Exh. HLR-6

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BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

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EXH. HLR-6

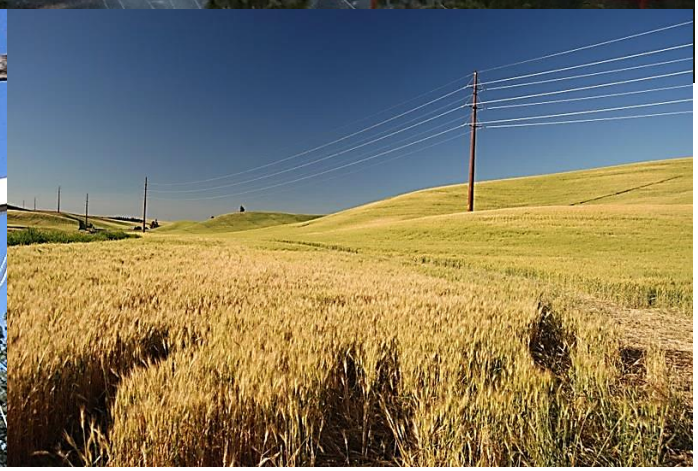
HEATHER L. ROSENTRATER

REPRESENTING AVISTA CORPORATION

Avista Utilities

Transmission Infrastructure Plan

2020



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Executive Summary

Our nation's electric utilities are facing times of unprecedented challenge when it comes to the forces driving the need for new investment in transmission infrastructure, and Avista is no different. This growing demand for new investment has significantly impacted the ability to fund all of the high-priority needs for electric transmission which include:

- **Aging Infrastructure**. Thousands of transformers, reactors, capacitors, conductors, poles and structures are well past their expected lifespans.[1] Avista has transmission lines that are over 110 years old. Though the Avista transmission group is replacing these lines as funding is available and changing out wood structures with more resilient steel, the need continues to outpace the ability and funding to complete all the work that must be done.

- **Increasing Need for Capacity**. Much of the U.S. power grid was built in the 1950s and 1960s with a 50-year life expectancy, and, to add further tension, the more than 640,000 miles of high-voltage transmission lines in the lower 48 states are at full capacity now while demand for use continues to grow.[2] Much of Avista's system was built during the same time frame. This already strained system is being significantly impacted by shifts in the loads served by the transmission system, including transmission interconnections to private parties for integration of new variable energy resources, particularly wind and solar. These types of interconnections require significant capital investment to extend or reinforce the system in order to provide for these non-traditional uses of the power system and add additional strain to an already constrained transmission grid.

- **Growing Numbers of Federal and State Regulations.** Power markets, already weakened by flat to declining demand growth, are often caught in the middle of a conflict between federal and state policies. Many states have pursued public policy goals with respect to renewable energy options, energy efficiency and CO_2 abatement. On the flip side, federal policy such as tax credits and the Public Utility Regulatory Policies Act (PURPA) have led to a growing amount of zero and negative marginal cost power being injected into power markets already suffering sluggish load growth. In addition, allowed return on equity (ROE) has been consistently dropping throughout the industry since the 1980s, although the need for capital investment is increasing, creating tremendous tension. Though regulators maintain close scrutiny over rates, they are "freely encouraging the development of renewables and greater customer access to the grid, distribution channels, and equipment through emerging technologies."[3] These technologies require expensive investments and infrastructure. The cost of new infrastructure is continually increasing, so any significant new construction means higher

[1] Robert Walton, "Aging Grids Drive $51B in Annual Utility Distribution Spending," UtilityDive, July 25, 2018, https://www.utilitydive.com/news/aging-grids-drive-51b-in-annual-utility-distribution-spending/528531/ and Energy.gov, https://www.energy.gov/articles/infographic-understanding-grid. The U.S. Department of Energy (DOE) estimates that, nationwide, 70% of transformers are 25 years old or older, 60% of high voltage circuit breakers are more than 30 years old, and 70% of transmission lines are 25 years old or older and approaching or at the end of their useful life.

[2] American Society of Civil Engineers, "2017 Infrastructure Report Card," https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Energy-Final.pdf

[3] Earl Simpkins, Leslie Hoard, Suva Chakraborty, Daniel Wilderotter, "Utilities Preparing for Growth: Navigating Disruption By Linking Capabilities," November 20, 2015, https://www.strategyand.pwc.com/reports/utilities-preparing-for-growth

rates for consumers. Utilities face significant risk of not recovering all their costs, much less an adequate return, for new infrastructure investment, the need for which is beyond their control.[4]

- **Siting, permitting and construction.** Building required transmission lines has become more complex, time-consuming and expensive due in part to increasing environmental and property requirements. Landowners, public and private, seek more compensation for rights-of-way and access agreements than in the past. Local, state, and federal permitting requirements cover issues such as endangered species, historical and cultural resources, water quality, wildlife and more. Permitting can extend over several years and typically includes conditions that limit how utilities construct or maintain these assets as well as stringent requirements for site restoration. These requirements considerably constrain the siting, construction and operation of new grid facilities.[5]

- **Changing Issues and Technology.** In addition to feeling its age, the integrated grid, designed to accommodate very steady, very stable traditional resources, is now required to integrate non-traditional and often unpredictable resources such as solar, wind, and distributed generation sources. Smart grid technology including wide-area monitoring, protection, automation and control is also predicted to have a significant impact on grid operations – and spending.[6] At the same time, the grid is facing cyber threats never imagined back in the 1950s and 1960s when most of the system was built. According to a variety of studies across the United States including the Department of Energy, the viability of the century old bulk power grid has been declining and is "nearing the end of its useful life."[7] They note that depreciation is exceeding new investment, even with all of the large projects being built nationwide. The grid is facing increasing digitization and other technologies that require adapting and upgrading the existing system. Customers are requiring new services, increased levels of reliability, flexibility, and choice that are beyond the experience of traditional power companies, demands that not only create uncertainty, but add cost, demand, and complexity.

When it comes to the impact for customers, who must ultimately pay for these requirements and investments, an exacerbating factor is Avista's relatively stagnant load growth due to both declining use per customer and lackluster economic growth in most of the region.[8] This translates into nearly flat revenues, which means that new capital investments must be covered by higher customer rates. Historically, annual increases in customer loads produced new revenues that were often sufficient to cover the costs for new investment and inflation without the need to increase customer rates. Now utilities are pulled to economize and pushed to innovate, dealing with decreasing revenues and, at the same time, expensive and revolutionary new technologies such as distributed generation, battery storage technology, customer-requested technologies, and integrating intermittent renewable resources. This report intends to illustrate the way Avista's Transmission group is dealing with these challenges.

