

NEVADA 2018

INFRASTRUCTURE REPORT CARD



Nevada Section of the American Society of Civil Engineers
INFRASTRUCTUREREPORTCARD.ORG/NEVADA

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EXECUTIVE SUMMARY

Nevada's infrastructure has been steadily improving over the past several decades and its infrastructure can be considered relatively new when comparing to other states. However, comparable to our state itself, there are two parts to our infrastructure story. Geographically, Nevada is the seventh largest in land area, but 36th largest in population. Over 90% of the state's residents are in Las Vegas and Reno. Additionally, 90% of the state is considered rural and over 80% of the land area is owned by the Federal government. Nevada is also one of the driest states in the country, with annual rainfall of five inches or less. A majority of the state's water supply is dependent on snowmelt from mountain ranges within Nevada and in neighboring states. The state's largest city, Las Vegas, has grown rapidly the past 20 years and has the newest and largest amount of infrastructure. Many other areas, including Reno, Elko, Ely and Tonopah, are home to much older infrastructure.

This 2018 Report Card on Nevada's Infrastructure is the third edition developed by ASCE's Nevada Section since 2007. This report covers twelve categories – Aviation, Bridges, Dams, Drinking Water, Energy, Public Parks, Roads, Stormwater, Schools, Solid Waste, Transit, and Wastewater. Energy and Public Parks are the two new categories and Transportation is divided into three categories in this report card – Bridges, Roads and Transit. We are pleased to report an improvement in Nevada's infrastructure from a C- in 2014 to a C in 2018.

The need to improve Nevada's infrastructure was evident and Nevada civil engineers have been addressing that need. The authorization of Fuel Revenue Indexing in Clark County, which goes through 2026, has made it possible to address overdue road and bridge projects over the past four years. Additionally, a portion of these additional revenues are allocated for state roadways. The two major airports in Nevada, Reno-Tahoe and McCarran in Las Vegas, have undergone major improvements to their terminals and airside facilities, in addition to implementing energy-saving measures. The two largest school districts of Washoe and Clark Counties have been constructing new schools while also upgrading existing facilities. Transit in Reno and Las Vegas continues to expand, and Las Vegas is considering the implementation of light rail.

The logo features a blue outline of the state of Nevada on the left. To its right, the text "NEVADA 2018" is in blue, "INFRASTRUCTURE" is in orange, and "REPORT CARD" is in green.

NEVADA 2018 INFRASTRUCTURE REPORT CARD

Nevada is set to be a leader in emerging technologies, which includes renewable energy (solar, wind and geothermal), autonomous vehicles, drone technology and transit systems, thanks to leadership in the State Legislature and in the Governor’s office. For example, Nevada was selected by the Federal Aviation Administration as one of six drone research areas in the United States—conducting research in this area and developing facilities within the state. Additionally, Nevada authorized autonomous vehicles in 2013 and has seen several test implementations in downtown Las Vegas and Clark County. NDOT just completed USA Parkway to provide access from I-80 and the Tahoe-Reno Industrial center continues to attract technology companies to the area.

However, progress was not universal across all categories. The “Dams” category did not change from 2014-2018. Dams have had the same funding and staffing issues over the past four years, which is consistent with a large portion of the country. However, the passing of the Water Resources Development Act (WRDA) of 2018 by Congress paves the way for reauthorization of the National Levee Safety Program and the National Dam Safety Program, both of which are designed to improve dam and levee safety across the country.

The Solid Waste category saw the only grade decrease from 2014 to 2018. Nevadans generate nearly double the national average of municipal solid waste each year. Rural parts of the state, in particular, are faced with limited and expensive methods for managing municipal solid waste. We’re also falling short of our statewide goal to recycle 25% of municipal solid waste each year. Nevadans will need to recycle the equivalent of nearly 100 Olympic size swimming pools more worth of waste each year to meet this goal.

RECOMMENDATIONS TO RAISE THE GRADES

1. Nevadans should vote to index the state fuel tax to inflation: We applaud Washoe and Clark Counties for raising new revenue for transportation infrastructure by indexing their gas taxes. The remaining counties in Nevada should follow suit in future election cycles. Adequate investment in our roads and bridges is critical to ensuring that freight move seamlessly throughout the state; tourists are easily able to access the parks, casinos and other forms of entertainment; and our rural citizens can enjoy the same quality of life as our urban residents.
2. Nevada should fund the State Infrastructure Bank: With the passage of Senate Bill 517 in 2017, a State Infrastructure Bank was authorized but not funded. A fully funded State Infrastructure Bank provides loans and grants to local jurisdictions looking for financial support in order to qualify for federal funds. Local funding has grown more critical as the amount of funds provided through federal programs has steadily decreased the past decade. The decreasing availability of federal funds mean local and state jurisdictions are responsible for providing a larger percentage of their own funding. A fully funded State Infrastructure Bank can help them make this happen.
3. Increase operations and maintenance budgets as additional infrastructure is added to our networks. Much of Nevada's infrastructure, particularly in the growing suburbs, is new. We must provide adequate operations and maintenance funding to support the state's new infrastructure, which will save us costly repairs and replacements down the line.
4. We must continue to support emerging technologies and foster an attractive culture for innovative companies. Nevada is leading the way in infrastructure and mobility innovation, including in renewable energies, autonomous vehicles, drone technology and transit systems. We should capitalize on progress and continue to support forward-thinking organizations and innovations. The University of Nevada is on the right track by offering degrees in Unmanned Aircraft Systems. Nevada should support students focused on infrastructure and mobility innovation with scholarships and provide seed money for new graduates to start new companies in Nevada, which are dedicated to emerging technologies.



