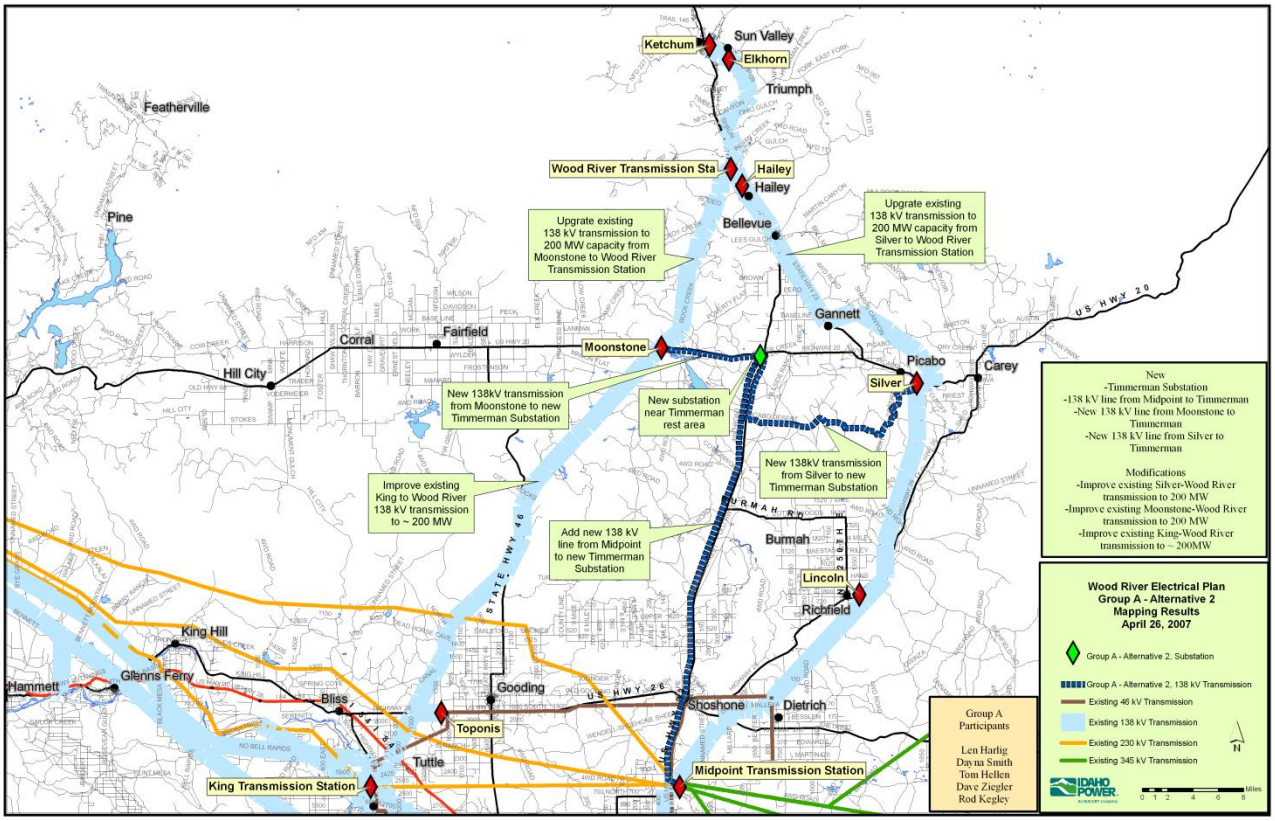


Figure 13. Group A - Alternative 2 Mapping Results

Group A – Alternative 3

This alternative installs a new 138 kV transmission underground from Wood River Transmission Station to Ketchum Substation, following Highway 75 north from Hailey to the Ketchum city limits. Group A did not specify a route through the City of Ketchum to Ketchum Substation, leaving that to the City of Ketchum to determine.

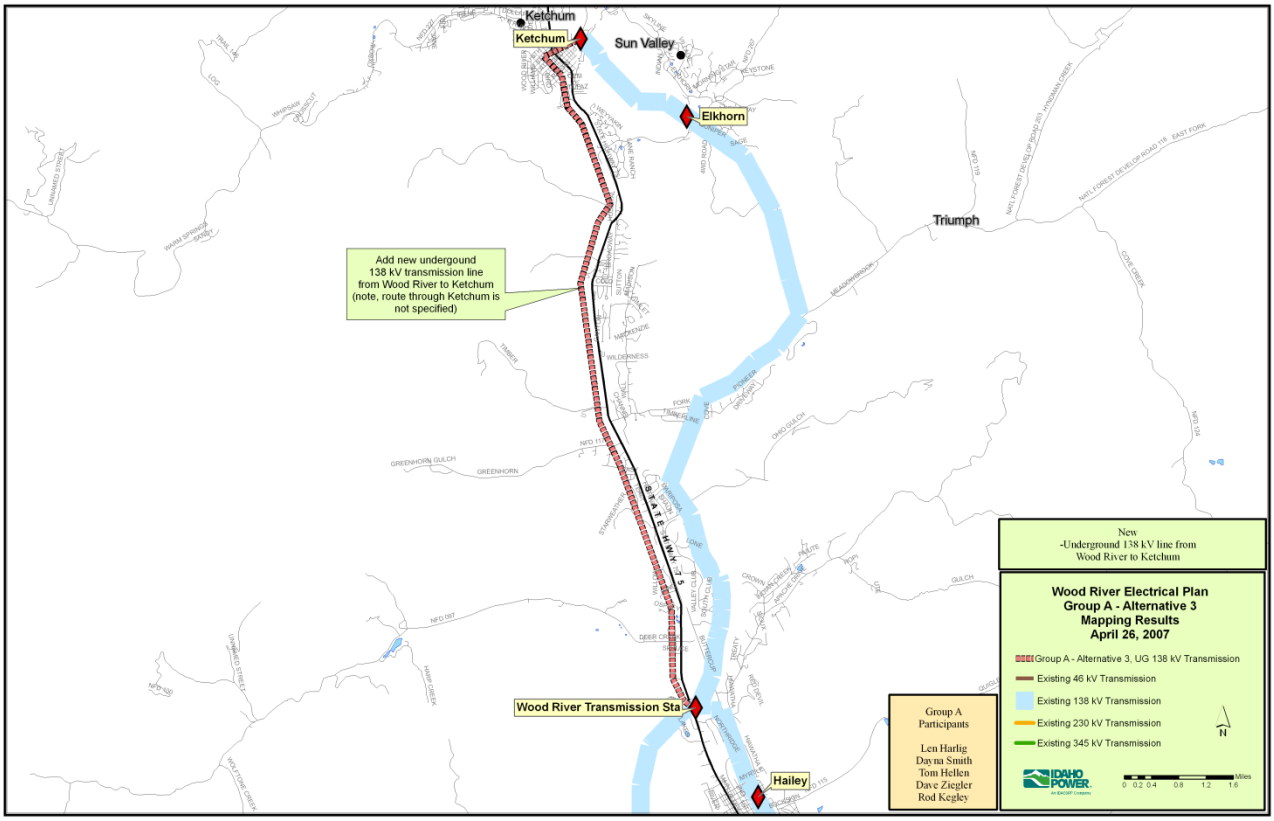


Figure 14. Group A - Alternative 3 Mapping Results

Group A – Alternative 4

In this alternative, Group A proposes to add a new overhead 138 kV transmission line from Wood River Transmission Station to the Ketchum City Limits, in the same right of way as the existing distribution circuits. From the Ketchum City Limits to Ketchum Substation, the line would be underground. Again, Group A did not specify a route through the City of Ketchum to Ketchum Substation, leaving that to the City of Ketchum to determine.

Additionally, this alternative specifies that the existing distribution circuits along Highway 75 between Hailey and Ketchum be put underground with the assumption that placing a distribution circuit underground costs much less than placing 138 kV transmission underground.

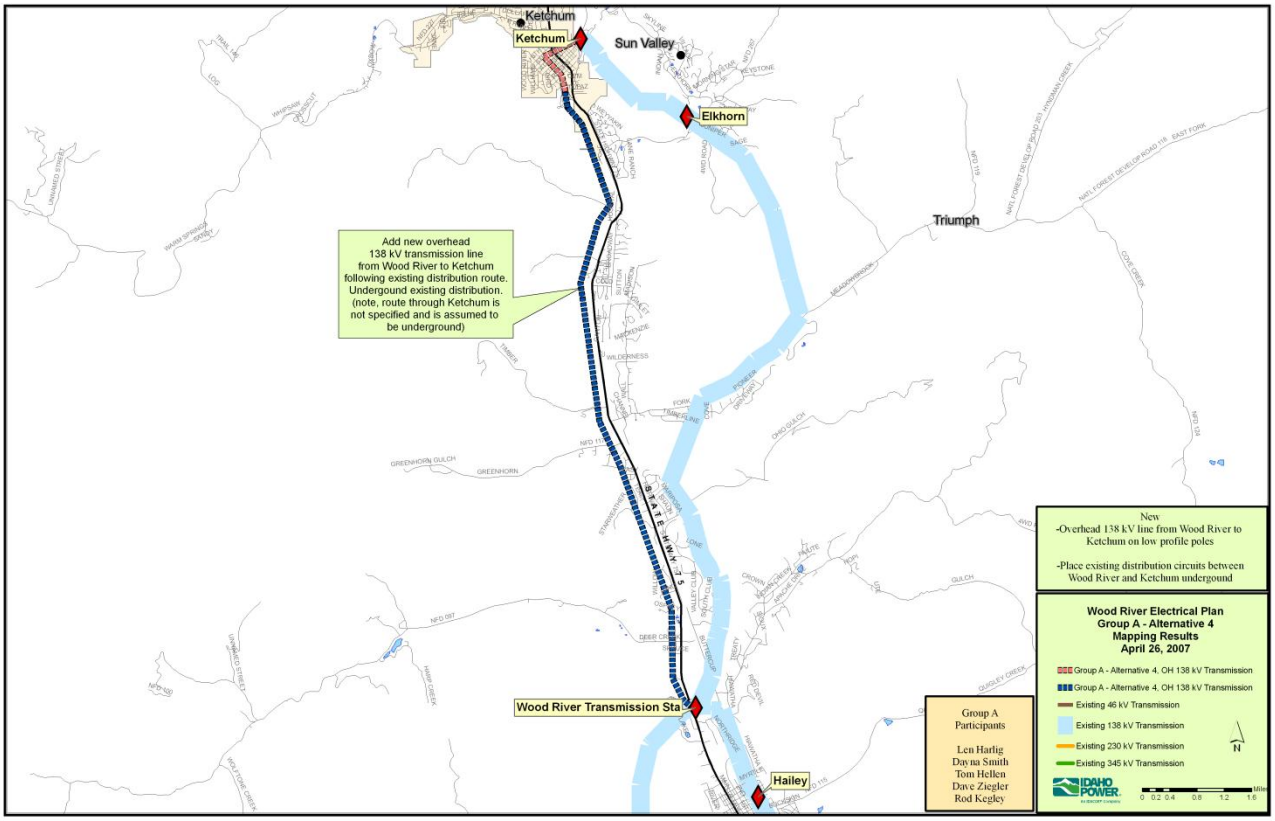


Figure 15. Group A - Alternative 4 Mapping Results

Group B Mapping Results

Group B, which consisted of five members, created one alternative – Alternative 1 – that was all-inclusive of the area from Midpoint and King Substations to Ketchum Substation. Appendix C contains notes taken from Group B during the mapping exercise. Appendix D contains larger, more readable versions of the following map.

Group B's alternative would convert the existing 138 kV transmission from King Substation to Moonstone Substation to 230 kV. It would install a new Timmerman Substation south of Timmerman Hill along Highway 75. It would then install a new 230 kV transmission line from Midpoint Substation to Timmerman Substation and a 230 kV transmission line from Timmerman Substation to Moonstone Substation.

This alternative would install a new 138 kV transmission line from Timmerman Substation to Wood River Transmission Station then on to Ketchum, all overhead. Group B specified that the 138 kV transmission should run along Highway 75 from Timmerman Substation to Glendale Road then follow Broadford Road until Hailey. It would then run west of Hailey until it reached Wood River Transmission Station. From Wood River Transmission Station it would follow the existing distribution circuits, constructed such that the 138 kV transmission would have distribution underbuild on the same poles. The line would terminate at Ketchum Substation.

This alternative also specified that the Moonstone Substation be upgraded from 138 kV to accommodate the new 230 kV supply. Group B noted that the existing 138 kV transmission from Juniper Road near Sun Valley to Elkhorn Substation is to be placed underground (paid for by affected parties).