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[4] Earl Simpkins, Leslie Hoard, Suva Chakraborty, Daniel Wilderotter, "Utilities Preparing for Growth: Navigating Disruption By Linking Capabilities," November 20, 2015, https://www.strategyand.pwc.com/reports/utilities-preparing-for-growth

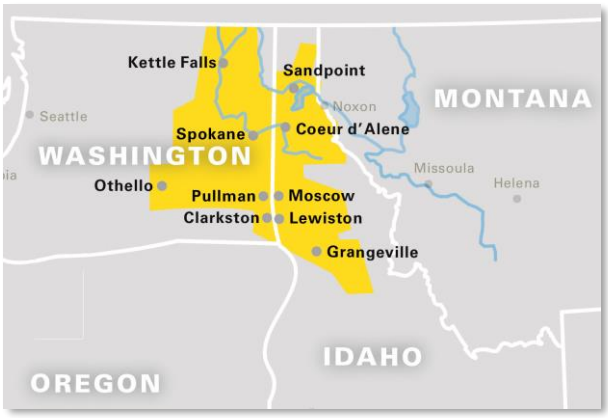
[5] To illustrate this point, a transmission line proposed into Las Vegas was on hold for twenty years due to continuous siting opposition, including protecting the habitat of two endangered species that were not considered endangered when the project was proposed. Holland & Hart, "Transmission Siting in the Western United States," page 10, https://www.hollandhart.com/articles/Transmission_Siting_White_Paper_Final.pdf

[6] Julio Romero Aguero, "What Does the Future Hold for Utilities?" February 24, 2015, T&D World, https://www.tdworld.com/grid-innovations/distribution/article/20965183/what-does-the-future-hold-for-utilities

[7] U.S. Department of Energy, Energy Advisory Committee, "Keeping the Lights On In a New World," https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/adequacy_report_01-09-09.pdf

[8] Avista's service territory is experiencing about 1% growth, a rate that economists predict will continue for the next several years.

Introduction



Avista Utilities serves approximately 380,000 electric customers in Washington and Idaho over an extensive electric transmission system that is designed, built, operated and maintained by the Company. This infrastructure system consists of approximately 2,750 miles of high voltage transmission lines[9] crossing 30,000 square miles and bringing electric power to over 1.6 million people in Washington and Northern Idaho.[10] Avista must continually make new investments in this system in order to continue providing customers with safe and reliable electric service at a reasonable cost with service levels that meet customer's expectations for quality and satisfaction, and, at the same time, meet stringent national, regional, state, and local regulatory requirements.

In order to meet all of these requirements, the Company creates specific capital programs. These programs are developed through planning and engineering studies and analyses, as well as scheduled upgrades or replacements identified in the operations districts, within engineering groups, or based upon need. These projects undergo internal review by multiple stakeholders who help ensure that all system needs and alternatives have been identified and addressed. If proposed projects are initially approved, they go through a formal review process referred to as the Engineering Roundtable, a diverse group of engineering leaders[11] who track project requests, prioritize them, and establish committed construction package dates and required in-service dates for projects. Once a project has passed this phase of evaluation, it moves to the Capital Planning Group.

The Capital Planning Group (CPG) is a group of Avista Directors that represent capital intensive areas of the Company. Committee members are directors from a variety of business units to add a depth of perspective, though their role is to consider capital decisions from the perspective of overall Company operations and strategic goals as well as spending guidance set by senior management and approved by the Finance Committee of the Board of Directors. They develop a final budget that represents a reasonable balance among competing needs in order to maintain the performance of Avista's systems, as well as prudent management of the overall enterprise in the best interest of customers.

The purpose of this report is to provide a comprehensive overview of the approved transmission system programs, as well describe the need for capital investment, operations, and maintenance funding. But more importantly, the goal is to explain the many forces that are driving these expenditures and how Avista is attempting to balance these complex and competing needs.

[9] This includes 700 miles of 230 kV, 1550 miles of 115 kV, and 500 miles of co-owned (Colstrip) 500 kV lines.
[10] Statistics from "2018 Avista Quick Facts," https://investor.avistacorp.com/static-files/a7342b27-72cc-44d4-b9a7-b62903e999df
[11] Eleven representatives are included in this group from: Transmission and Distribution Planning, Transmission, Distribution, and Substation Design, System Protection, System Operations, Asset Management, Communications and Generation Engineering, and Transmission Services.

Avista's Transmission Capital Investments

Classification of Infrastructure Need by Investment Drivers

As a way to create more clarity around the particular needs being addressed with each capital investment as well as simplifying the organization and understanding of Avista's overall project plans, the Company has organized all capital infrastructure investments by the classification of need or "Investment Driver." The investments associated with each investment driver are briefly defined below, and in greater detail later in this report.