KEY CONTRIBUTORS

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ABOUT THE INFRASTRUCTURE REPORT CARD

GRADING CRITERIA

ASCE-NV's 2018 Report Card Committee is a group of dedicated civil and environmental engineers from Nevada, who volunteered their time to collect and analyze data; prepare, review, and revise each section; and develop the final Report Card. Committee members worked with ASCE's Committee on America's Infrastructure and ASCE Infrastructure Initiative staff to develop this snapshot of Nevada's infrastructure.

The Report Card Sections are analyzed based on the following eight criteria:

CAPACITY Does the infrastructure's capacity meet current and future demands?

CONDITION What is the infrastructure's existing and near-future physical condition?

FUNDING What is the current level of funding from all levels of government for the infrastructure category as compared to the estimated funding need?

FUTURE NEED What is the cost to improve the infrastructure? Will future funding prospects address the need?

OPERATION AND MAINTENANCE What is the owners' ability to operate and maintain the infrastructure properly? Is the infrastructure in compliance with government regulations?

PUBLIC SAFETY To what extent is the public's safety jeopardized by the condition of the infrastructure and what could be the consequences of failure?

RESILIENCE What is the infrastructure system's capability to prevent or protect against significant multi-hazard threats and incidents? How able is it to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security?

INNOVATION What new and innovative techniques, materials, technologies, and delivery methods are being implemented to improve the infrastructure?

GRADING SCALE



EXCEPTIONAL: FIT FOR THE FUTURE

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and are resilient to withstand most disasters and severe weather events.



GOOD: ADEQUATE FOR NOW

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable with minimal capacity issues and minimal risk.



MEDIOCRE: REQUIRES ATTENTION

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.



POOR: AT RISK

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of significant concern with strong risk of failure.



FAILING/CRITICAL: UNFIT FOR PURPOSE

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.

NEVADA 2018 INFRASTRUCTURE REPORT CARD

NEVADA'S 2018 INFRASTRUCTURE REPORT CARD

 AVIATION		 ROADS	
 BRIDGES		 SCHOOLS	
 DAMS		 SOLID WASTE	
 DRINKING WATER		 STORMWATER	
 ENERGY		 TRANSIT	
 PARKS & RECREATION		 WASTEWATER	

GPA: 



AVIATION



EXECUTIVE SUMMARY

As Nevada's economy relies heavily on tourism, efficiently functioning airports are essential to keep the state thriving. Our state's regional airports are important in binding our communities together and making our rural areas accessible. Today, over 50 million passengers utilize Nevada's largest airports – the Reno-Tahoe International and McCarran International Airports – placing a heavy strain on existing facilities and requiring constant maintenance. To accommodate current and future passenger volumes, McCarran has begun a \$30 million modernization project. Reno-Tahoe recently completed work on renovating their two terminals and have plans to begin a major \$1.6 billion expansion in 2019. Meanwhile, Nevada's general aviation airports are typically eligible for Federal Aviation Administration (FAA) grants and can also receive state apportionment and discretionary funding from the FAA. However, the airport sponsors are sometimes challenged to provide the required local matching funds to make necessary projects a reality.

CONDITION & CAPACITY

The two largest cities contain the state's only international airports, the Reno-Tahoe International airport in Reno, and the McCarran International airport in Las Vegas. There are three additional "commercial service" airports located in the state, three "reliever airports" and 22 regional "general aviation" (GA) facilities. Each of these airports are included in the FAA's National Plan of Integrated Airport Systems (NPIAS) report from 2016, which means that they have been considered significant to national air travel and therefore are eligible to receive federal grants under the Airport Improvement Program (AIP).

Between Reno and Las Vegas, there were approximately 24.5 million enplanements in 2016, 23 million from McCarran and 1.5 million from Reno. In 2017, McCarran International saw over 48.5 million total passengers and Reno traffic topped 4 million, which is the biggest year in both airports' histories. The term "enplaned passenger" is widely used in the aviation industry, and is loosely defined as a passenger boarding a plane at a particular airport. It differs from total passenger count, as it measures revenue generating passengers and does not include layover or round-trip passengers. It appears that the growing rates of enplaned passengers continue. With rapid growth occurring in both cities, there will also be the need for more air travel. Though both airports have invested in major additions and upgrades over the past decade, they are both limited as to how much more capacity they can handle.