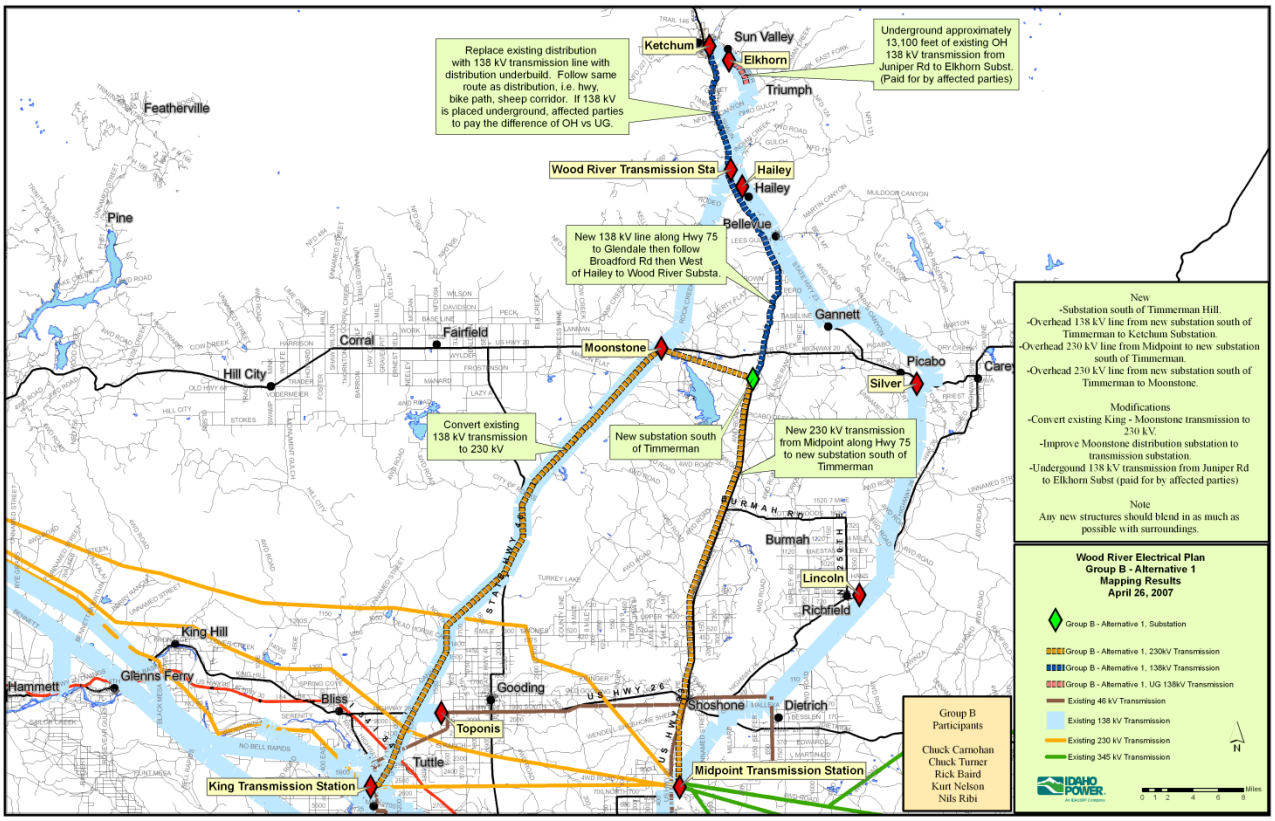


Figure 16. Group B - Alternative 1 Mapping Results

Group C Mapping Results

Group C consisted of six members. Like Group B, it created one alternative – Alternative 1 – that was all-inclusive of the area from Midpoint and King Substations to Ketchum Substation. Appendix C contains notes taken from Group C during the mapping exercise. Appendix D contains larger, more readable versions of the following map.

Group C's alternative would convert the existing 138 kV transmission from King Substation to Moonstone Substation to 230 kV. It would install a new Timmerman Substation south of Timmerman Hill along Highway 75. It would then install a new 138 kV transmission line from Midpoint Substation to Timmerman Substation and a 138 kV transmission line from Timmerman Substation to Moonstone Substation. It would also install a new 138 kV transmission line from Timmerman Substation to Silver Substation. Group C did not designate precise right-of-way routes for the transmission from Timmerman to Silver or from Timmerman to Moonstone.

This alternative would build a new transmission switching station west of Bellevue along the route of the existing King Wood River 138 kV transmission line. From this new switching station, a new overhead 138 kV transmission line would be built running along the west side of the mountains and coming out in the Cold Springs area. From the Cold Springs area it would then run underground to Ketchum Substation.

Group C's alternative would also upgrade the existing 138 kV transmission from Moonstone to Wood River to 200 MW and upgrade the existing 138 kV transmission from Silver to Wood River to 200 MW.

Group C designates that both Silver and Moonstone Substation be upgraded to 80 MW capacity. Like Group B, this group noted that the existing 138 kV transmission from Juniper Road near Sun Valley to Elkhorn Substation is to be placed underground (paid for by affected parties).

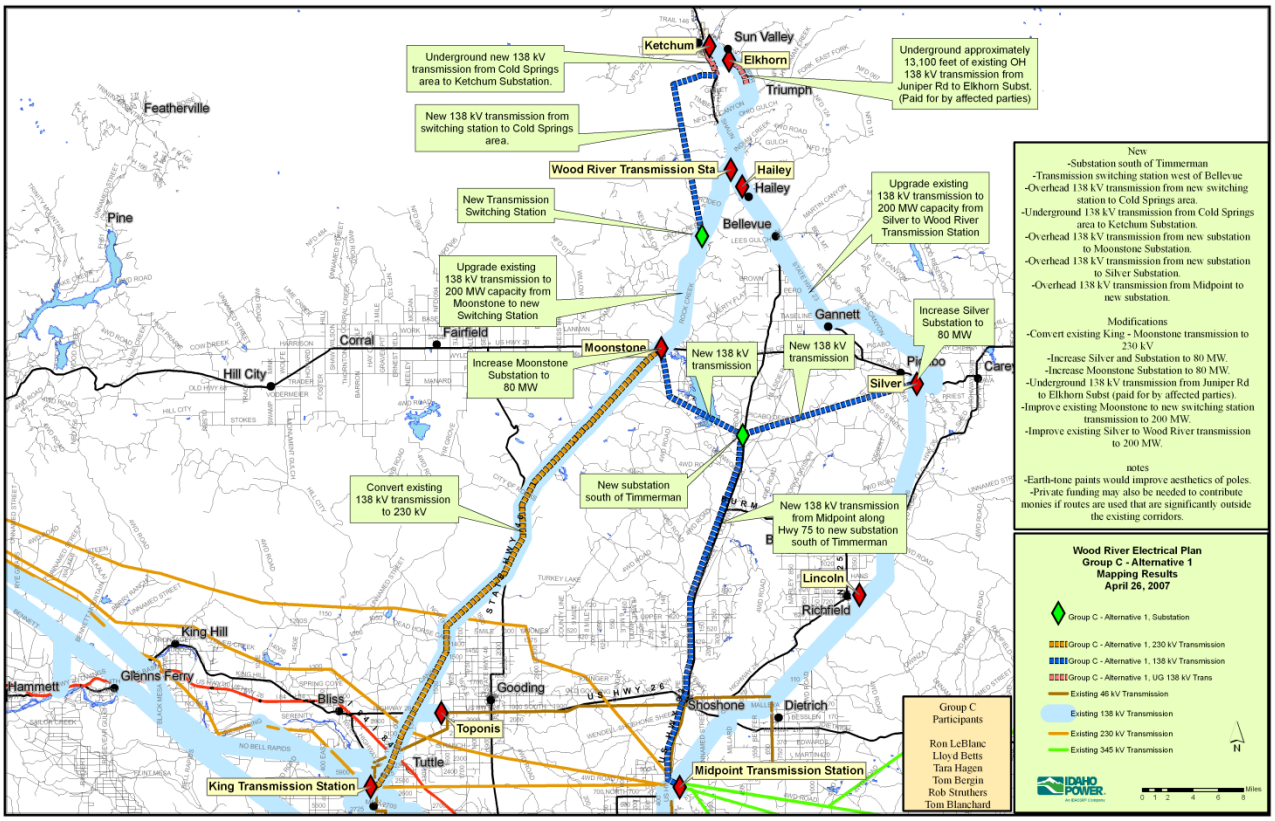


Figure 17. Group C - Alternative 1 Mapping Results

Screening Alternatives

To aid in screening the alternatives developed by the three groups, a screening matrix was developed that each CAC member could fill in to see numerically how each alternative ranked. It must be noted that a numerical screening of the alternatives is just a tool to evaluate the alternatives against one another. The final decision as to which alternative or alternatives to designate as the most feasible going forward is a consensus decision reached within the CAC.

Table 8 contains the totals for the scoring developed by the committee. Thirteen of twenty members filled out the matrix and their scores were totaled for each alternative. The categories used in the matrix came from the goals the committee had developed at an earlier meeting.

Alternatives	***Grand Total Scoring***							***Total Score***
Zone 1: South of Timmerman	*Reliable Power*	*New Infrastructure Design*	*Energy Conservation*	*Environ -ment*	*Political Support*	*Cost Effectiveness*	*Siting*	
A-1	52	42	39	42	47	31	44	297
A-2	56	35	39	30	34	42	32	268
B-1	62	39	39	39	33	53	40	305
C-1	56	39	39	34	36	51	38	293
Zone 2: Mid Valley								
A-1	56	49	39	49	49	41	44	327
A-2/C-1	53	41	39	36	39	44	38	290
B-1	59	34	39	35	23	53	32	275
Zone 3: North Valley								
A-3	58	50	39	55	46	16	50	314
A-4	55	44	39	52	39	42	42	313
B-1	58	42	39	39	35	57	38	308
C-1	53	37	39	33	34	44	35	275

Table 8. Alternatives Scoring Matrix

The committee decided to score "Energy Conservation" equally between the alternatives, hence the grand total score of 39 for each alternative. This is because energy conservation measures are not going to affect any one alternative differently than any other alternative since these are all transmission alternatives. It was decided that communities or public entities in the future may be willing to support different levels of energy conservation, which would have to be applied at the time any of the alternatives are in design or construction and could mitigate the energy demands to be met with new infrastructure.

There was some discussion regarding weighting the scores for the various categories. In the end, the committee determined that it was unnecessary to vary the category weighting since the scoring matrix is simply a screening tool and the committee may determine their preferred alternatives exclusive of the scoring matrix.

Using the scoring matrix approach, it can be seen that on a numerical basis, the alternative choices are,

- Zone 1: South of Timmerman – Alternative B-1
- Zone 2: Mid Valley – Alternative A-1
- Zone 3: North Valley – Alternative A-3 (Alternative A-4 was a close second)

Committee Alternative Consensuses

Using the results of the scoring matrix as a basis for discussion, the committee went on to reach consensus on each of the three sub-areas of the Plan; South of Timmerman, Mid Valley and North Valley.

Zone 1: South of Timmerman

The committee determined that the final Zone 1 scores in the matrix were quite similar for Alternatives B-1, A-1 and C-1 and were to close to call using the scoring. The final consensus, in preference order, for Zone 1 is as follows:

- Preferred Choice: Alternative C-1
- Second Choice: Alternative A-1
- Third Choice: Alternative B-1
- Alternative A-2 will be dropped due to the undesirable location of the new substation

The committee shared numerous comments concerning the South of Timmerman zones, which are recorded below.

- Substation placement cannot be north of Timmerman Hill crest
- Do not locate substation in the area of the potential new town (west side)
- Probably ought to avoid potential airport locations
- Might consider putting the new substation at the "square hole" on the north side of Picabo Desert Road
- Might consider old ITD material site
- Structures: Stay away from two-pole design (H-frame). Stay with single pole design. Steel poles would be preferable; less fire hazard
- South of Burmah Road, the BLM has some Wilderness Study Areas and Areas of Critical Environments Concern. The further south of Burmah Road one goes, the more difficulty BLM has with the route due to these special management areas
- Stay within existing corridors, distribution areas and highways, etc.

Zone 2: Mid Valley

The CAC consensus recommendations for Zone 2 are as follows:

- Preferred Choice: Combination/modified Alternatives C-1/A-1 (moving new substation south side of Timmerman Hill). Named Alternative C-2.
- Dropped Alternative A-2 – this is a duplicate to A-1 in Zone 2 when the location of the new substation to the south side of Timmerman Hill is moved
- Dropped Alternative B-1 – due to undesirable route along Broadford Road

A number of committee comments concerning Zone 2 are recorded below.

- Do not go up the highway
- Don't skyline the structures in any phase of the project; especially as you top Timmerman Hill looking north
- Just have one set of taller poles for distribution and transmission instead of multiple shorter poles, generally speaking

Zone 3: North Valley

Finding consensus for North Valley transmission was by far the most contentious of all the zones. The committee agreed that the north end of the Valley needed a second 138 kV transmission line for redundancy (dependability). The primary issue was whether that transmission should be overhead or underground. Some on the committee insisted that the only acceptable alternative to the land owners, and thus those who would grant easements for transmission, would be to put the transmission underground. Others believed that would be unreasonable since Idaho Power is required by the Idaho Public Utilities Commission to recover the costs associated with undergrounding transmission from those wanting it. That is, Idaho Power is not allowed to spread the cost of underground transmission across its entire customer base.