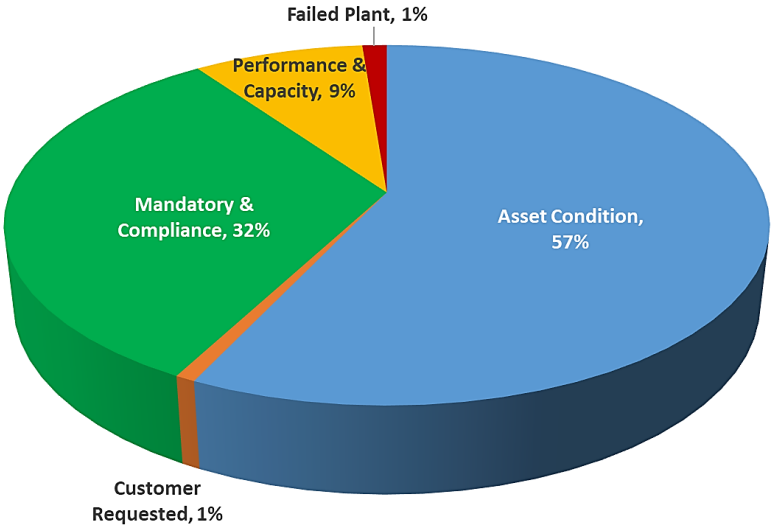


Figure 1. Total Planned Capital Expenditures by Investment Driver 2020-2024

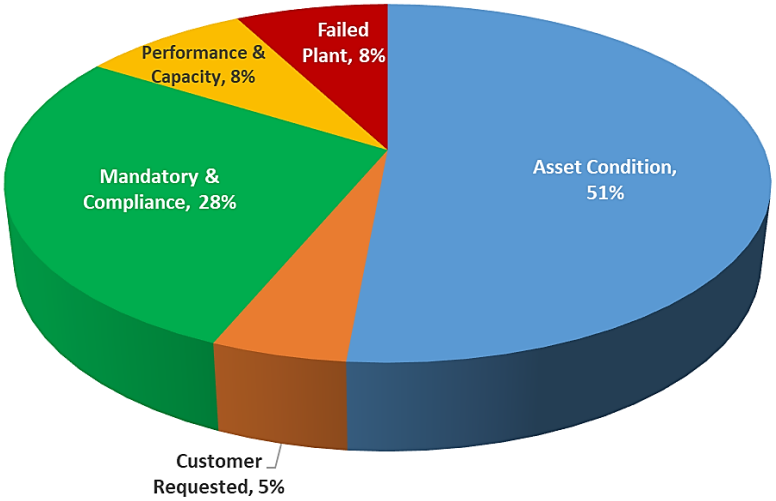


Figure 2. Historic Capital Expenditures by Investment Driver 2010-2019

Customer Requested – In the Transmission business unit, this category is primarily related to building new facilities for connecting large transmission-direct customers or to enhance their service as requested. This category is used, for example, to provide for expenses related to the requested interconnection of solar or wind projects, which are typically owned by an independent developer requesting interconnection with the Company's transmission system.

Mandatory & Compliance – The Company makes a large number of business decisions as a direct result of compliance with laws, mandatory standards, safety codes, contracts, and agreements. Examples include transmission reinforcement projects or control equipment required by NERC to preserve the reliability of the interconnected grid or contract-required work on the Colstrip transmission system that Avista co-owns with other utilities. These decisions are primarily driven by external requirements that are largely beyond the Company's control.

Failed Plant & Operations – This category sets aside funds to replace failed equipment as well as support ongoing utility operations. Typically these expenditures are the result of storm damage but are also the result of damage from vehicles accidents, animals, trees, etc.

Asset Condition – All assets have a defined useful service life. This category provides funding to replace equipment as needed so the system can continue to function effectively. This may include replacing parts as they wear out or when items can no longer meet their required purpose, as systems become obsolete and replacement parts are no longer available, to remedy safety or environmental issues, or if the condition of an asset is such that it is no longer optimizing its own performance or customer value. The Company also replaces critical equipment prior to failure in order to mitigate the risk of failure and the resulting customer impacts.

Customer Service Quality & Reliability – This category is for expenses related to meeting customer expectations for quality of service and reliability. Transmission does not have any dollars set aside under this category, as it does not typically directly impact customers.

Performance & Capacity – Programs in this category ensure that assets satisfy business needs and meet performance standards, typically defined by Company experts or in line with industry standards. Some examples include adding new substations or transmission lines to meet customer growth or to provide redundancy to reduce the potential for customer outages.

All of Avista's capital expenditures are categorized into one of these drivers, though not all of the investment driver categories are represented for each business unit. For example, investments planned for electric transmission during the upcoming five year planning cycle do not include any projects in the category of Customer Service Quality and Reliability. This is fairly common, since very few of Avista's customers receive direct transmission service. In addition, investments in electric transmission related directly to service reliability for all customers are generally driven by mandatory compliance requirements so can be found in the "Mandatory & Compliance" Driver. Note that not all of the investment drivers will be used in all of Avista's primary asset categories in every budgeting cycle, yet they remain an efficient and effective way of categorizing expenditures in a clear and transparent fashion that promotes better understanding of how and why the Company makes business decisions.

Currently Planned Capital Investments in Transmission 2020 – 2024

For the next five-year planning horizon, Avista expects to spend about $143 million in capital dollars for the Transmission side of the business, allocated across five of the investment drivers described above. These programs are summarized by investment driver below. Note that Transmission and Substations are connected by physical locations and voltage and thus share several business cases, which is noted in the text below.

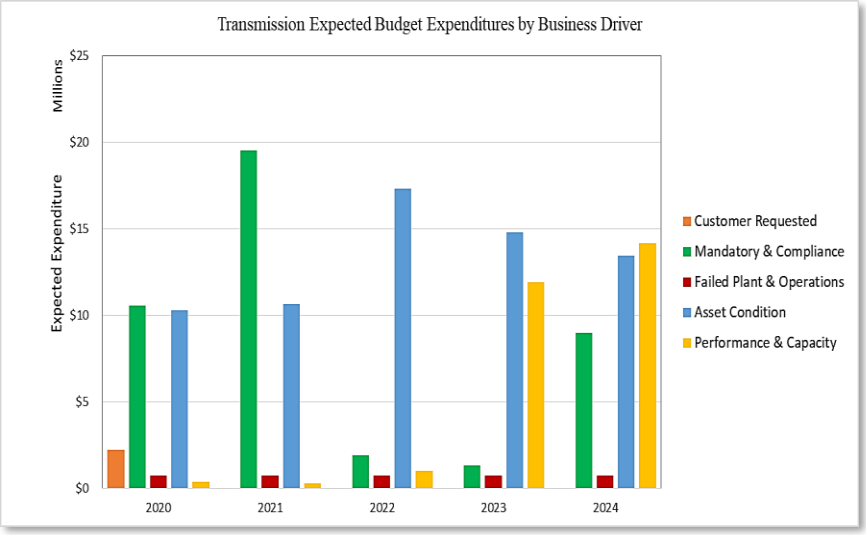


Figure 3. Capital Budget by Investment Driver

Business Driver	2020	2021	2022	2023	2024	5 Year Total	5 Year Average
Customer Requested	$2,225,000	$0	$0	$0	$0	$2,225,000	$445,000
Mandatory & Compliance	$10,550,000	$19,500,000	$1,900,000	$1,350,000	$9,000,000	$42,300,000	$8,460,000
Failed Plant & Operations	$750,000	$750,000	$750,000	$750,000	$750,000	$3,750,000	$750,000
Asset Condition	$10,309,120	$10,659,120	$17,309,120	$14,793,420	$13,443,420	$66,514,200	$13,302,840
Performance & Capacity	$400,000	$300,000	$1,000,000	$11,900,000	$14,150,000	$27,750,000	$5,550,000
	$24,234,120	**$31,209,120**	**$20,959,120**	**$28,793,420**	**$37,343,420**	**$142,539,200**	**$28,507,840**