In Las Vegas, McCarran International is essentially "landlocked," as development has surrounded the facility, including the adjacent Las Vegas Strip. In addition to limiting the amount of flights that can come through the airport, it also puts a restraint on the size of aircraft that can be accommodated, as the runways cannot be extended. The Reno-Tahoe International lies between multiple mountain ranges, which limits the amount of air traffic it can safely accommodate, as the wind patterns through the valley are constantly shifting.

At both airports, cargo handling has become a standard part of daily operations. Between the two airports, there was over 350 million pounds of cargo moved in 2017. While this is good for Nevada's commerce and economic vitality, increased cargo volumes put additional strain on the airport systems and facilities.



Another critical aspect of all Nevada’s airports is pavement condition. The Nevada Department of Transportation (NDOT) conducts periodic pavement condition assessments for most general aviation and air carrier airports across the state. In 2013, the NDOT performed a comprehensive pavement condition assessment of 21 of the 23 NPIAS-listed, regional airports. At the time, the study found that the pavement conditions were fair, overall. The rating scale used by NDOT represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (excellent) (see figure 1). However, each airport’s location can have a major impact on the deterioration of the facility, both from usage and climate. To secure funds for maintenance, there is an application process that each airport must undergo.

Representative Pavement Surface	PCI	Representative Pavement Surface	PCI
	100		40
	60		5

FUNDING & FUTURE NEED

To accommodate current and future passenger volumes, McCarran has begun work on the modernization of Terminal 1. This is a \$30 million project and includes renovations in the baggage claim area, as well as a facelift for the entire terminal. This is in addition to a separate \$57 million “behind the scenes” baggage screening system being undertaken by the Transportation Security Administration. Reno-Tahoe has recently completed work on renovating their two terminals, but have plans in place to begin a major \$1.6 billion expansion in 2019, which would include a new terminal, additional parking and modernization of its concourses.



The future of Nevada's airport system does not appear dire. Though our major airports are essentially land-locked and unable to expand, there have been studies to add a new international hub south of Las Vegas. However, construction of this new hub may be many years in the future. As for the rural and GA airports, they are established and functioning as intended; the focus going forward will be sustaining O&M budgets to keep them at this current status.

O&M

Both the McCarran International and Reno-Tahoe International airports carry their own operation and maintenance (O&M) budgets, which are primarily funded through passenger usage fees. However, the remaining general aviation airports across the state do not have the same luxury and rely on the NDOT securing Airport Improvement Program (AIP) grants to supplement their O&M needs. In 2017, Nevada received \$14.4 million in federal grants, which was disbursed to 18 of our 22 general aviation airports for various O&M projects.

The state has a source of funding for O&M that was created in 2001, called the Nevada Fund for Aviation (aka Common Aviation Fund). This law amended Chapter 494 of the Nevada Revised Statutes (NRS) to create a fund for improving the state's airport system. In 2015, the law was revisited and reestablished under SB 514 and set the fund at \$100,000 per year. These monies are primarily used to subsidize grants for airports that fall within the NPIAS, matching up to 6.25% for any grant issued by the AIP. While this program does provide valuable financial support, it is quickly allocated when dispersed across the state.

The RTIA estimates that they have saved approximately \$250,000 by installing LED light fixtures in both the airfield and terminal and saved another \$200,000 in energy and operational costs by upgrading parts of their HVAC system. By installing a 135 kW solar PV system at the RTIA Aircraft Rescue facility they have reduced the electricity usage by 260,000 kWh.

McCarran Airport installed digital controls and monitoring system to run HVAC equipment more efficiently during operations. They coated 115 jetways with a ceramic coating to better reflect heat and installed more efficient cooling units at each jetway to achieve 15% more cooling efficiency. The installation of high efficiency filters reduced air filter changes from every three months to every 16 months. By installing LED fixtures in the terminal and on the airfield McCarran airport achieved a 50% energy reduction by 1 million kWh annually and saved \$100,000 in maintenance costs annually.

Both RTIA and the Clark County Department of Aviation have ongoing Sustainability programs in place. These programs are administered by an inter-departmental committee responsible for the creation and implementation of sustainable actions. Reno-Tahoe Airport Authority has adopted the Airports Council International's EONS approach to help guide their sustainability approach.

Inside the passenger terminals recycling is in place for passenger waste such as bottles, plastic, aluminum cans and paper. On the operations side waste oil, carpet, scrap metals, batteries, toner cartridges, tires and construction materials are also recycled. Other materials have been donated to local charities for re-use. The terminals have installed water stations that allow passengers to refill water bottles.



PUBLIC SAFETY

The most active airports in Nevada are within the urban confines and are in close proximity to residential and commercial areas. All of the urban airports and many of the rural GA airports have FAA-required monitored access and required fencing around the airport property to prevent unauthorized pedestrian access to the airfields.

Transportation Security Administration (TSA) is present at the three commercial airports. The Reno Tahoe Airport maintains its own police department, while McCarran airport has a security force supplemented by a substation of the Las Vegas Metropolitan Police Department.