The committee consensus decision for North Valley transmission follows.

- Preferred Choice – New alternative: new overhead 138 kV line along SH 75 from Wood River Transmission Station to Ketchum. Underbuild distribution circuit on same towers with transmission.
- Funding Contingent Alternative – New underground 138 kV line and underground distribution along SH 75 from Wood River Transmission Station to Ketchum. Install underground where funding is available to pay cost difference between overhead and underground transmission
- Dropped Alternative A-4 – due to uncertainty of funding for Ketchum underground transmission
- Dropped Alternative A-3 – due to uncertainty of funding for full length underground transmission
- Dropped Alternative B-1 – due to lack of support for distribution underbuild and resulting structure height
- Dropped Alternative C-1 – due to undesirable route off SH 75 to Cold Springs

In addition to the consensus described above, the committee generally agreed that if the 138 kV transmission is installed overhead, Idaho Power should investigate putting the existing distribution circuits underground. Like underground transmission, this would require that stakeholders bear the cost difference between overhead and underground, though it would be a much lower cost than placing transmission underground.

Notes taken from the Zone 3 discussions are recorded below.

- Committee consensus support for providing physical redundancy in North Valley and throughout the other portions of the Wood River Valley's electrical system
- Committee consensus support for a new 138 kV line along SH 75 between Wood River Transmission Station and Ketchum
- Support for overhead transmission line installation (Idaho Power's industry standard with costs shared by everyone in the electrical system (rate payers), with no additional cost to individuals along the route – details within this choice are how and why?
    - Include with this recommended alternative a photo illustration for the public, depicting what this option will look like in-place.
- Support for underground line installation – "Here's the optimal, if you can find the money"
    - Include cost estimate description, what Idaho Power will pay for and what must be paid for by others
- The Plan should describe "who pays" for each part of each alternative

- When introducing this and other parts of the Committee's recommendation, public education is critical. Education to the public about the need for redundancy, need for additional power to meet future "build out" needs and general education about the system and how it works, photo illustrations of alternatives, etc. is critical to successful public support of the Committee's recommendations.

Combined Alternatives Based on Committee Consensus

Figure 17 is a combination of the preferred alternatives for each of the three Valley segments; north, mid and south.

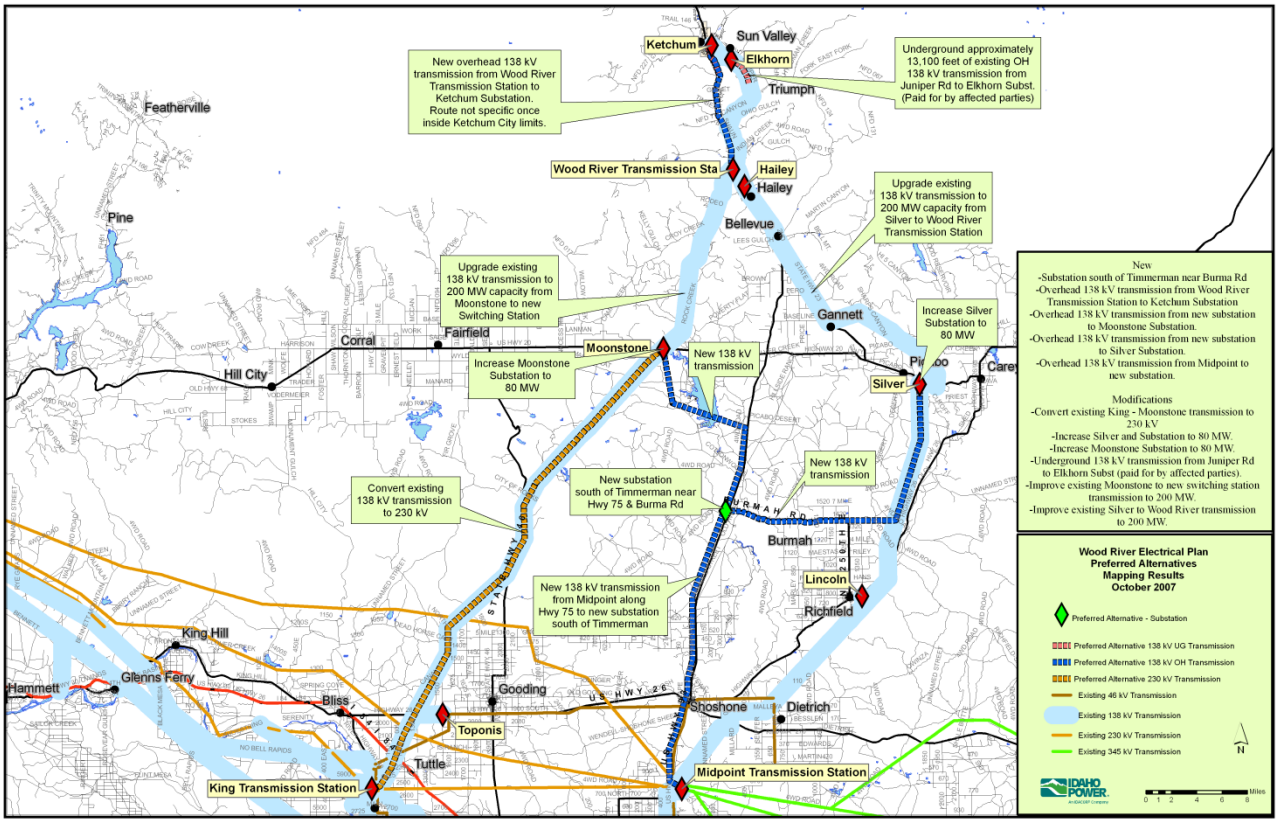


Figure 18. Preferred Alternatives

For south Valley, the preferred alternative would convert the existing 138 kV transmission from King Substation to Moonstone Substation to 230 kV. It would install a new Substation south of Timmerman Hill along Highway 75 near the intersection of Highway 75 and Burmah Road (depending on land availability). It would then install a new 138 kV transmission line from Midpoint Substation to the new substation and a 138 kV transmission line from the new substation to Moonstone Substation. It would also install a new 138 kV transmission line from the new substation to Silver Substation routed along Burmah Road until it reached the existing 138 kV line. The new circuit would then be run on common towers with the existing 138 kV circuit until it reached Silver Substation.

The preferred alternative designates that both Silver and Moonstone substations be upgraded to 80 MW capacity. It is noted that the existing 138 kV transmission from Juniper Road near Sun Valley to Elkhorn Substation is to be placed underground (paid for by affected parties).

The preferred alternative for mid-Valley would also upgrade the existing 138 kV transmission from Moonstone to Wood River to 200 MW and upgrade the existing 138 kV transmission from Silver to Wood River to 200 MW.

The preferred alternative for the north Valley region would install a new 138 kV line along SH 75 from Wood River Transmission Station to Ketchum City limits with the existing distribution circuit(s) placed on common towers with the 138 kV transmission, if placed overhead. Once the circuit reaches Ketchum City limits, the routing is not specified.

A funding contingent alternative to overhead transmission in the north Valley is to install a new 138 kV transmission circuit underground from Wood River Transmission Station to Ketchum Substation, running along Highway 75. This alternative is contingent upon local entities paying the cost difference between overhead and underground transmission.

Comments and Suggestions Recorded During Mapping Exercises:
(Note: these notes only reflect the flip chart notes from the small group work, not the complete discussion.

Group A: Len Harlig, Dayna Smith, Tom Hellen, Dave Zeigler, Rod Kegley

South Valley Options: - see Group A maps

- Upgrade the King line to 230 kV now, upgrade the Silver line to 230 kV when necessary, which would create redundant capacity. Do not build a high-voltage line up the highway corridor.
- Use three 138 kV lines, creating new corridors; upgrade two existing lines to 138 kV lines, using new poles.

Options from Hailey Substation North: - see Group A maps

- Run a new 138 kV line following the existing distribution lines, and bury the existing distribution lines so that we have fewer power poles, less visible wires. The existing distribution lines are less expensive to bury than the larger lines.
- Combine lines on the same poles, so as not to increase the number of poles.

Group A Mapping Notes:

- 230 kV from Midpoint to Silver; 230 kV from King to Moonstone; 138 kV from Moonstone to Timmerman; 138 kV from Silver to Timmerman; upgrade Moonstone to Wood River to 200 MW; upgrade Silver to Wood River to 200 MW; upgrade silver & Moonstone stations
- Third 138 kV from Midpoint to Wood River; improve King to Wood River to 200 MW; add Timmerman station
- Underground 138 kV & distribution from Wood River to Ketchum.
- Underground distribution; put in low profile 138 kV in same R.O.W., Wood River to Ketchum
- Look for 138 kV route to east through BLM land from Wood River to Ketchum. (No map created for this option)

Group B: Chuck Carnohan, Chuck Turner, Rick Baird, Kurt Nelson, Nils Ribi

South Valley Options: - see Group B maps

- Define a 230 kV line to come from Midpoint to Moonstone- use existing highway corridor, and then cut off near Magic, going to Moonstone. Create a new transmission station at Moonstone. Upgrade line from King to Moonstone to 230 kV. Create substation south of Timmerman Hill. Create third feed of 138 kV through the Valley to WR substation. Follow right of way until Glendale. Then create a split and follow Broadford Rd. west of SH 75.

North Valley Options: - see Group B maps

- Going north, use single pole concept and put all lines on single pole on existing highway corridor; consolidate distribution lines on poles (not adding new poles but use bigger poles), minimizing additional impact and increasing dependability and redundancy.

DISCUSSION: Discussed using existing corridors and use mostly existing facilities, being a far less intrusive option; possibly use sheep trail and hike/bike trail for additional rights of way.

- 1st phase. New line to get 230 kV.
- 2nd phase: Upgrade 1962 (King – Wood River) line to 230 kV.

Group B Mapping Notes:

- From WRSS to Ketchum, if line goes in existing corridor, consolidate transmission and distribution on same structures; new structures required.
- South- new line (230 kV) along SH 75, midpoint to moonstone; replace and improve 230 kV (existing) King to Moonstone—can be phased, 138 kV now, 230 kV later; upgrade over time. Moonstone becomes transmission substation.
- New substation in Gannet Triangle (south end)—north end or new line from midpoint.
- North of WRSS- to Ketchum (water wheel); replace distribution lines with 138 kV single pole; both on same pole; in existing corridors—highway, bike path, sheep corridor.
- New 138 kV line from new substation along SH 75 to Glendale
- Upgrade existing west line (138 kV) from Moonstone to Wood River substation.
- East side- 138 kV line north from new substation to south of Bellevue, follow Broadford Road west of SH 75 to Wood River substation

*Underground- Juniper Road to Elkhorn substation paid by affected parties, 2 miles @ 138 kV; upgrade available if affected parties will pay for cost difference; any new structures should blend in as much as possible to surroundings.

Group C: Ron LeBlanc, Lloyd Betts, Tara Hagen, Tom Bergin, Rob Struthers, Tom Blanchard

- Use existing highway easement in south Valley. Upgrade King to Moonstone line to 230 kV.
- North Valley, from Ketchum station to Hospital would be buried with common transmission lines, thus hopefully eliminating county overlap. New line……would be beyond private property, so minimal impact on private landowners. Come across the top into Cold Springs and down behind the hospital, so it wouldn't be visible for most of the ski area. Group C didn't try to be too specific with routing but stayed general to feasibility.
- Commonalities in south end with other groups reporting.

Group C Mapping Notes:

- 230 kV from King to Moonstone
- 138 kV from Midpoint to south of Gannett, new switching station with 138 kV lines to Moonstone substation and Silver substation.
- Upgrade 138 kV from Moonstone north to new switching station west of Bellevue
- Upgrade 138 kV from Silver to Hailey
- New 138 kV from switching station to Cold Springs area, underground to Ketchum substation.