Table 1. Planned Capital Budget by Investment Driver

Increasing Capital Investments for Infrastructure Needs

In recent years Avista has experienced an increasing demand for new and upgraded infrastructure investment. The pattern of investments made by the Company during this time period are similar to that of the industry, as shown in Figure 4. Utilities across the nation are responding to the same issues mentioned earlier: the demand to replace an increasing amount of infrastructure that has reached the end of its useful life, ever increasing regulatory compliance requirements, and the need for reliability and technology investments necessary to build the integrated energy services grid of the future. Avista's investments in electric

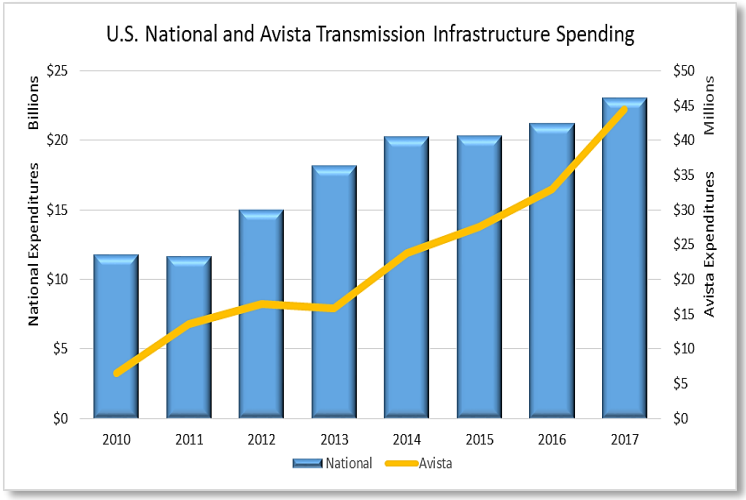


Figure 4. Avista's Transmission Spending Compared to National Levels [12]

[12] National data obtained from EEI: https://www.eia.gov/todayinenergy/detail.php?id=34892 (only available through 2017)

transmission also reflect the Company's adoption of asset management-based approaches for assessing infrastructure needs and developing strategies and programs to optimize the lifecycle value of the Company's transmission system.

Customer Requested

Customer requested projects are triggered by non-Company applications for new transmission-level connections, line extensions, transmission capacity, or system reinforcements. For example, the Company may be obligated to construct a distribution substation with an associated transmission line extension in order to meet the requested new load requirements of an industrial or large commercial customer, large subdivision or business park. Other situations may involve a requested transmission interconnection with a neighboring utility or a customer-owned generation project. In the current five year budget period, this category includes an interconnection required to integrate Rattlesnake Flat Wind Project, being built by an independent developer.

Customer Requested	2020	2021	2022	2023	2024	5 Year Total
Rattlesnake Flat Wind Integration	$2,225,000	$0	$0	$0	$0	$2,225,000

Table 2. Planned Capital Budget for Customer Requested

Rattlesnake Flat Wind Integration

Avista issued a request for proposal in June 2018 for additional renewable energy. An external company, Clearway Energy Group, was selected to provide that energy. They are developing a wind power facility known as Rattlesnake Flat Wind, which is projected to provide Avista with approximately 50 average megawatts of renewable energy, or as much as 144 megawatts of nameplate wind capacity, under a 20-year power purchase agreement with deliveries beginning in 2020. This project, including 90 wind turbines and associated facilities, is located on approximately 23,000 acres in Adams County, Washington. This project requires significant upgrades to Avista's existing infrastructure, including transmission line rebuilds, an additional new switching station, and existing substation upgrades in order to handle the new generation. This new energy resource benefits Avista customers in two primary ways: providing customers with additional renewable energy and the required transmission upgrades enhance the strength and resiliency of the existing infrastructure. *This business case is part of the same Substations business case.*

Mandatory & Compliance

The investments in transmission infrastructure made under this category are investments driven typically by compliance with laws, rules, and contract requirements that are external to the Company and outside of Avista's control. Many of these are the result of NERC Reliability Standards related to planning and operations, where failure to comply may result in monetary penalties of up to $1 million per day per infraction. In addition, imbedded within every transmission construction project are environmental compliance costs. Other examples in this category include leases on tribal lands, contractual obligations, and expenditures related to implementing safety standards. Other examples in the current budget cycle of projects required by NERC mandates include the new Saddle Mountain and West Plains Reinforcement Plan and upgrades to the Ninth and Central Substation, described below.

Mandatory & Compliance	*2020*	*2021*	*2022*	*2023*	*2024*	*5 Year Total*	*5 Year Average*
Saddle Mountain 230/115kV Station (New) Phase 1	$3,300,000	$0	$0	$0	$0	$3,300,000	$660,000
Saddle Mountain 230/115kV Station (New) Phase 2	$300,000	$10,700,000	$0	$0	$0	$11,000,000	$2,200,000
Spokane Valley Transmission Reinforcement	$300,000	$2,250,000	$0	$0	$0	$2,550,000	$510,000
Transmission Construction - Compliance	$2,850,000	$3,500,000	$0	$1,200,000	$0	$7,550,000	$1,510,000
Transmission NERC Low-Risk Priority Lines Mitigation	$2,800,000	$2,700,000	$1,000,000	$0	$0	$6,500,000	$1,300,000
West Plains New 230kV Substation	$0	$100,000	$500,000	$0	$0	$600,000	$120,000
Ninth & Central Sub - New 230kV Transformation	$0	$0	$150,000	$150,000	$9,000,000	$9,300,000	$1,860,000
Westside 230/115kV Station "Brownfield Rebuild"	$500,000	$250,000	$250,000	$0	$0	$1,000,000	$200,000
Road Relocations	$500,000	*TBD*	*TBD*	*TBD*	*TBD*	$500,000	$500,000
	$10,550,000	***$19,500,000***	***$1,900,000***	***$1,350,000***	***$9,000,000***	***$41,800,000***	***$8,460,000***