Weather in Nevada can also present a public safety challenge. In the winter the northern parts of the state are subject to snow and ice, while in southern Nevada the summer heat brings possible heavy thunderstorms and high heat. The high summer heat reduces an airplane's lift, requiring longer takeoff lengths. McCarran Airport has two runways with lengths between 10,000 and 14,000 feet to allow for the longer takeoff requirements in the summer months. The airport shuts down during heavy thunderstorms. The Reno airport maintains de-icing operations for the freezing temperatures.

RESILIENCE

Airports are critical to the movement of people, goods and medical supplies, therefore it's critical that airports remain functional after catastrophic events such as weather, earthquakes or other disasters. Since Nevada is a highly active seismic and wind area, all airport facilities are designed and constructed for earthquakes and high winds. In both Northern and Southern Nevada there are military airfields nearby – Fallon Naval Air Station and Nellis Air Force Base that can be used by commercial aircraft in case of emergencies. Both Reno-Tahoe and McCarran Airports maintain Emergency Contingency Plans.

INNOVATION

In 2013, Nevada was selected by the FAA as one of six locations for testing and research of Unmanned Aerial Systems (UAS). This effort is led by the Nevada Institute for Autonomous Systems and both the University of Nevada, Reno and University Nevada Las Vegas offer degrees in UAS. Nevada has conducted several test demonstrations of UAS in different areas of the state over the past three years. Nevada has numerous locations that are officially designated as UAS test locations to conduct research, testing and business development. These areas include the Reno-Stead Airport (home of the Reno Air Races), Hawthorne Advanced Drone Multiplex (230 square miles), Mesquite UAS test range for testing large vehicles over 55 pounds and Boulder City where the Eldorado Droneport is being developed.

At both the Reno-Tahoe and McCarran Airports, terminal and airfield lighting has been modernized and solar generation has been installed to reduce energy consumption. Turf grass has been replaced with xeriscaping to minimize water usage.



RECOMMENDATIONS TO RAISE THE GRADE

While Nevada has many positives in aviation, there are still some items for improvement.

- Many of the rural GA airports have been challenged to identify funding to maintain their facilities and several have had to close due to a lack of ownership. ASCE recommends a strategic plan to fund the rural GA airports, possibly through fees at the developing UAS industry in Nevada.
- The two largest airport authorities in Reno and Las Vegas have robust sustainability programs with realized benefits. ASCE recommends that these programs be used statewide for all airports in the state. Many of the rural GA's have land that could easily be utilized for solar power generation and possibly geothermal energy generation.
- Rural airports have unused runways and taxiways that could also be used to test autonomous ground vehicles.
- Nevada's Congressional delegation should support an increase in the cap on Passenger Facility Fees to increase funding in the long term. In addition, they should continue to fund and accelerate the implementation of the Next Generation Air Transportation System (NextGen) to improve aviation safety within Nevada.

FIND OUT MORE

ASCE Public Policy Statements

http://www.asce.org/public_policy_statements/

2017 Report Card General Recommendations

<http://www.infrastructurereportcard.org/solutions/>

2017 Aviation Chapter with Category-Specific Recommendations

<http://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Aviation-Final.pdf>

Nevada Department of Transportation

<https://www.nevadadot.com/mobility/aviation/airport-pavement-evaluations>

McCarran International Airport

<https://www.mccarran.com/>

Reno-Tahoe International Airport

<https://renoairport.com/>



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BRIDGES



EXECUTIVE SUMMARY

With only 1.5% of Nevada's 1,944 bridges rated as structurally deficient, the state's bridge network is one of the best in the country. However, 26% of the bridges in the state are over 50 years old and another 12% will reach their 50-year design life by 2030. Older bridges are often costlier to maintain and will eventually require replacement. Meanwhile, available funding is insufficient to address future needs. Nevada spends approximately \$17 million per biennium on bridge preservation with revenue from a combination of federal funds, fuel taxes and registration fees. Nevada's current backlog of bridge preservation is approximately \$133 million for corrective maintenance, rehabilitation and replacement.

INTRODUCTION

Nevada's unique geography presents challenges to bridges and roadways. Nevada is the seventh largest state by geographic area at 110,679 square miles and is the most mountainous state in the U.S., with over 150 separate mountain ranges. Meanwhile, Nevada is only the 34th most populated state at just over 3.2 million residents and over 85% of the state's residents live in two metropolitan areas – Las Vegas (2.2 million) and Reno-Sparks (450,000). Nevada has a total of 1,944 bridges throughout the state, ranking 43rd in the U.S. for number of bridges. Similar to the population demographics, 53% of all bridges are located in the Las Vegas/Clark County area and another 15% located in the Reno-Sparks/Washoe County area. The remaining 32% of bridges are distributed in rural areas of Nevada.

The two heaviest-traveled corridors are I-80 through Reno in Northern Nevada and I-15 through Las Vegas in Southern Nevada. Both corridors are vital links to some of the largest cargo ports in the U.S. – Oakland, Los Angeles and Long Beach – in addition to being favored routes for tourists and recreation. I-80 in Reno carries 100,000 vehicles per day while I-15 in Las Vegas can carry over 250,000 vehicles per day. Because of this, any bridge issues could have a major impact on traffic. Meanwhile in the rural parts of Nevada, a bridge shutdown can result in detours of more than 100 miles due to a sparse roadway network.