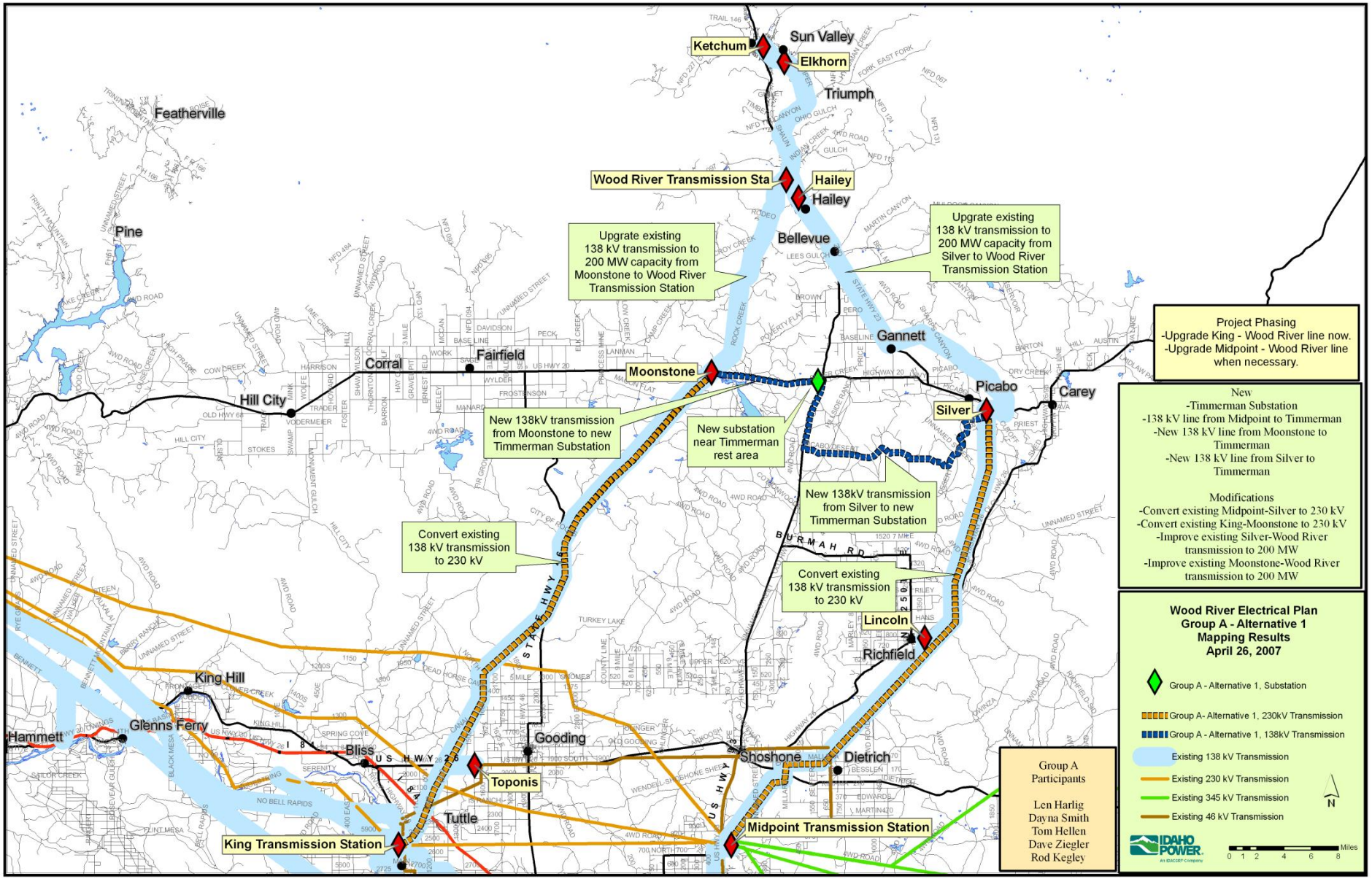
ADDITIONAL COMMENTS FROM ALL GROUPS regarding options:

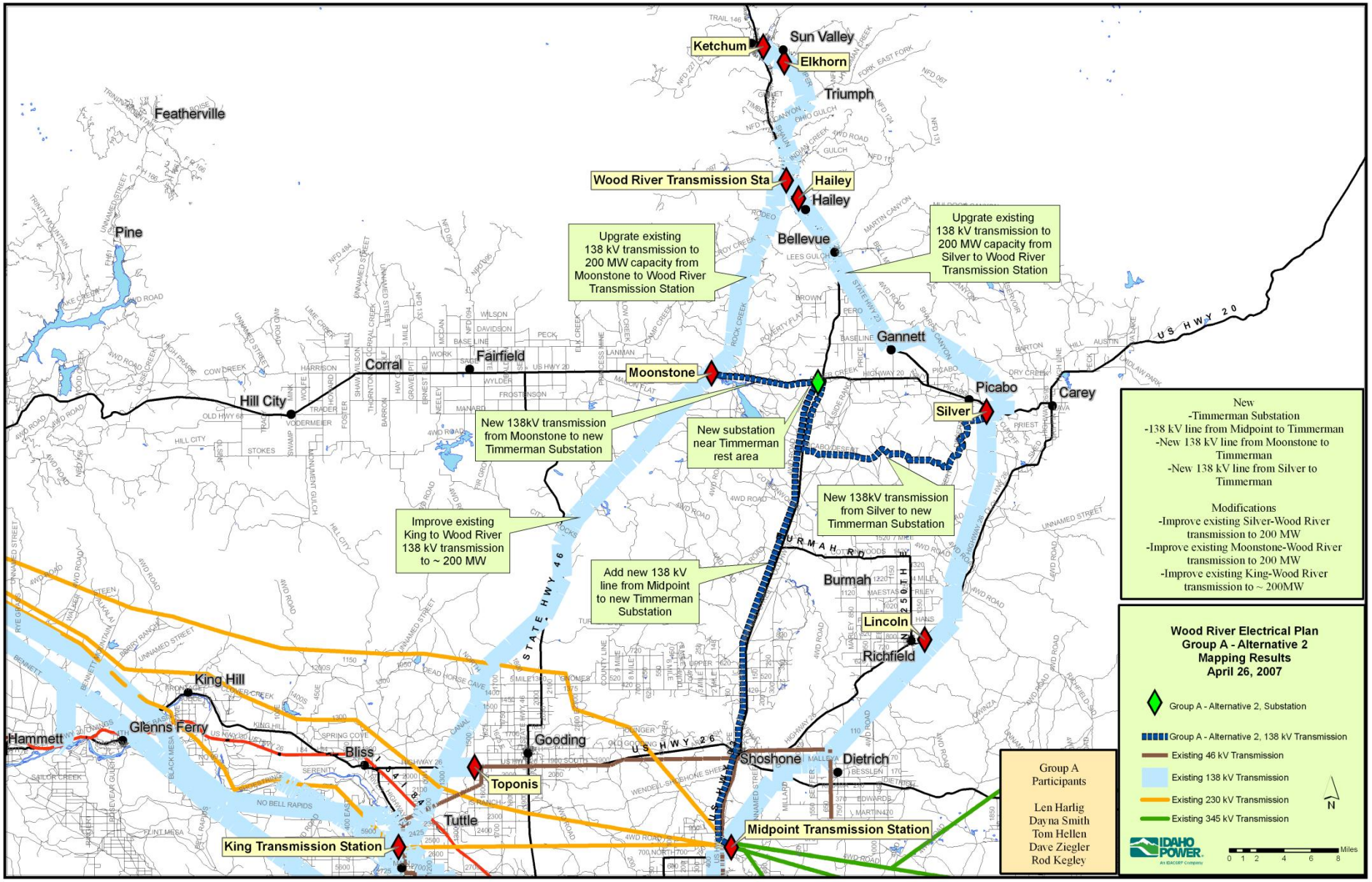
- Can the poles be made with earth-tone paints? This would improve aesthetics. A: Yes, there are options for steel towers that look more earth-tone.
- It wouldn't be a bad idea for the group to come up with two proposals for the public. However, it might be best if the group presents one as a preferable option and the other as a secondary option.
- Private funding may also need to contribute monies if routes are used that are significantly outside the existing corridors.
- If we leave existing corridors and move onto forest or BLM land, it would almost certainly necessitate an Environmental Impact Statement, which adds a time component and also an improbability component.
- **** Request: When IP breaks down the costs of different construction plans, could they also break down costs by "legs" of the route?*
- **** Request: Would IP provide cost expectations of Idaho Power's share versus private funding share for different legs of the route?*
- At this point, should the committee be discussing these preliminary routes with constituents? Feedback from constituents would be helpful from individual conversations but WREP is not ready for public debate at this juncture. – Yes, the committee is encouraged to gather input from their constituents, but not in a formal or public venue, as the committee's recommendations is not yet complete and ready for public discussion.