Table 3. Planned Capital Budget for Mandatory & Compliance

Saddle Mountain 230/115 kV Station

Saddle Mountain Substation under construction

Avista System Planning and related outside entity studies determined that the western portion of the Avista's existing system is not meeting NERC performance requirements during heavy load scenarios. The Saddle Mountain project, undertaken in two phases, will allow Avista to continue serving Company load in the Big Bend Area near Othello while eliminating pressure on the Grant County Public Utility District system. This problem will be solved by constructing a new 230/115 kV substation where the Walla Walla–Wanapum 230 kV and the Benton–Othello 115 kV transmission lines cross. This new sub will consist of a three-terminal 230 kV double bus double breaker configuration, a 250 MVA[13] 230/115 kV auto-transformer, four 115 kV terminals, rebuilding the existing associated aging 115 kV transmission lines, and building ten miles of new 115 kV transmission. This project will greatly improve the reliability of transmission in the area and

[13] MVA refers to the amount of power output a transformer is capable of delivering at a specified voltage under normal operating conditions without exceeding internal temperature limitations. A 250 MVA transformer is a very large transformer.

remove the current single point of failure situation which could create widespread outages. It also mitigates potential thermal overloading and voltage issues in this area. *This business case is part of the same Substations business case.*

Spokane Valley Transmission Reinforcement

Site of new Irvin Substation in Spokane Valley

This project reinforces transmission in the Spokane Valley area, spurred by load growth in the region as well as compliance with the NERC TPL-001-4 Reliability Standard[14] which requires each utility to ensure that their system is robust enough to operate reliably over a broad spectrum of system conditions and under a wide range of possible contingencies. Avista system studies identified this area as requiring additional reinforcement in order to be in compliance with the NERC standard about ten years ago, and the Company has been working on it since that time. This long term project requires the construction of a new switching substation (Irvin) off of Trent Avenue. It also includes rebuilding 4.4 miles of the Beacon-Boulder #2 115 kV transmission line, building 1.75 miles of transmission for the new Irvin-Opportunity 115 kV tap, constructing 2.2 miles of 115 kV transmission from the new Irvin sub to the existing Millwood sub, and installing circuit breakers to handle the changes at the existing Opportunity Sub. This work will not only address compliance issues, but will make the transmission system in this urban area more stable and reliable, specifically for serving large industrial customers. *This business case is part of the same Substations business case.*

Transmission Construction - Compliance

This program covers the transmission rebuild work, line reconductoring, and new construction outlined in the Corrective Action Plan developed under NERC Reliability Standard TPL-001-4.[15] It has 8 requirements and 57 sub-requirements related to planning and analysis, including the requirement for robust system models to determine system stability, voltage levels and system performance under various scenarios. This Standard also contains spare equipment regulations, load loss requirements and mitigation, a number of system protection requirements, and more. In addition, when Avista's system planning studies indicate any kind of problem that could arise in the transmission system, it must be remedied within specific timeframes. The Transmission Construction - Compliance Program provides funding to mitigate any identified reliability issues in order to remain in compliance with NERC requirements.

[14] NERC Standard TPL-001-4: http://www.nerc.com/files/tpl-001-4.pdf requires the Company to avoid load loss and have circuit breakers with sufficient interrupting capability for faults.
[15] NERC TPL-001-4: https://www.nerc.com/pa/Stand/TPL0014RD/Implementation%20Plan%20for%202010-11_TPL-001-4.pdf and http://www.oasis.oati.com/PPW/PPWdocs/PacifiCorp"s_NERC_TPL-001-4_Standard_Overview_R1.pdf

Transmission – NERC Low Risk Priority Lines Mitigation

This program addresses mitigation required on Avista's "Low Risk" 115 kV transmission lines and brings these lines into compliance with NERC requirements[16] and National Electric Safety Code (NESC) minimum transmission line clearance values.[17] These code minimums have also been adopted into the State of Washington's Administrative Code (WAC).[18] "Low risk" lines are those ***not*** connecting Avista generation to primary load.

Placing conductor using a helicopter (left) and by hand (right)

Investments made under this program provide funding to reconfigure insulator attachments, rebuild existing transmission line structures, or remove earth from beneath transmission lines to mitigate ratings/sag discrepancies found between the line designs and actual field conditions in order to provide minimum clearance requirements for worker and public safety.

West Plains New 230 kV Substation

Planning studies of the Spokane area transmission system revealed specific transmission performance issues which will occur within the next five to ten years. Note that these performance issues have a significant potential to exceed NERC reliability standards, designed to prevent cascading outages and ensure the integrity of the interconnected system.[19] System studies identified at least seven NERC thermal or voltage limit violations including:

- Inadequate 230/115 kV transformation provided by the four existing substations in the area, especially in the case of system events. In addition, the existing transformers are reaching maximum thermal capacity now and in time will exceed it.
- Related 115 kV transmission lines are running at 96% to 135% of their rated capacity during specific contingency scenarios.[20]

These issues are expected to intensify with projected growth in this region. In addition, some of the transmission lines in the Spokane area are radial lines, requiring manual intervention in order to restore

[16] North American Electric Reliability Corporations (NERC) "NERC Alert" - Recommendation to Industry, "Consideration of Actual Field Conditions in Determination of Facility Ratings," http://www.nerc.com/pa/rrm/bpsa/Pages/Facility-Ratings-Alert.aspx
[17] National Electric Safety Code Electrical Safety Requirements, https://www.usbr.gov/ssle/safety/RSHS/sec12.pdf
[18] Washington State Legislature WAC 296-46B-010: https://apps.leg.wa.gov/wac/default.aspx?cite=296-46B-010
[19] NERC Reliability Guidelines, September 2018, https://www.nerc.com/comm/PC_Reliability_Guidelines_DL/Reliability_Guideline_Methods_for_Establishing_IROLs.pdf
[20] This includes the Northwest-Westside 115 kV, the Bell-Northeast Waikiki Tap 115 kV lines, and the lines from the Beacon and Westside substations.

service to customers after a fault, with a total customer exposure of up to 31 miles. In order to manage this situation and remain in compliance with NERC directives, the Company is constructing a new 230 kV substation in the West Plains area. This location provides also an opportunity to interconnect with Bonneville Power Administration (BPA) to strengthen Avista's grid and add additional operating flexibility. The West Plains Substation is designed to mitigate all of the identified system deficiencies, including adding 500 MVA of transformer capability and redundancy to the transmission system in this area. *This business case is part of the same Substations business case.*