CONDITION & CAPACITY

Nevada has a total of 1,944 bridges statewide. The Nevada Department of Transportation (NDOT) maintains 58% of those bridges and other agencies maintain the remaining 42%. Nevada will face significant challenges in the future as 26% of the bridges in the state are now over 50 years old and another 12% will reach their 50-year design life by 2030. However, 75% of all bridges in Nevada have a Good condition rating, while only 1% are rated in Poor condition. Generally, bridges in Good condition have a Sufficiency Rating of 80 or greater, a Fair condition has a rating between 50 and 80, while the Poor condition has a rating below 50.



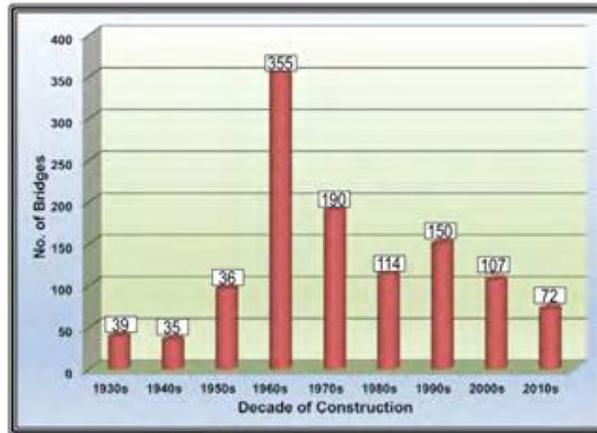


FIGURE 27. NDOT Bridges, Decade of Construction

Approximately 1.5% of Nevada’s bridges are structurally deficient, while nationally 8.9 % of all bridges are considered structurally deficient. A structurally deficient bridge is defined as a bridge that has significant load-carrying elements found to be in poor or worse condition due to deterioration or damage. Structurally deficient bridges are not inherently unsafe, but are in need of repair or rehabilitation and are inspected more frequently than other bridges. Over the past 20 years NDOT has decreased the number of structurally deficient state-owned bridges from a peak of 45 to 12 bridges. Non-state owned structurally deficient bridges decreased from a peak of 32 to 19. This is positive progress, but challenges loom. Many of the bridges in Nevada were constructed between 1960-1980 and will be approaching their 50-year service life within the next 12 years. While the lifespan of a bridge can be extended with regular maintenance and rehabilitation, such action requires significant funding.

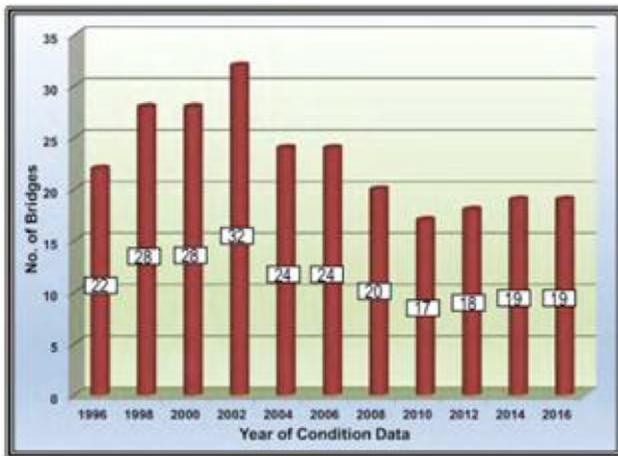


FIGURE 31. Structurally Deficient Non-NDOT Bridges over Time

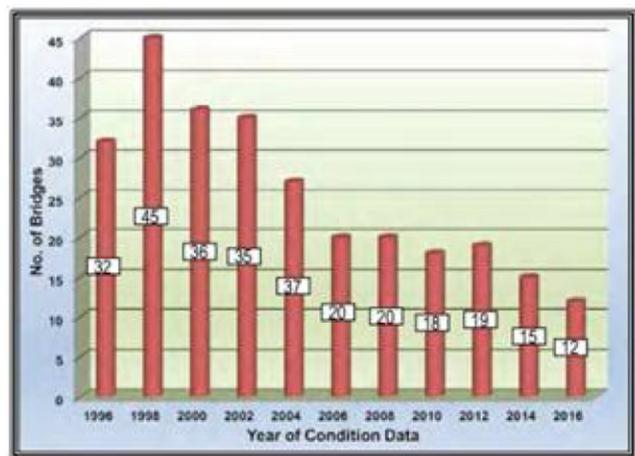


FIGURE 29. Structurally Deficient NDOT Bridges over Time

The G-947 viaduct in downtown Las Vegas along the U.S. 95 freeway exemplifies Nevada’s aging bridge inventory. Constructed in 1968, this viaduct represents 8% of the total bridge deck area in the entire state and has a Sufficiency Rating of 64, but it carries 250,000 vehicles per day. Should a portion of the bridge need to be shut down for emergency repairs, it would likely impact 100,000 vehicles each day it was out of service.