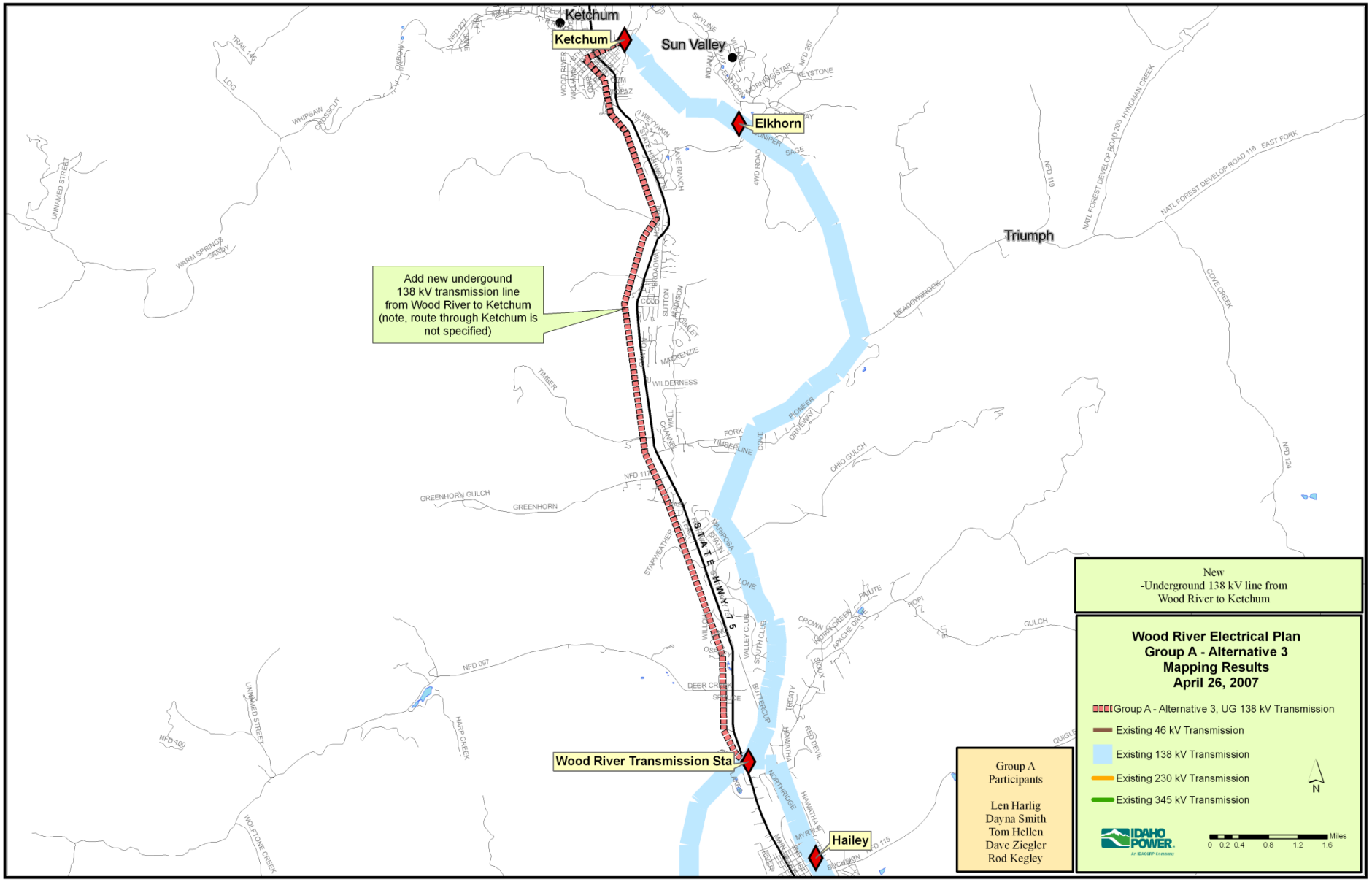
*** Idaho Power tasks by next CAC mtg

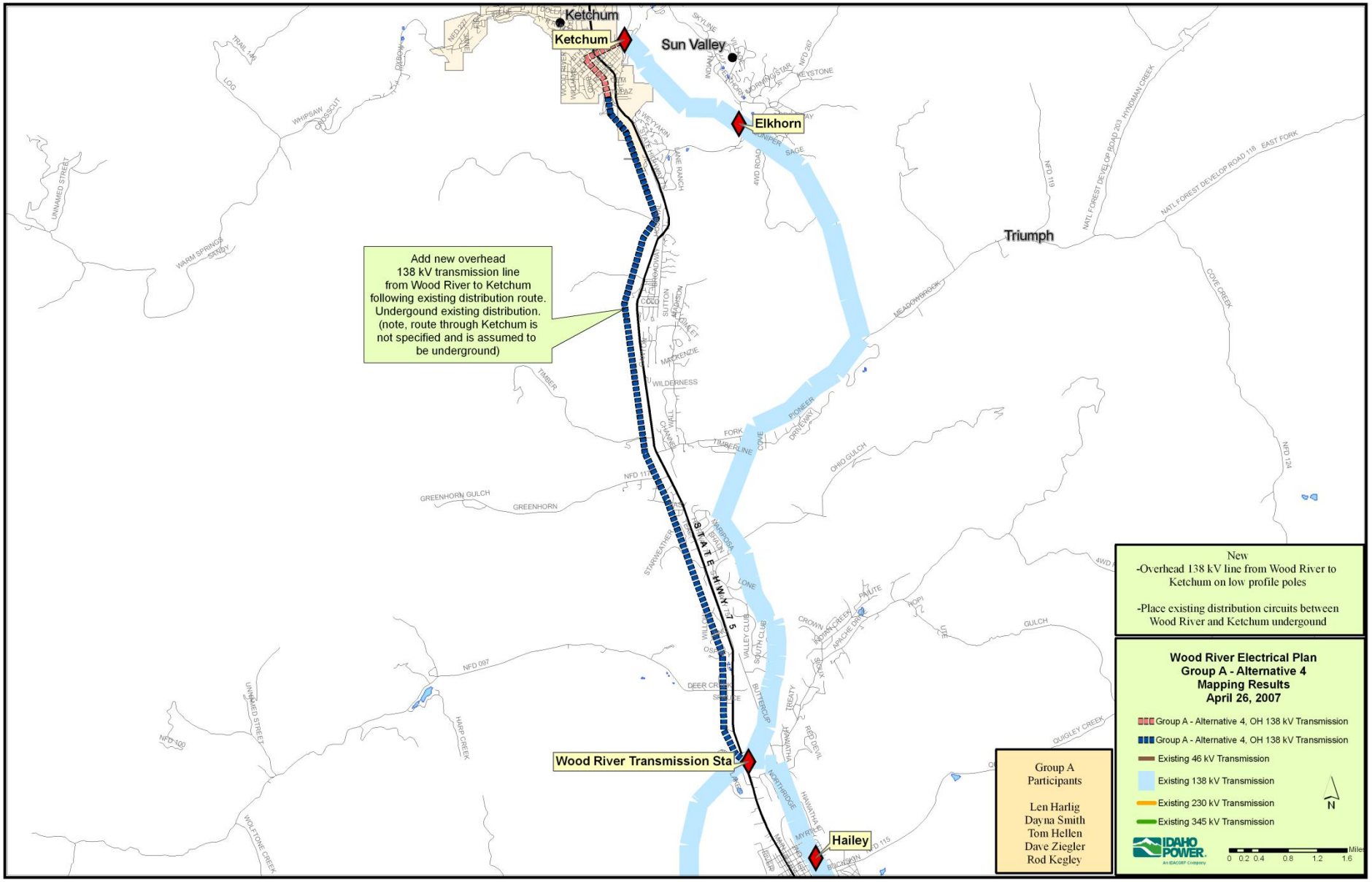
Appendix D – Group Mapping Results

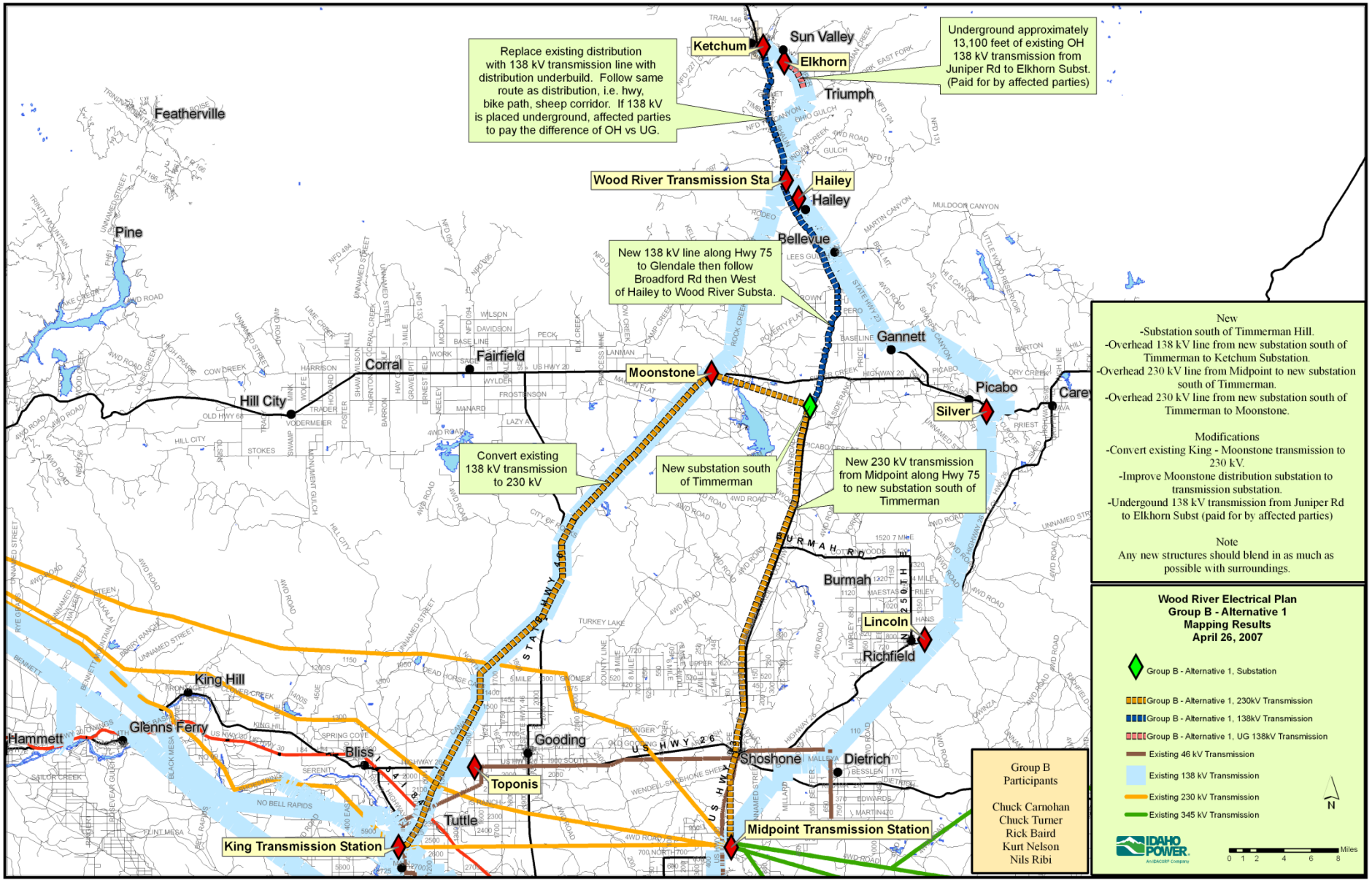
Detailed Maps

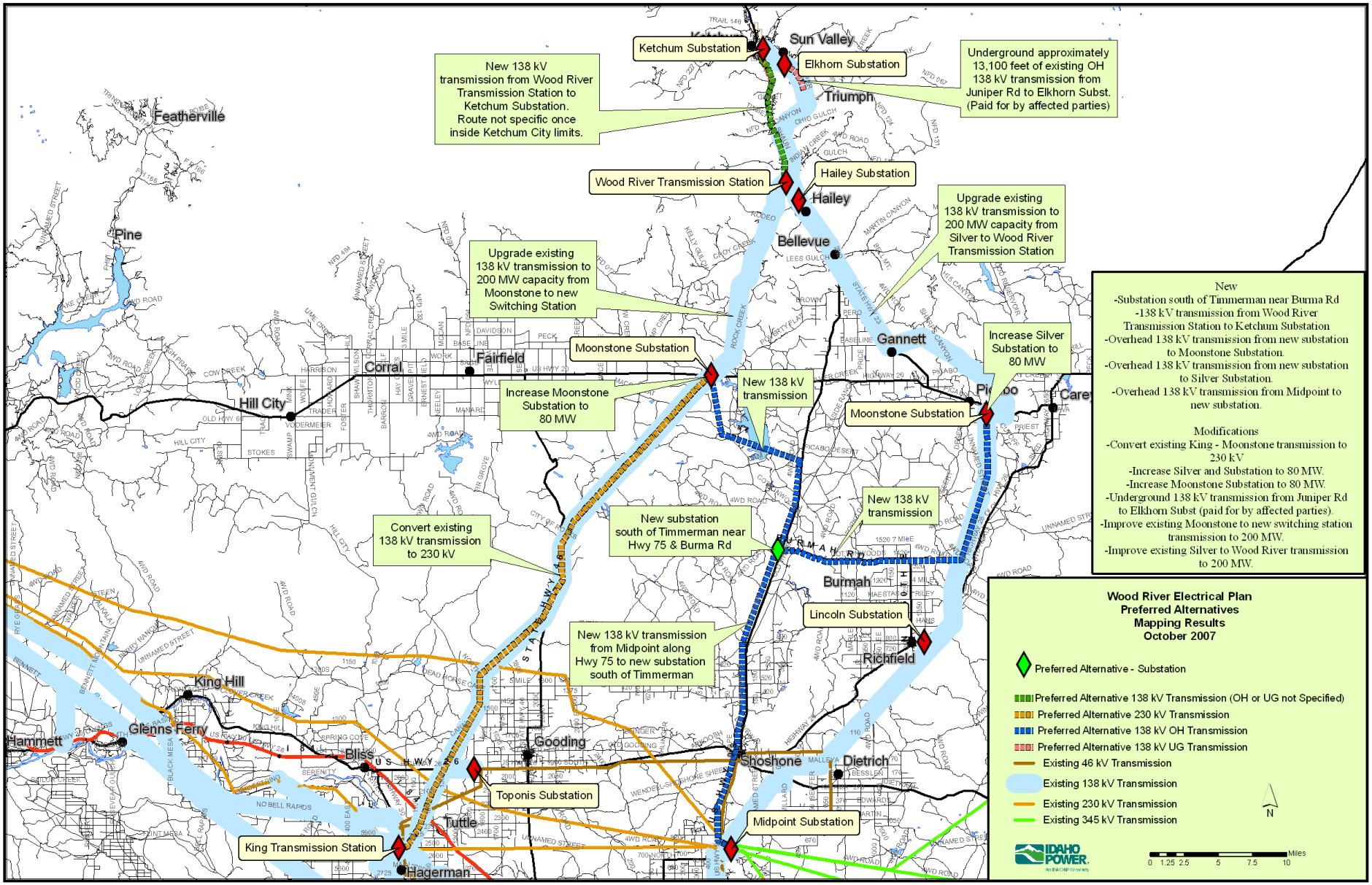

Ketchum
Sun Valley
Elkhorn
Triumph
Featherville
Wood River Transmission Sta
Hailey
Hailey
Pine
Bellevue
Upgrate existing 138 kV transmission to 200 MW capacity from Moonstone to Wood River Transmission Station
Upgrate existing 138 kV transmission to 200 MW capacity from Silver to Wood River Transmission Station
Gannett
Project Phasing
-Upgrade King - Wood River line now.
-Upgrade Midpoint - Wood River line when necessary.
Corral
Fairfield
Moonstone
Hill City
Picabo
Carey
Silver
New 138kV transmission from Moonstone to new Timmerman Substation
New substation near Timmerman rest area
New
-Timmerman Substation
-138 kV line from Midpoint to Timmerman
-New 138 kV line from Moonstone to Timmerman
-New 138 kV line from Silver to Timmerman
Modifications
-Convert existing Midpoint-Silver to 230 kV
-Convert existing King-Moonstone to 230 kV
-Improve existing Silver-Wood River transmission to 200 MW
-Improve existing Moonstone-Wood River transmission to 200 MW
New 138kV transmission from Silver to new Timmerman Substation
Convert existing 138 kV transmission to 230 kV
Convert existing 138 kV transmission to 230 kV
Lincoln
Richfield
Wood River Electrical Plan
Group A - Alternative 1
Mapping Results
April 26, 2007
King Hill
Glenns Ferry
Hammett
Bliss
Gooding
Toponis
Tuttle
King Transmission Station
Shoshone
Dietrich
Midpoint Transmission Station
Group A - Alternative 1, Substation
Group A- Alternative 1, 230kV Transmission
Group A - Alternative 1, 138kV Transmission
Existing 138 kV Transmission
Existing 230 kV Transmission
Existing 345 kV Transmission
Existing 46 kV Transmission
Group A Participants
Len Harlig
Dayna Smith
Tom Hellen
Dave Ziegler
Rod Kegley
IDAHO POWER
Miles
0 1 2 4 6 8
N