Ninth & Central 230 kV Station & Transmission

The Spokane area transmission system is heavily dependent upon the Beacon Substation, which is networked to the Bell Substation as well as eight 115 kV transmission lines. In order to reduce this dependency, create redundancy, enhance customer reliability, and remain in compliance with mandatory standards, Avista is upgrading the infrastructure of the Ninth & Central Substation to take on more of this load. The Company is adding new 230 kV infrastructure to accommodate a 230/115 kV auto-transformer and associated circuit breakers, and putting in place additional transformer capacity for the Spokane transmission system. This project will also build eight miles of new transmission lines, utilizing existing 115 kV corridors in a double circuit configuration in order to fortify the Spokane area transmission system. This project significantly strengthens and adds resiliency to the electric system. It is scheduled to begin in 2022. *This business case is part of the same Substations business case.*

Westside 230/115 kV Substation "Brownfield Rebuild"[21]

The Westside 230 kV Substation Rebuild is major project made necessary because the existing Westside #1 230/115 kV transformer exceeded its applicable facility rating during heavy summer loads, which led to the cascading failure of the Westside #2 230/115 kV transformer. This situation created a compliance risk with NERC TPL-001-4, a standard which defines system planning performance and has very specific requirements around equipment exceeding ratings as well as shedding customer load.[22] The previous transformers were underrated for their use and not up to current design standards. In addition, air switches and breakers at this substation had begun to fail, the protection equipment needed to be updated and upgraded, oil containment provisions needed to be made, and site security issues had to be addressed.

New Westside #1 230/115 kV transformer being placed

[21] A "Brownfield" project refers to a project that takes place on land that has been occupied by a "permanent" structure at some point, requiring demolishing or renovating a prior structure, versus a "Greenfield" project that will be built in a place where nothing had been built before.
[22] NERC TPL-001-4, http://www.nerc.com/files/tpl-001-4.pdf

Engineers determined that the existing old transformers (one was manufactured in 1976 and one in 1958) must be replaced with 250 MVA rated transformers that meet current performance, efficiency, and safety standards. In addition, the 230 kV and 115 kV buses at the substation will be upgraded to a double bus double breaker configuration to provide adequate redundancy. Along with the transformer change-outs, numerous other equipment replacements are required to have the capacity needed from this station. This project, started in 2016, should be completed during the current budget cycle. *This business case is part of the same Substations business case.*

Road Relocations

Avista is required to move its infrastructure in response to municipalities, counties, and state-level agency projects to rebuild or realign roads, streets and highways, as well as other state, county, and city infrastructure projects. This work must be performed at the Company's expense.

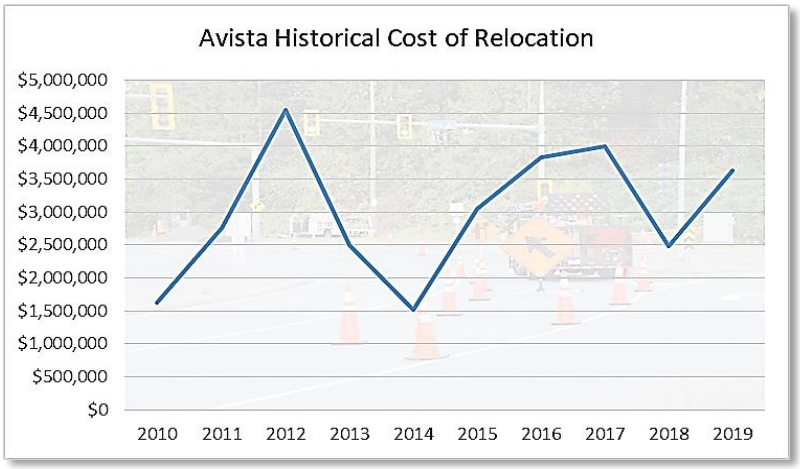
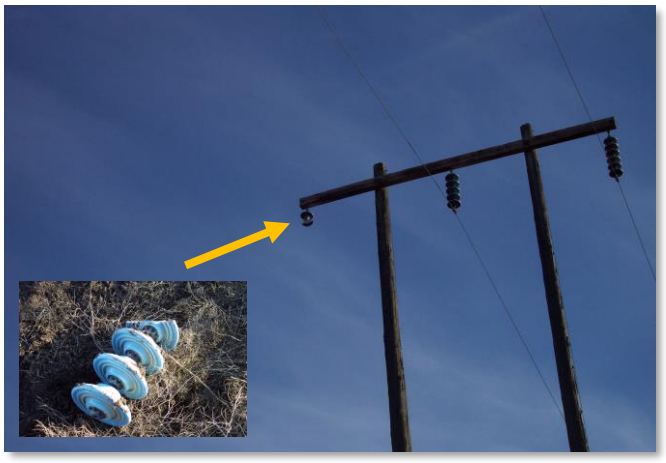


Figure 5. Facilities Relocation Capital Expenditures

While Avista may have some latitude to negotiate the timing of the construction, it has no choice with regard to removing and relocating its infrastructure and paying all of the associated costs. Avista also works with the Departments of Transportation in both states to renew and maintain crossing and encroachment permits, which at times also necessitates the Company moving its infrastructure at its own expense. This work may require the Company to realign or modify existing infrastructure to comply with state clear zone, conductor clearance, and other regulations regarding the location of poles, guy wires, and overhead conductors. These costs are increasing over time as jurisdictions in which Avista must perform the work are becoming more and more demanding in their requirements, including calling for additional work as a condition of construction such as extensive landscaping, which increases costs. As shown in Figure 5, these costs are also highly variable from year to year and difficult to predict.

Failed Plant & Operations

Transmission investments in this category are primarily the result of storm damage to the Company's transmission system or the funding needed for failed or damaged equipment. When this happens, the Company must quickly respond to replace the infrastructure in order to ensure



the continuity of service to customers. Common causes of damage to the system include major wind events, lightning, fire, snow and ice, downed trees/vegetation, wildfires, human or animal caused damage (left), and equipment failure (above). Other failures include the unanticipated loss of assets due to a range of factors including age and condition. *Planned pending for this category is shared between Distribution, Substations, and Transmission.* Transmission's share of this spending is shown in Table 4.