FIGURE 28. NDOT Bridge Conditions over Time



FIGURE 30. Non-NDOT Bridge Conditions over Time

O&M, FUNDING & FUTURE NEED

Nevada’s current backlog of bridge preservation is approximately \$133 million for corrective maintenance, rehabilitation and replacement. Nevada spends approximately \$17 million per biennium on bridge preservation, which is funded with a combination of federal funds, fuel taxes and registration fees. Washoe County residents voted to index their fuel taxes to inflation in 2010. In 2013, Clark County commissioners approved a fuel tax increase of up to 10 cents-per-gallon, and voters supported adjusting the fuel tax to inflation in 2016. These measures provide several hundred million dollars annually for bridge and road repairs.

Another positive item for funding occurred during the 2017 Nevada Legislative session, when a bill was passed to authorize a State Infrastructure Bank for public works projects. Even though no funds were appropriated in 2017, it is possible that funding will be budgeted during the 2019 legislative session. With help from the State Infrastructure Bank, many municipalities in Nevada will be better able to leverage local or state funding to match federal funding.

The additional funding from voter-approved ballot measures, as well as potential financing from the State Infrastructure Bank, can go a long way towards addressing Nevada’s bridge needs, but challenges remain. The total estimated cost to replace bridges in Nevada that are currently over 50 years old is \$680 million. Ten years from now, this number will grow to \$1.5 billion as many more Nevada bridges exceed the 50-year mark. Approximately 18% of bridges in Nevada were constructed between 1960 and 1970, which have already exceeded the 50-year design life and will need replacement or increased maintenance. Another 12% of Nevada bridges were constructed in the 1970s, so the trend of bridges exceeding the 50-year design life will continue for the next 20 years. Maintaining bridges that have exceeded their lifespans is often costly, but replacement is expensive too. Annually, Nevada replaces an average of two bridges that have exceeded their design lives, a rate that is not enough to keep pace with the future number of bridges approaching 50 years or more.



PUBLIC SAFETY & RESILIENCE

Nevada has been addressing seismic vulnerability for the past 20 years. NDOT has engaged in a bridge seismic retrofit program during that time and has performed seismic retrofits on more than 150 bridges, with another 82 bridges on high priority. As an added measure of safety, for the past two decades, NDOT has required that all new bridges are designed to withstand a minimum of the third highest level Seismic Design Category “C” regardless of the bridge location in the state.

INNOVATION

Nevada has utilized several innovative bridge technologies. For example, improvements to the I-15 exit 120 in Mesquite utilized a bridge slide to replace the existing bridges in this service interchange to minimize the traffic impacts to I-15. Meanwhile, the Galena Creek bridge on I-580 uses pop-up de-icing sprayers in the bridge deck to prevent icing of the bridge, which crosses the Galena Canyon and is subject to freezing temperatures and wind gusts over 100 mph.

On the Virginia Street Bridge over the Truckee River in downtown Reno, the contractor constructed the tied-arches on the river bank and slid them across the river. This was done to avoid the possibility of flood waters collapsing the falsework in the river if the bridge had been constructed in place and provided an easily accessible work area instead of over the river.



Photo courtesy of Regional Transportation commission of Southern Nevada

RECOMMENDATIONS TO RAISE THE GRADE

While Nevada's bridge network is among the best in the country, there are several areas of potential improvement.

- Fund the Nevada State Infrastructure Bank to provide more funding for bridge maintenance and repairs since a higher number of bridges will reach 50 years of age or greater during the next 10-20 years.
- Nevada will need a solid funding strategy to deal with the dual issues of a growing number of bridges reaching their 50-year design life and the potential increase in new bridges and roads that comes with population growth. Nevada should develop and implement a program and secure funding sources specific to bridge repair and replacement to address both of these challenges. This may become necessary as Nevada implements the new I-11 corridor from Las Vegas to Reno, which could draw funds away from bridge repair and replacement.

FIND OUT MORE

2017 Report Card General Recommendations
<http://www.infrastructurereportcard.org/solutions/>

2017 Bridges Chapter with Category-Specific Recommendations
<http://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Bridges-Final.pdf>

2017 Nevada Department of Transportation State Highway Preservation Report
<https://www.nevadadot.com/doing-business/documents-and-publications>