Ketchum
Sun Valley
Elkhorn
Triumph
Featherville
Wood River Transmission Sta
Hailey
Hailey
Pine
Bellevue
Upgrate existing 138 kV transmission to 200 MW capacity from Moonstone to Wood River Transmission Station
Upgrate existing 138 kV transmission to 200 MW capacity from Silver to Wood River Transmission Station
Gannett
Corral
Fairfield
Moonstone
Hill City
Picabo
Silver
Carey
New 138kV transmission from Moonstone to new Timmerman Substation
New substation near Timmerman rest area
New 138kV transmission from Silver to new Timmerman Substation
Improve existing King to Wood River 138 kV transmission to ~ 200 MW
Add new 138 kV line from Midpoint to new Timmerman Substation
Burmah
Lincoln
Richfield
King Hill
Glenns Ferry
Hammett
Bliss
Gooding
Toponis
Tuttle
Shoshone
Dietrich
King Transmission Station
Midpoint Transmission Station
US HWY 20
STATE HWY 46
US HWY 26
US HWY 93
New
-Timmerman Substation
-138 kV line from Midpoint to Timmerman
-New 138 kV line from Moonstone to Timmerman
-New 138 kV line from Silver to Timmerman
Modifications
-Improve existing Silver-Wood River transmission to 200 MW
-Improve existing Moonstone-Wood River transmission to 200 MW
-Improve existing King-Wood River transmission to ~ 200MW
Wood River Electrical Plan
Group A - Alternative 2
Mapping Results
April 26, 2007
Group A - Alternative 2, Substation
Group A - Alternative 2, 138 kV Transmission
Existing 46 kV Transmission
Existing 138 kV Transmission
Existing 230 kV Transmission
Existing 345 kV Transmission
IDAHO POWER
Miles
0 1 2 4 6 8
N
Group A
Participants
Len Harlig
Dayna Smith
Tom Hellen
Dave Ziegler
Rod Kegley


Ketchum
Ketchum
Sun Valley
Elkhorn
Triumph
Add new undergound
138 kV transmission line
from Wood River to Ketchum
(note, route through Ketchum is
not specified)
STATE HWY 75
Wood River Transmission Sta
Hailey
New
-Underground 138 kV line from
Wood River to Ketchum
Wood River Electrical Plan
Group A - Alternative 3
Mapping Results
April 26, 2007
Group A - Alternative 3, UG 138 kV Transmission
Existing 46 kV Transmission
Existing 138 kV Transmission
Existing 230 kV Transmission
Existing 345 kV Transmission
N
IDAHO POWER
Miles
0 0.2 0.4 0.8 1.2 1.6
Group A
Participants
Len Harlig
Dayna Smith
Tom Hellen
Dave Ziegler
Rod Kegley


Ketchum
Ketchum
Sun Valley
Elkhorn
Triumph
Add new overhead
138 kV transmission line
from Wood River to Ketchum
following existing distribution route.
Undergound existing distribution.
(note, route through Ketchum is
not specified and is assumed to
be underground)
STATE HWY 75
Wood River Transmission Sta
Hailey
New
-Overhead 138 kV line from Wood River to Ketchum on low profile poles
-Place existing distribution circuits between Wood River and Ketchum undergound
Wood River Electrical Plan
Group A - Alternative 4
Mapping Results
April 26, 2007
Group A - Alternative 4, OH 138 kV Transmission
Group A - Alternative 4, OH 138 kV Transmission
Existing 46 kV Transmission
Existing 138 kV Transmission
Existing 230 kV Transmission
Existing 345 kV Transmission
N
IDAHO POWER
0 0.2 0.4 0.8 1.2 1.6
Group A
Participants
Len Harlig
Dayna Smith
Tom Hellen
Dave Ziegler
Rod Kegley


Replace existing distribution with 138 kV transmission line with distribution underbuild. Follow same route as distribution, i.e. hwy, bike path, sheep corridor. If 138 kV is placed underground, affected parties to pay the difference of OH vs UG.
Underground approximately 13,100 feet of existing OH 138 kV transmission from Juniper Rd to Elkhorn Subst. (Paid for by affected parties)
New 138 kV line along Hwy 75 to Glendale then follow Broadford Rd then West of Hailey to Wood River Substa.
Convert existing 138 kV transmission to 230 kV
New substation south of Timmerman
New 230 kV transmission from Midpoint along Hwy 75 to new substation south of Timmerman
Ketchum
Sun Valley
Elkhorn
Triumph
Wood River Transmission Sta
Hailey
Bellevue
Featherville
Pine
Fairfield
Corral
Moonstone
Hill City
Gannett
Picabo
Silver
Burmah
Lincoln
Richfield
King Hill
Glenns Ferry
Hammett
Bliss
Gooding
Toponis
Tuttle
Shoshone
Dietrich
King Transmission Station
Midpoint Transmission Station
New
-Substation south of Timmerman Hill.
-Overhead 138 kV line from new substation south of Timmerman to Ketchum Substation.
-Overhead 230 kV line from Midpoint to new substation south of Timmerman.
-Overhead 230 kV line from new substation south of Timmerman to Moonstone.
Modifications
-Convert existing King - Moonstone transmission to 230 kV.
-Improve Moonstone distribution substation to transmission substation.
-Undergound 138 kV transmission from Juniper Rd to Elkhorn Subst (paid for by affected parties)
Note
Any new structures should blend in as much as possible with surroundings.
Wood River Electrical Plan
Group B - Alternative 1
Mapping Results
April 26, 2007
Group B - Alternative 1, Substation
Group B - Alternative 1, 230kV Transmission
Group B - Alternative 1, 138kV Transmission
Group B - Alternative 1, UG 138kV Transmission
Existing 46 kV Transmission
Existing 138 kV Transmission
Existing 230 kV Transmission
Existing 345 kV Transmission
Group B Participants
Chuck Carnohan
Chuck Turner
Rick Baird
Kurt Nelson
Nils Ribi
IDAHO POWER
Miles
0 1 2 4 6 8
N


Ketchum Substation
Sun Valley
Elkhorn Substation
New 138 kV transmission from Wood River Transmission Station to Ketchum Substation. Route not specific once inside Ketchum City limits.
Underground approximately 13,100 feet of existing OH 138 kV transmission from Juniper Rd to Elkhorn Subst. (Paid for by affected parties)
Triumph
Wood River Transmission Station
Hailey Substation
Hailey
Upgrade existing 138 kV transmission to 200 MW capacity from Silver to Wood River Transmission Station
Featherville
Pine
Bellevue
Upgrade existing 138 kV transmission to 200 MW capacity from Moonstone to new Switching Station
Gannett
Increase Silver Substation to 80 MW
Moonstone Substation
Fairfield
Corral
Hill City
Increase Moonstone Substation to 80 MW
New 138 kV transmission
Moonstone Substation
Convert existing 138 kV transmission to 230 kV
New substation south of Timmerman near Hwy 75 & Burma Rd
New 138 kV transmission
Burmah
Lincoln Substation
Richfield
New 138 kV transmission from Midpoint along Hwy 75 to new substation south of Timmerman
King Hill
Glenns Ferry
Hammett
Bliss
Gooding
Shoshone
Dietrich
Toponis Substation
Tuttle
Midpoint Substation
King Transmission Station
Hagerman
New
-Substation south of Timmerman near Burma Rd
-138 kV transmission from Wood River Transmission Station to Ketchum Substation
-Overhead 138 kV transmission from new substation to Moonstone Substation.
-Overhead 138 kV transmission from new substation to Silver Substation.
-Overhead 138 kV transmission from Midpoint to new substation.
Modifications
-Convert existing King - Moonstone transmission to 230 kV
-Increase Silver and Substation to 80 MW.
-Increase Moonstone Substation to 80 MW.
-Underground 138 kV transmission from Juniper Rd to Elkhorn Subst (paid for by affected parties).
-Improve existing Moonstone to new switching station transmission to 200 MW.
-Improve existing Silver to Wood River transmission to 200 MW.
Wood River Electrical Plan
Preferred Alternatives
Mapping Results
October 2007
Preferred Alternative - Substation
Preferred Alternative 138 kV Transmission (OH or UG not Specified)
Preferred Alternative 230 kV Transmission
Preferred Alternative 138 kV OH Transmission
Preferred Alternative 138 kV UG Transmission
Existing 46 kV Transmission
Existing 138 kV Transmission
Existing 230 kV Transmission
Existing 345 kV Transmission
N
IDAHO POWER
Miles
0 1.25 2.5 5 7.5 10

Appendix E – Technical Analysis

Technical analysis was performed by Idaho Power staff on each alternative that the CAC came up with. Computer models were developed using PowerWorld power flow software to evaluate the power flow that would result in each alternative and to evaluate the dependability of each configuration.

The Wood River Valley's electrical system is modeled only down to the 138 kV level. Distribution lines are not modeled. For a high-voltage analysis such as this, the results will be adequate and accurate.

The PowerWorld model shows how the power flows on the system. It is used to evaluate voltage levels at all substations, reactive and real power flows, whether the lines are adequately sized, and whether or not the model meets n-1 reliability criteria.

n-1 Reliability Criteria

Because of the predicted large future load, the buildout goal for the Wood River Valley is to have a fully redundant transmission system. The system will be designed to perform to n-1 reliability criteria. This means that for multiple transmission lines delivering power to the same point, if one of the lines goes out of service, the remaining line(s) must be able to carry both the load they were carrying before the event, plus the load carried by the line that is out of service. This is true even if the line with the highest capacity is the one that goes out of service. See Appendix K for an example of the n-1 criteria. At buildout, the transmission serving from King and Midpoint substations to Wood River Transmission Station can be considered parallel paths in that if one of the lines is out of service, the remaining line cannot be overloaded and none of the substations can have voltages lower than an acceptable level. This also holds true for the case where there are two transmission lines serving from Wood River Transmission Station to the Ketchum/Sun Valley area.

The maximum line-loading criterion used under n-1 contingencies (events) in this study is 100%. This means that if the system experiences one line out of service, the remaining transmission line cannot be loaded beyond 100%of its capability. The minimum voltage acceptable under n-1 contingency is 90%, meaning that the voltage cannot be less than 90% of the normal value at any given substation.

Line-Loading Criteria

The only requirement applied to the amount of power a transmission line is allowed to carry under normal operating conditions is that it cannot go beyond 100% of its capacity. If a line is loaded to 100%, it still must be able to meet the n-1 criteria described above; thus, normally, a line will not be allowed to carry 100% of its capacity during normal operating conditions.

Modeling Results

The models developed for each alternative using the PowerWorld power flow software indicate that each alternative, as recommended by the CAC, will perform within the set criteria. The

computer models indicate that at buildout using the given alternatives, none of the lines within the Wood River Valley become overloaded during an n-1 contingency, nor do any substation voltages fall below 90% during an n-1 contingency. Thus, for electrical service purposes, the alternatives developed by the Committee are equivalent.

Appendix F – ROW Analysis

As discussed previously, the Community Advisory Committee chose a number of routes in which Idaho Power could place 138 kV transmission lines. Most of the routes follow existing road and transmission rights-of-way. If the lines are placed in existing transmission corridors, it will require either replacing/upgrading the existing infrastructure or expanding the corridor's width. Securing the rights-of-way necessary for all the transmission slated for the Wood River Valley will likely prove the most challenging task facing Idaho Power as it constructs electrical infrastructure toward the Valley buildout scenario.

Transmission line rights-of-way can be obtained using any of the following methods:

Easement – An easement gives Idaho Power the right to use the land for a specific purpose. Idaho Power acquires rights from private property owners through negotiations. The easement specifies rights and restrictions on Idaho Power's use of the land while the property owner retains ownership of the land. This is the most common arrangement.
Fee Title Ownership – A landowner may sell the land needed for the transmission line to Idaho Power. Idaho Power then owns the property, receiving title through a deed.
Permit – Idaho Power makes application to the appropriate agency for a permit to place the necessary facilities across public lands.
Eminent Domain or Condemnation – If the landowner and Idaho Power are unable to negotiate a price for an easement or purchase of property, Idaho Power may exercise its rights under state law to take the easement or property through court action. The court then determines the fair price to be paid based on testimony provided by Idaho Power and the property owner's witnesses.

If a transmission line route follows a transportation corridor, Idaho Power can either place the transmission line within the road right-of-way or purchase a private easement along the road right-of-way. Normally, Idaho Power chooses to secure private easement since if the road is widened in the future making it necessary to move the line, the cost of moving the transmission line would fall upon the agency widening the road. If the line were within the road right-of-way, Idaho Power would have to bear those costs.

One Committee member discussed at length the belief that right-of-way costs for underground transmission in the North Valley would be significantly lower than for overhead transmission because landowners would be more willing to grant easements for underground transmission. The cost difference for the right-of-way could overshadow the material cost difference between overhead and underground transmission. The member also asserted that the political and legal costs would be quite high if Idaho Power were to attempt to install 138 kV overhead transmission in the North Valley. It was suggested that Idaho Power analyze this potential difference in right-of-way costs. While Idaho Power agrees that community acceptance for underground transmission would be greater, there is no valid method that can be used to estimate the cost difference for right-of-way between overhead and underground transmission short of actually going out and attempting to purchase the easements. It should be noted that some other committee members believed that there would actually not be a great difference between overhead and underground easement costs.

Appendix G – Cost Estimates

Idaho Power personnel developed some projected costs for the various alternatives the CAC came up with in their April mapping sessions. Note that these costs represent 2007 values and are not escalated into the future.