Failed Plant & Operations	*2020*	*2021*	*2022*	*2023*	*2024*
Transmission - Minor Rebuild: Storm	$750,000	$750,000	$750,000	$750,000	$750,000

Table 4. Planned Capital Budget for Failed Plant & Operations

Asset Condition

Investments in transmission infrastructure related to Asset Condition are required to replace assets based on established asset management principles and strategies adopted by the Company, which are designed to optimize the overall lifecycle value of the investment for customers. This category includes rebuilds related to aging or end-of-life assets and upgrades related to design, safety, or construction standards. It also includes specific technology upgrades related to interconnected system reliability and cybersecurity. The Company closely monitors outages and replaces equipment that is either impacting customer service or is likely to do so. Some equipment is so critical that it cannot be allowed to fail. When this equipment reaches an age when it is close to or at the end of its useful life, the Company preventively replaces it to maintain reliability and acceptable levels of service.

Asset Condition	*2020*	*2021*	*2022*	*2023*	*2024*	*Five Year Total*	*Five Year Average*
SCADA - SOO and BuCC	$2,100,000	$920,000	$700,000	$700,000	$700,000	$5,120,000	$1,024,000
Substation Rebuild Program	$18,750,000	$18,250,000	$24,950,000	$25,050,000	$25,125,000	$112,125,000	$22,425,000
Transmission Major Rebuild - Asset Condition	$7,550,000	$7,500,000	$14,000,000	$10,000,000	$10,000,000	$49,050,000	$9,810,000
Transmission - Minor Rebuild: Non-Storm	$909,120	$1,659,120	$1,659,120	$1,843,420	$1,843,420	$7,914,200	$1,582,840
	$29,309,120	*$28,329,120*	*$41,309,120*	*$37,593,420*	*$37,668,420*	*$174,209,200*	*$34,841,840*

Table 5. Planned Capital Budget Based on Asset Condition

SCADA – SOO and BuCC

Above: Post Street control panels
Right: Rathdrum Substation panel house

Supervisory Control and Data Acquisition (SCADA) and the System Operations Office and Backup Control Center (BuCC) provide the capabilities required to achieve compliance with numerous reliability standards and requirements.[23] This business case replaces and upgrades existing control center telecommunications and computing systems for these systems as they reach the end of their useful lives, require increased capacity, cannot be upgraded due to outdated technology, or are necessitated by other requirements, including NERC reliability standards, system growth, and external projects (e.g. Smart Grid). This type of work includes hardware, software, and operating system replacement and upgrades. These control systems provide real-time visibility, situational awareness, and control of Avista's electric and gas systems and are critical to Company operations. These expenditures prevent the degradation of these capabilities due to lack of capacity, capability, or aging systems that would present increased safety and significant compliance risk. These specialized systems are critical in ensuring continued operation and customer service. *This business case is shared and is part of the same Substations business case.*

Substations Rebuild Program

Work at the Kooskia Substation

Replacing and upgrading major substation apparatus and equipment as it approaches end-of-life or becomes obsolete is a routine part of Avista's maintenance strategy. Replacing this equipment before it fails is necessary to maintain the safe and reliable operations of the transmission and distribution systems, and substations are at the heart of these interconnected systems. Investments in this program include updating old equipment to meet new safety and construction standards, installing communications systems, and replacing or upgrading other equipment such as

[23] For the electrical system these include NERC standards BAL, COM, CIP, EOP, INT, PER, PRC, TOP, and VAR. BAL = Balancing Authority Control, COM = Interpersonal Communications among business units within a utility, CIP = Critical Infrastructure Protection, EOP = Emergency Preparedness & Operations, INT = Interchange Scheduling & Coordination, PER = Personnel Training Requirements, PRC = Protection & Control Systems, TOP = Transmission Operations Requirements, and VAR = Voltage and Reactive capabilities. For more information about any of these requirements, please see: https://www.nerc.com/pa/Stand/Pages/AllReliabilityStandards.aspx

circuit breakers, reclosers, switches, capacitor banks, transformers, and regulators. In addition, supporting equipment like relays, meters, batteries, panel housing, and fences must be replaced periodically to ensure the full functionality and safety of Avista's substations. *Please note that capital allocated for this program is shared between Transmission, Substations, and Distribution but the entire amount is shown here as the Transmission function creates and manages this program.*

Transmission Major Rebuild – Asset Condition

Investments made under this program rebuild existing transmission lines based on overall asset condition. "Condition" is measured by useful life or the number of condition-related outages. Factors such as operational issues, ease of access during outages, and need to add automation or communications equipment may be included in the type of spending in this category. Replacing old and worn-out poles and cross-arms and other associated transmission equipment, help guard against increasing risk for more failures and outages. Transmission outages can have significant consequences, as they tend to impact a large number of customers and have the potential to start fires in dry areas. In addition to reliability issues, failure to properly invest builds a bow-wave of needed investments in the future, thus this program is crucial to maintaining operations. It is split between the 115 kV system and the 230 kV system.

Working on the Benewah – Moscow 230 kV line

Transmission Minor Rebuild – Non-Storm

Expenditures under this business case typically cover work found during wood pole and aerial patrol inspections as well as replacement of air switches that have malfunctioned, failed, or reached end-of-life. During inspections, various issues are discovered regarding the condition of assets. This can include rotten poles, broken or split crossarms, broken conductor, guy or ground wire missing or damaged, encroachments, and the like. At times these issues are discovered based on outages. Transmission engineers evaluate each situation and prioritize them based on customer impact, safety and fire risks to allocate funding in this category.

Failed Conductor

Performance & Capacity

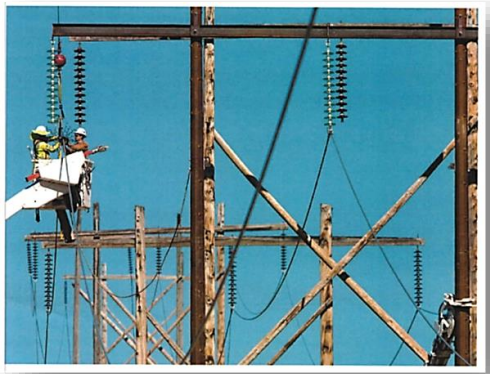
These investments support additions of new substations or reinforcement of existing substations that require supporting transmission upgrades or additions. Investments are typically requested by Transmission Planning or Operations. Funding in this category can be used to increase reliability to existing substations by providing redundant transmission feeds to radially-fed substations, reducing the potential for customer outages. Another common example is an identified operational or equipment issue that is leading to increasing outages or safety concerns. The issue that hits the "capacity" aspect of this driver is customer load growth or load changes. Currently there are two Transmission programs in the Performance and Capacity category in the upcoming budget cycle which will be described below.