FHWA National Bridge Inventory System
<https://www.fhwa.dot.gov/bridge/nbi.cfm>



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DAMS



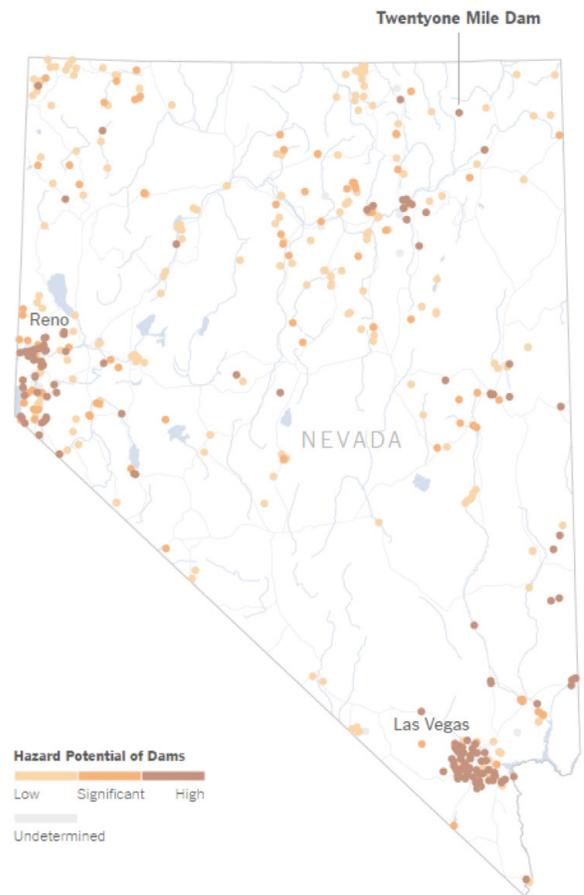
EXECUTIVE SUMMARY

Nevada has a total of 656 state regulated dams, 154 of which are considered to have “high hazard” potential. A high hazard dam is defined as a dam whose failure would cause loss of life and significant property damage. In addition to the 656 state regulated dams, there are also 282 dams in Nevada that are either federally managed or below the jurisdictional threshold to be managed by the state. In a condition rating assessment published by the Association of State Dam Safety Officials for the state of Nevada, 95% of the state-regulated dams with a high hazard potential had a condition assessment rating in the National Inventory of Dams. Over 80% of these dams received a condition rating of either Satisfactory or Fair. Approximately 9% of these dams received a condition rating of either Poor or Unsatisfactory. Unfortunately, the dam safety budget for high hazard dams is only about half of the national average, when comparing services such as inspections, legislation, and EAPs. Additionally, the number of agency staff per high hazard dam is approximately half of the national average.

CONDITION & CAPACITY

Communities in western states such as those in Nevada rely on a consistent, predictable supply of water for residential, commercial, irrigation and recreational purposes. Nevada’s dams not only provide water for these purposes, but also play a significant role in debris and flood control systems, waste impoundment, and power generation. In the state of Nevada, the State Engineer, through the State of Nevada Division of Water Resources, is responsible for dam safety of the 656 state regulated facilities. Additionally, the federal government, through the U.S. Army Corps of Engineers, Bureau of Indian Affairs and Bureau of Reclamation, are responsible for the safety of 62 dams in the state. Nevada’s dam safety program is intended to reduce the risk to life and property from dam-related hazards.

The majority of dams in Nevada are owned by private entities, followed by local governments, federal entities, public utilities, and the State. Nevada has a total of 656 state-regulated dams. As reported by the U.S. Army Corps of Engineers National Inventory of Dams (NID), the majority of these dams are earth dams, over half of which are used for flood control and irrigation purposes. The remaining dams are used for mine tailings impoundments, fish and wildlife support, water supply, fire protection, recreation, hydroelectric, and other purposes.



State regulatory agencies and federal owners and regulators report dams to the NID. The NID includes dams based on dam height, total storage, and the potential for downstream damage should a failure occur. The NID classifies dams by hazard potential: high, significant and low. To be classified as a high hazard potential dam, the loss of human life is likely if the dam fails; to be classified as a significant hazard potential dam, there would be no potential loss of human life, but economic loss, environmental damage, disruption of lifeline facilities, or other non-life-threatening impacts would occur. Any other dams would be classified as low hazard. The NID contains the 656 state-regulated dams in Nevada. One hundred fifty-three are classified as high hazard, 91 as significant hazard, and 412 as low hazard.

Construction of most dams in Nevada was completed after 1950, and with a typical design life ranging from 50 to 100 years, active inspection and maintenance programs become more important to maintain the safe operation of these dams well beyond their design life. In a condition rating assessment published by the Association of State Dam Safety Officials for the state of Nevada, 95% of the state-regulated dams with a high hazard potential had a condition assessment rating in the NID. Over 80% of these dams received a condition rating of either Satisfactory or Fair. Approximately 9% of these dams received a condition rating of either Poor or Unsatisfactory. Adequate staffing of state dam officials is important to continuing outreach and inspection programs, so that state officials can continue work with dam owners regarding the condition and on-going maintenance of these dams and increase the awareness of the public regarding the risks associated with dams. Fortunately, no major failures, related loss of life, nor significant loss to downstream property has been reported in Nevada, so public perception of dams remains relatively neutral.