Alt.	*South Valley*	*Mid Valley*	*North Valley Total*	*North Valley Private*	*Total (excluding Private)*	*Total*
B1 (1)	$29,605,000	$31,687,500	$12,400,000	$8,800,000	$64,892,500	$73,692,500
C1 (2)	$32,542,500	$36,525,000	$15,350,000	$9,000,000	$75,417,500	$84,417,500
C2 (3)	$30,405,000	$42,925,000	$15,350,000	$9,000,000	$79,680,000	$88,680,000
A1/A4 (4)	$36,258,000	$42,525,000	$20,800,000	$17,800,000	$81,783,000	$99,583,000
A1/A3 (5)	$36,258,000	$42,525,000	$43,050,000	$39,600,000	$82,233,000	$121,833,000
A2/A4 (6)	$48,531,250	$30,875,000	$20,800,000	$17,800,000	$82,406,250	$100,206,250
A2/A3 (7)	$48,531,250	$30,875,000	$43,050,000	$39,600,000	$82,856,250	$122,456,250
Preferred (8)	$30,405,000	$42,925,000	$4,600,000	$0	$77,930,000	$77,980,000

Table 9. Estimated Alternative Buildout Costs

Notes to Table 9:

(1) Construct new King to Moonstone 230 kV transmission line adjacent to existing 138 kV line. This includes upgrade to Moonstone to Wood River Transmission Station 138 kV line. After the 230 kV line is built, remove existing 138 kV line.

(2) Construct new King to Moonstone 230 kV transmission line adjacent to existing 138 kV line. After the 230 kV line is built, remove existing 138 kV line.

(3) Alternative C2 was developed by the CAC in addition to the alternatives developed in April. This alternative moved the location for the new south of Timmerman substation further south near the intersection of Highway 75 and Burmah Road. It then installed a new 138 kV transmission line from this substation to Silver Substation routed along Burmah Road and then double circuiting (common towers) the existing Midpoint to Silver 138 kV transmission line until it reached Silver Substation. This alternative would also build the new 230 kV transmission line adjacent to the existing King to Moonstone 138 kV line. After the 230 kV line is built, remove existing 138 kV line.

(4) Construct new King to Moonstone and Midpoint to Silver 230 kV transmission lines adjacent to existing 138 kV transmission lines. After the 230 kV lines are built, remove existing 138 kV lines.

(5) Construct new King to Moonstone and Midpoint to Silver 230 kV transmission lines adjacent to existing 138 kV transmission lines. After the 230 kV lines are built, remove existing 138 kV lines.

(6) Must upgrade the Midpoint to Silver 138 kV transmission line also.

(7) Must upgrade the Midpoint to Silver 138 kV transmission line also.

(8) This row represents the estimated cost for construction of the preferred alternatives for the South, Mid and North Valley segments.

In Table 9, the column labeled "North Valley Private" shows the funding that would have to be provided by entities other than Idaho Power and represents the difference between what Idaho

Power would pay for an overhead transmission line and what it would cost to put that transmission line underground. Because of the tremendous material cost difference between overhead and underground transmission, the Idaho Public Utilities Commission regulates Idaho Power as an overhead utility meaning that unless there are physical obstructions to installing a transmission line overhead and thus forcing it to be installed underground, Idaho Power must always place transmission lines overhead. If communities or persons want a transmission line installed underground, they must pay the difference between what it costs to build overhead versus what it cost to install it underground.

Appendix H – Implementation Plan

The recommendations of the Community Advisory Committee cover infrastructure improvements to the Idaho Power system that will deliver sufficient power at the Wood River Valley's buildout. Not all the facilities are needed in the near term and will be phased in as the Valley's load increases. The following is Idaho Power's recommended implementation plan:

5 Year
- Build a second 138 kV transmission line between the Wood River Transmission Station in Hailey and Ketchum Substation. This is the top priority project.
- Site and build the new Burmah Substation
- Build new 138 kV transmission line from Midpoint Substation near Shoshone to the new Burmah Substation
- Build new 138 kV transmission line from Burmah Substation to Silver Substation (near Picabo)
- Build a new 138 kV transmission line from Burmah Substation to Moonstone Substation (east of Fairfield)

10 Year
- Upgrade Moonstone to Wood River transmission line to 200 megawatts
- Add new 230 kV to 138 kV transformer at Midpoint Substation
    - The existing transformer capacity will be inadequate to serve the Wood River Valley load at this point.

15 Year
- Add new voltage control device at Ketchum Substation
    - Won't require new lines into Ketchum Substation
    - Won't require that Ketchum Substation be enlarged

20 Year
- Add distribution feeders from Wood River Transmission Station
    - Currently, this station only serves to switch the transmission, it doesn't directly feed any of the load around Hailey
    - This would relieve some of the load from Hailey Substation

30 Year
- Upgrade Silver to Wood River transmission line to 200 megawatts
    - This will provide more capacity to the growing Valley load
    - This will also help to support the voltage at Ketchum and Elkhorn substations

When load levels require, the King to Moonstone 138 kV transmission line will be converted to 230 kV. This will require that the line be completely rebuilt but it will likely be installed in the existing right-of-way. Moonstone Substation will also require improvements at this point to accommodate the higher voltage.

Appendix I – Load Density Based on Zoning

City/County	*Description*	*Code*	*kW/mi²*
Blaine	Productive agricultural, one unit per twenty (20) acres.	A-20	500
Blaine	Productive agricultural, one unit per forty (40) acres.	A-40	300
Blaine	Rural residential, one unit per ten (10) acres.	R-10	820
Blaine	Rural remote, one unit per forty (40) acres.	RR-40	180
Blaine	Residential/agricultural, one unit per five (5) acres.	R-5	840
Blaine	Rural residential, one unit per two and one-half (21/2) acres.	R-2.50	1280
Blaine	Planned residential development district, one unit per two (2) acres.	R-2	1600
Blaine	Low density residential, one unit per one acre.	R-1	3200
Blaine	Medium density, one unit per four-tenths (0.4) of an acre.	R-.40	8000
Blaine	High density, one unit per one-fourth (1/4) of an acre.	R-1/4	12800
Blaine	Sawtooth City medium density residential.	SCR.4	8000
Blaine	Recreation development district.	RD	50
Blaine	Commercial district.	C	15000
Blaine	Sawtooth City commercial.	SCC	15000
Blaine	Light industrial use district, no residential density.	LI	15000
Blaine	Heavy industrial use district, no residential density.	HI	20000
Blaine	Floodplain management district, one unit per five (5) acres.	FP	320
Blaine	Riparian setback district.	R	0
Blaine		UI	800
Blaine		UIB	1200
Hailey	TRANSITIONAL		7000
Hailey	TECHNOLOGICAL INDUSTRY		15000
Hailey	SERVICE COMMERCIAL INDUSTRIAL		10000
Hailey	RECREATIONAL GREEN BELT		10
Hailey	LIMITED BUSINESS		7500
Hailey	LIMITED RESIDENTIAL – 8000 S.F.		12800
Hailey	LIMITED RESIDENTIAL – 12000 S.F.		6400
Hailey	LIGHT INDUSTRIAL		20000
Hailey	GENERAL RESIDENTIAL		12800
Hailey	BUSINESS		10000
Hailey	AIRPORT		12000
Sun Valley	Commercial Center	CC	10000
Sun Valley	Recreational	OR-1	400
Sun Valley	Public Institution (public use – almost open space)	P-1	100
Sun Valley	Residential max 1 per acre	RA	3200
Sun Valley	Residential 4-16 units per acre	RM-1	51200
Sun Valley	Residential 4-24 units per acre	RM-2	76800
Sun Valley	Residential max 2 per acre	RS-1	6400
Sun Valley	Residential 4-8 units per acre	RS-2	25600
Sun Valley	Service Commercial (Limited “low intensity”)	SC	7000
Ketchum	LR – Limited Residential District,	LR	15360

Ketchum	LR-1 – Limited Residential – One Acre Zoning District,	LR-1	3840
Ketchum	LR-2 – Limited Residential – Two Acre Zoning District,	LR-2	1920
Ketchum	GR-L – General Residential – Low Density District,	GR-L	15360
Ketchum	GR-H – General Residential – High Density District,	GR-H	19200
Ketchum	MH – Mobile Home District,	MH	30720
Ketchum	STO-.4 – Short-Term Occupancy - .4 Acre Zoning District,	STO-4	9600
Ketchum	STO-1 – Short-Term Occupancy – One Acre Zoning District,	STO-1	3840
Ketchum	STO-H – Short-Term Occupancy – High Density Zoning District,	STO-H	19200
Ketchum	T – Tourist District,	T	15000
Ketchum	T-3000 – Tourist – 3000 Zoning District,	T3000	15000
Ketchum	T-4000 – Tourist – 4000 Zoning District,	T4000	15000
Ketchum	CC – Community Core District,	CC	20000
Ketchum	LI-1 – Light Industrial District Number 1,	LI-1	18000
Ketchum	LI-2 – Light Industrial District Number 2,	LI-2	30000
Ketchum	LI-3 – Light Industrial District Number 3,	LI-3	18000
Ketchum	RU – Recreation Use District,	RU	100
Ketchum	AF – Agricultural and Forestry District,	AF	2500

Appendix J – Example Transmission Tower Photographs

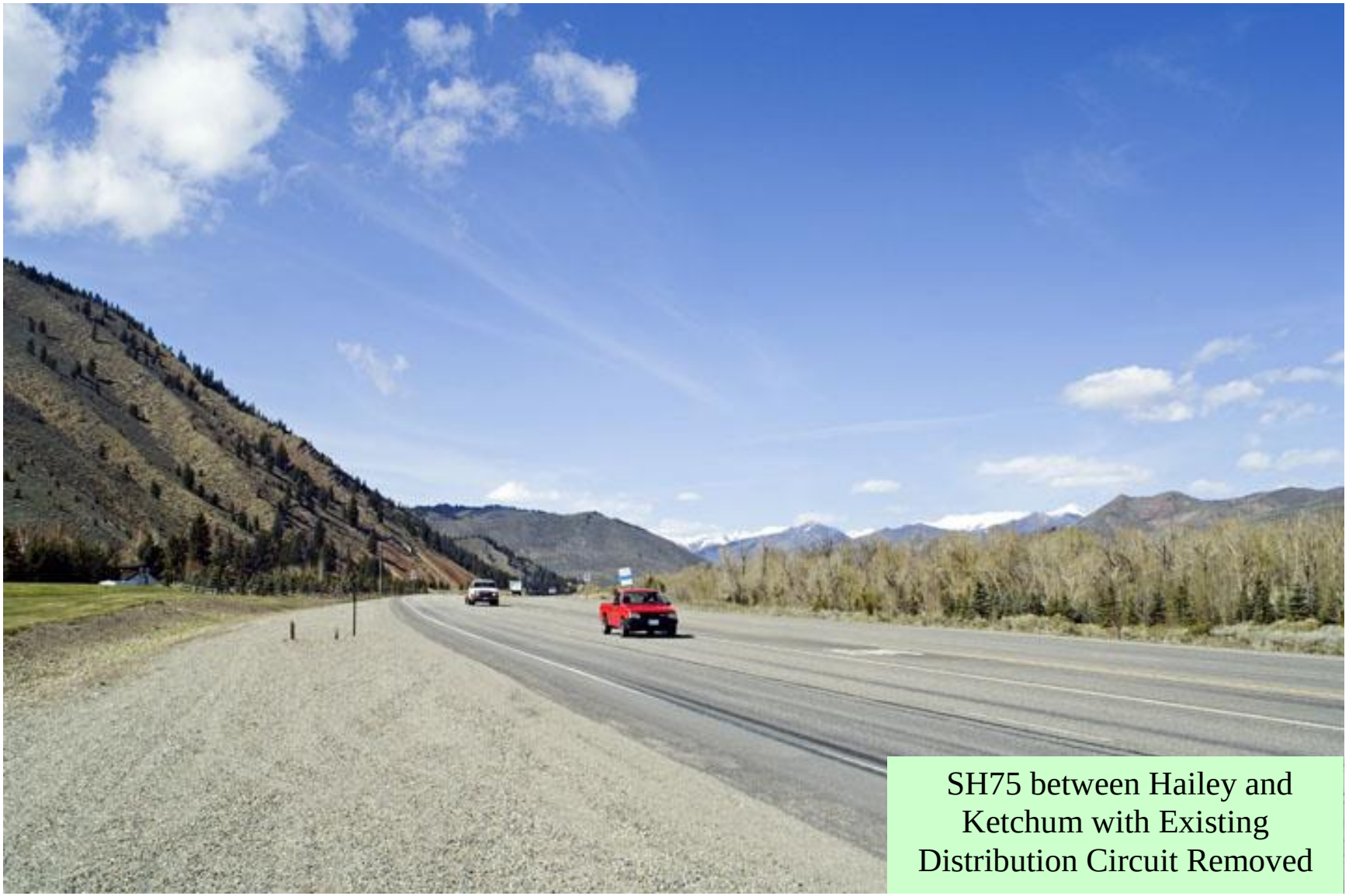
The following photo overlays were created at the request of the Community Advisory Committee in order to evaluate the visual effects of various transmission configurations.