Performance & Capacity	*2020*	*2021*	*2022*	*2023*	*2024*	*Five Year Total*	*Five Year Average*
Cabinet Gorge 230kV Add Bus Isolating Breakers	$100,000	$1,500,000	$0	$0	$0	$1,600,000	$320,000
Transmission New Construction	$0	$0	$400,000	$11,250,000	$12,900,000	$24,550,000	$4,910,000
	$100,000	***$1,500,000***	***$400,000***	***$11,250,000***	***$12,900,000***	***$26,150,000***	***$5,230,000***

Table 6. Planned Capital Budget Based on Performance & Capacity

Transmission New Construction

Investments made under this program support the addition of new substations due to load growth in a particular area or to reinforce existing substations which require new transmission. Funding in this category is typically related to increased performance, system stability, customer load growth, or service reliability. Funding in this category is also used to provide redundant transmission feeds to radially-fed substations, reducing the potential for customer outages. This program is managed through the joint efforts of Avista's Transmission Design & Engineering, Substations, Operations, and Transmission Planning groups, from which the requests for upgrades or additions are initiated.



Avista's Transmission O&M Investments

Transmission O&M Expenditures

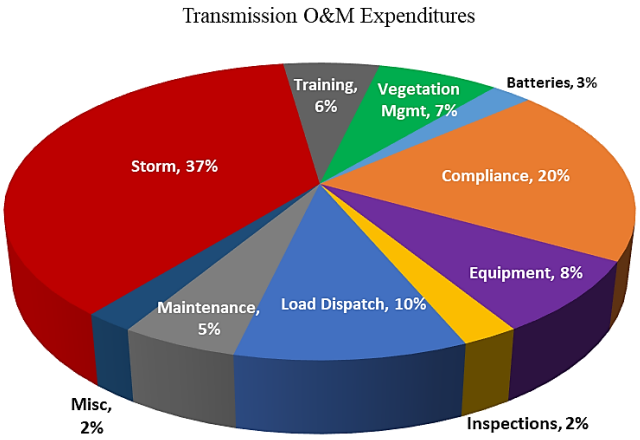


Figure 6. Typical Transmission O&M Expenditures

Avista typically spends about $13 million annually in operations and maintenance work required to sustain its electric transmission system. Unexpected expenses are always a possibility, but the Company has routine maintenance programs in place to insure that those occurrences are as few as possible. All of Transmission's O&M programs play a role in ensuring reliable service. Programs such as aerial and ground patrols to identify potential problems, fire retardant to protect poles from wildfire, foundation work to maintain the integrity of structures, and vegetation management around lines and on associated roads and trails to allow access for maintenance and repair all work to help prevent outages.

As can be seen in Figure 6, storms take a significant toll on transmission equipment, though these expenditures can vary widely from year to year. Compliance related expenditures are also a major factor. Compliance category requirements can include interconnection work with neighboring utilities, Columbia Grid and Western Electricity Coordinating Council (WECC) regulations, and meeting requirements from the North American Electric Reliability Corporation (NERC) that impact equipment maintenance requirements, security measures, training, and planning among other elements. Compliance also includes work related to the Colstrip transmission system as required by Avista's contract with the other line owners. Other Transmission O&M expenditures include performing aerial and ground inspections of Avista's transmission system, ensuring adequate vegetation management in all transmission rights-of-way, installing, replacing, and maintaining air switches and other system control devices, and providing the manpower and equipment for System Operations, System Planning, the Supervisory Control and Data Acquisition (SCADA) and Energy Management Systems (EMS), System Protection, Reliability, and Distribution Operations.

The Transmission group is closely involved with the Substation and Generation groups, as transmission structures and equipment directly connect with both generating sources and the substations which direct the power around the system. Thus some of the projects listed in this report are shared with other business units within the Company (as noted where each business case is described above).

More details about the Transmission team, their work, equipment used, regulations, and a glossary of terms are all available in the 2018 Transmission Infrastructure Report located on the Company's intercompany website[24] or upon request.

[24] Avista Avenue, "Tools & Resources" tab, "Avista Infrastructure Plans" heading as "Transmission Plan."

Conclusion

Avista's transmission infrastructure programs are thoughtfully developed, analyzed, optimized, adjusted, and re-analyzed as appropriate to ensure that Avista delivers cost effective value for customers while meeting all legal and mandatory requirements. As the Company moves forward with new programs such as Wildfire Resiliency, many of Transmission's programs will be impacted. For example, it is likely that new technology including LIDAR,[25] infrared imaging, drones, and virtual inspections will create significant change for the current inspection practices and may increase costs, but will also provide a far more robust picture of the state of Avista's transmission system. The Wildfire Resiliency project is also driving a change to the Company's wood pole fire protection programs, which have used an effective fire resistant paint for poles until now, but which will migrate toward a fire-resistant mesh system that lasts far longer.

Avista's Transmission is facing other long-term issues being felt by utilities across the nation. Aging structures and equipment create increasing risk of failure and resulting impacts to customer reliability, just as customers are demanding higher and higher levels of service. Determining the priority of replacement is also a challenge, as Transmission competes for limited funding with other Company business units facing their own aging equipment challenges and requirements. State and federal regulations increase every year; sometimes hundreds of new regulations are introduced within a short span of time, and compliance is required; it is not an option. Most of these new regulations have an impact on the bottom line in one way or another, and add ever-increasing levels of complexity to the way the Company operates.

The Transmission team is dedicated to facing all of these challenges in the most efficient, cost-effective, and thoughtful way possible, as demonstrated by the programs described here. As these programs change and adapt to whatever comes next, be it new regulations, state policies, failed equipment, or even a pandemic, the focus of this group will remain unchanged. They will continue to operate and manage Avista's grid successfully and in the long-term best interests of customers.

[25] LIDAR is a surveying system that uses a laser to create 3-D images of landscapes, making it invaluable for identifying vegetation management issues.