Existing Distribution Circuit
Between Hailey and Ketchum
Along SH75

New Overhead 138kV Transmission Circuit on Low Profile Towers, Distribution Circuit Removed

New Overhead 138kV Transmission Circuit on Low Profile Towers alongside Existing Distribution Circuit

New Overhead 138kV Transmission Circuit with Distribution Circuit Underbuild



SH75 between Hailey and Ketchum with Existing Distribution Circuit Removed

Existing Distribution Circuit in Lane Ranch Area along SH75

Lane Ranch Area with Existing Distribution Circuit Removed

Existing SH75 Between Ice Cave and Timmerman Hill

New Overhead 138kV Transmission Circuit with Distribution Circuit Underbuild

Existing SH75 Between Ice Cave and Timmerman Hill

New Overhead 138kV Transmission Circuit with Distribution Circuit Underbuild

Existing SH75 Between Ice Cave and Timmerman Hill

Appendix K – n-1 Reliability Criteria Example

n-1 Reliability Example

Idaho Power must adhere to what's known as an "n-1" criterion for main grid transmission.

For multiple transmission lines delivering power to the same point, if one of the lines goes out of service, the remaining lines must be able to carry both the load they were carrying before the event, plus the load carried by the line that is out of service.

- This is true even if the line with the highest capacity is the one that goes out of service.
- Only holds true for major transmission lines.

Take for example three, extra-high voltage, 345,000-volt transmission lines operating electrically in parallel as shown in Figure 1. This means that they all originate in the same location and deliver power to the same location. Each line might take a different path to get there, but all three begin and end in the same locations.

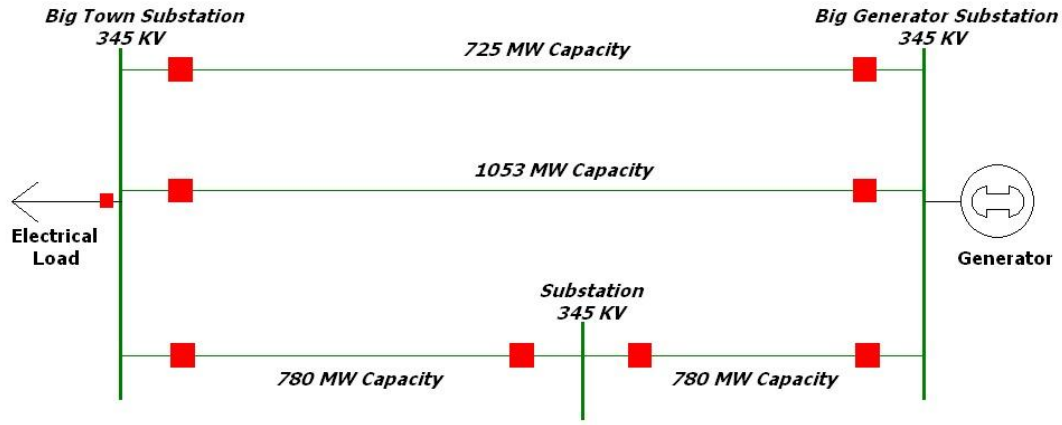


Figure 1. Three Parallel Transmission Lines

The top line is 100 miles long and has a capacity of 725 MW. The middle line is also 100 miles long and has a capacity of 1,053 MW. The bottom line is 200 miles long and has a capacity of 780 MW. There is a substation located at the halfway point on the bottom line but it has no effect on the power flow.

Normal Operation, No Lines Out

The three lines in Figure 2 are carrying a total of 1,400 MW to a load located at Big Town Substation. Note that the generator is producing 1,406 MW of power while the load is only consuming 1,400 MW. The difference between the two is due to losses on the transmission system…losses that must be provided for by the generator. The green arrows shown on the drawings indicate the direction of power flow.

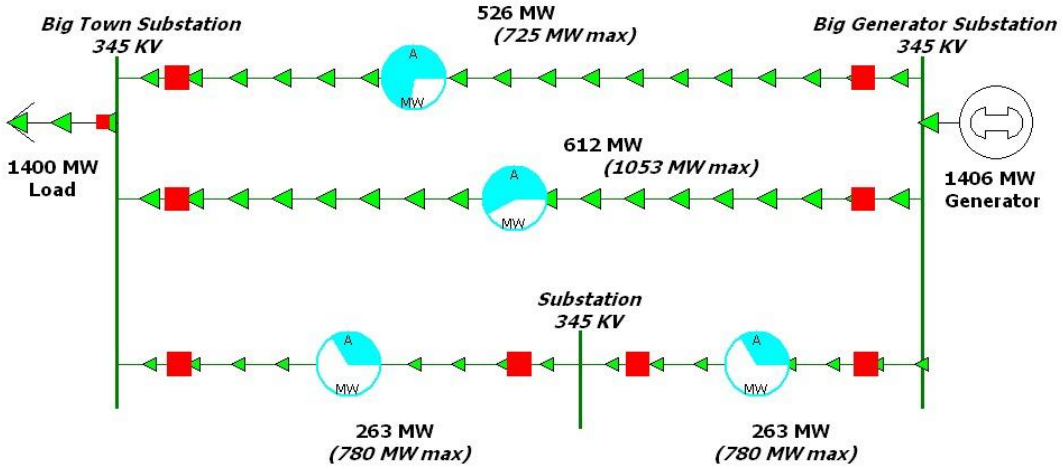


Figure 2. Three Parallel Transmission Lines During Normal Operation

The blue circle on each transmission line is a visual indication of how much each line is loaded. The top circle indicates that the line is carrying about ¾ of the amount it is capable of. If the circle turns orange, it indicates that the line is approaching its maximum capacity. A red circle indicates that the line has exceeded its capacity.

All three lines are operating within their capacity and could operate like this indefinitely.

Top line capacity = 725 MW
    Top line operating at 526 MW
Middle line capacity = 1053 MW
    Middle line operating at 612 MW
Bottom line capacity = 780 MW
    Bottom line operating at 263 MW

Bottom Line Out of Service

Now lets see what happens if we take the bottom line out of service. The circuit breaker located on the right side of the line (red box in upper drawing) turns to a hollow green when the circuit breaker is open, de-energizing the line.

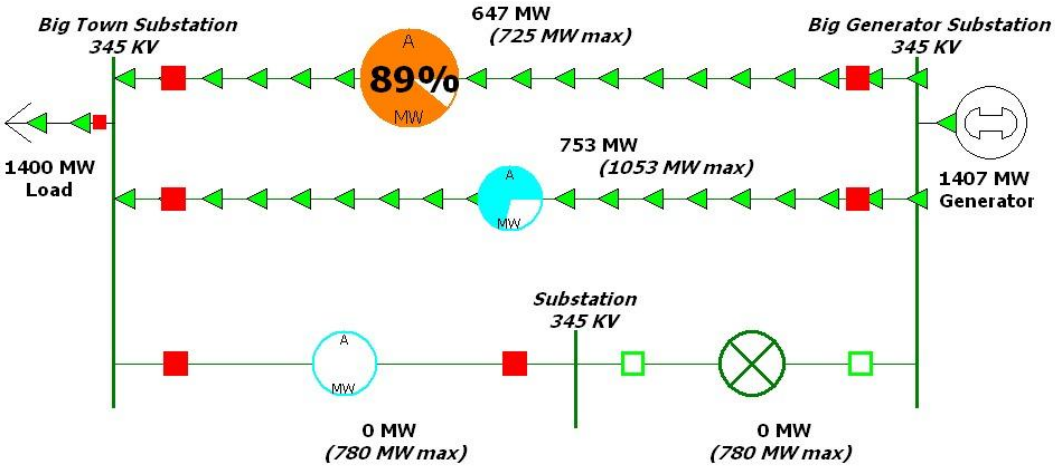


Figure 3. Three Parallel Transmission Lines, Bottom Line Out of Service

Notice that no power flows on the bottom line now. The middle line, which has the highest capacity of all three, is now operating to about ¾ of its capability. The top line indicates that it is operating at 89% of its capability, giving us a warning. However, these lines could operate like this indefinitely so no action is required. In this case, we have met the n-1 criteria.

Top line capacity = 725 MW
Top line operating at 647 MW

Middle line capacity = 1053 MW
Middle line operating at 753 MW

Bottom line capacity = 780 MW
Bottom line operating at 0 MW

Note that the generator on the right side of the drawing is producing more power compared to the last case. The power losses are higher with one of the lines out of service because there is more resistance to power flow.

Top Line Out of Service

Now we will put the bottom line back in-service and take the top line out of service. Again, the circuit breaker on the right of the top line will go from solid red to hollow green indicating that the line is out of service.

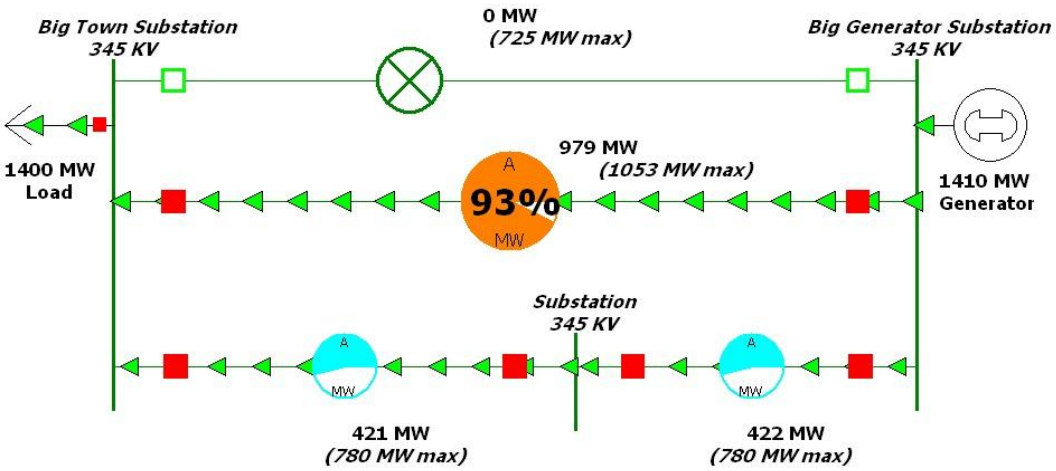


Figure 4. Three Parallel Transmission Lines, Top Line Out of Service

Notice that no power flows on the top line now. The bottom line indicates that it is operating at about 2/3 of its capability while the middle line is warning us that it is operating at 93% of its capability. These two lines could operate like this indefinitely so again no action is required.

Top line capacity = 725 MW
Top line operating at 0 MW

Middle line capacity = 1053 MW
Middle line operating at 979 MW

Bottom line capacity = 780 MW
Bottom line operating at 421 to 422 MW

Again, notice that the generator is now producing more power due to the higher line losses with one of the lines out of service.

Middle Line Out of Service

The top line is put back in service and the middle line is taken out of service. This is indicated in Figure 5 by the circuit breaker located on the right side of the middle line changing from a solid red box to a hollow green box.

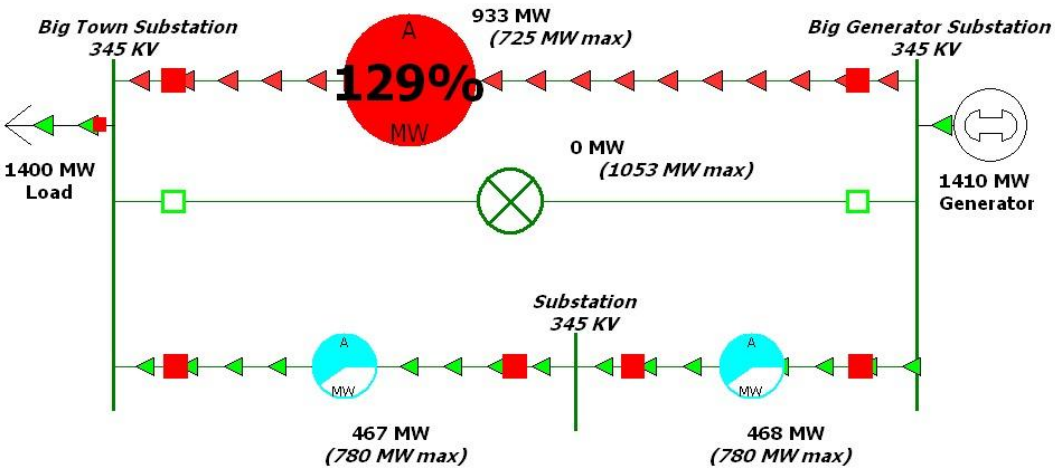


Figure 5. Three Parallel Transmission Lines, Middle Line Out of Service

Figure 4 indicates that the bottom line is operating at about 2/3 of its capability and this can be maintained indefinitely. However, notice that the top line's indicator shows that it is now operating at 129% of its capability. A transmission line cannot operate like this for very long because the line gets too hot and can be damaged to the point of breaking. So, in this case, our three transmission lines have failed the n-1 test. When the largest transmission line was taken out of service, the other two could not safely carry the power it was carrying plus the power they were carrying before the incident.

Top line capacity = 725 MW
Top line operating at **933 MW**

Middle line capacity = 1053 MW
Middle line operating at 0 MW

Bottom line capacity = 780 MW
Bottom line operating at 467 to 468 MW