O&M, FUNDING & FUTURE NEED

While a majority of Nevada's dams have a satisfactory rating, it is estimated that rehabilitation and future maintenance of Nevada's most critical dams will cost upwards of \$40 million. However, as of 2015, Nevada's dam safety state budget was only around \$277,000. These funds are only available to conduct inspection and manage the Dam Safety Program for the inventoried and state-regulated dams. As with most other states, over 50% of dams in Nevada are privately owned. Without additional funding opportunities to help private dam owners inspect and maintain their facilities, there will likely be incidences similar to the one Nevada saw at 21 Mile Dam in Montello, Nevada in February of 2018.

21 Mile Dam Failure – Montello, Nevada (Source: Stuart Johnson, Deseret News)



PUBLIC SAFETY & RESILIENCE

Emergency Action Plans (EAPs) identify conditions at a specific dam and outline preplanned actions to be followed to help prevent loss of life and minimize property damage should a failure occur. The EAP also specifies actions for the owner to take regarding moderating or mitigating potential issues at their dam. State officials work with local entities and dam owners to prepare new and update existing EAP's.

Of the 154 High Hazard Potential Dams in Nevada, approximately 84% have EAPs in place. The owners of the high hazard dams that don't have an EAP on file are either working on an EAP or in the process of decommissioning the subject facility.

However, Nevada's dam safety program only employs three full-time staff members (FTE), which puts Nevada well behind the national average for state regulated high hazard potential dams per FTE. Furthermore, Nevada's budget for high hazard dams is also well below the national average for both budget per regulated dam AND budget per regulated high hazard potential dam. Additional staff and funding is needed to help with continuing inspection, legislation, EAPs and outreach programs.

RECOMMENDATIONS TO RAISE THE GRADE

- Education and risk awareness related to dams should be an important goal of Nevada's dam safety program. Dam owners and operators need to be aware of Nevada's dam safety laws and regulations and should be held liable for any damages caused by neglect or inattention.
- Local emergency management officials should be aware of the risks associated with upstream dams and should have emergency action plans in place should there be a breach somewhere upstream. Though 84% of Nevada's high hazard dams have an emergency action plan in place, the national goal is 100%. In order to meet this goal, funding should be increased to allow for continual condition assessment and emergency action plan development for high hazard dams across the state.
- Additional funding is needed to bridge the gap between the state's dam safety budget and the national average. This would allow for the state program to employ additional staff and provide additional services to the public and other entities. This funding can also be used to gain a better understanding of the amount and condition of Nevada's privately-owned facilities.

FIND OUT MORE

<http://water.nv.gov/programshomes.aspx?program=Dams%20and%20Dam%20Safety>

<http://water.nv.gov/DamGuidelinesHazard.aspx>

<https://www.fema.gov/national-dam-safety-program>

http://nid.usace.army.mil/cm_apex/f?p=838:3:0::NO

file:///ASCE%20NV_PerformanceReport_v2.pdf

<http://www.damsafety.org/Nevada>

<http://irjci.blogspot.com/2017/02/more-than-70-of-us-dams-will-be-50.html>



DRINKING WATER



EXECUTIVE SUMMARY

Nearly three-quarters of the population of Nevada lives in the Mojave Desert, a region that receives less than six inches of rainfall annually. The remainder of the state is considered “semi-arid” and can be subjected to intermittent periods of drought. These conditions require long-term planning to ensure that water resources remain renewable, reliable and sustainable. The 6th Drinking Water Infrastructure Needs Survey and Assessment issued by the EPA reported that Nevada will require \$5.316 billion for water system improvements over the next twenty years, three quarters of which will be needed for large capacity systems. Though much of Nevada’s existing drinking water infrastructure is new in relation to the national average, the projected growth for the Las Vegas and Reno areas requires a level of investment that exceeds what has been the trend over the past decade. Nevada’s rural areas have struggled to keep up with their water systems needs due to lack of resources and funding, which is an on-going theme in all aspects of infrastructure in the state.

CONDITION & CAPACITY

SOUTHERN NEVADA

Southern Nevada is served by Southern Nevada Water Authority (SNWA), a water wholesaler, which represents seven member agencies. SNWA is responsible for water treatment and delivery to the individual agencies who then operate distribution systems to their customers. Approximately 90% of water used in the Las Vegas Valley comes from Lake Mead with the remaining 10% coming from groundwater sources.

The Las Vegas Valley Water District (LVVWD) comprises more than 6,500 miles of pipeline, 53 pumping stations, 70 reservoirs/tanks, 76 production wells and approximately 400,000 customer water meters. It is the largest service provider in the area with approximately 1.4 million customers. Starting in 2007 and coinciding with the economic recession, LVVWD switched from construction of new facilities to a robust asset management program, which helps them prioritize necessary repairs. LVVWD also operates the Big Bend Water District that serves a population of 9,000 in Laughlin, Nevada.

The City of Henderson provides about 15% of its community drinking water through a 15 MGD treatment plant. Henderson also receives its water from Lake Mead; the treatment process includes filtration and disinfection with ultraviolet (UV) light which reduces the amount of chlorine needed to maintain water quality.

NORTHERN NEVADA

Truckee Meadows Water Authority (TMWA) is a public authority providing water services in the Truckee Meadows of Washoe County in Northern Nevada, which serves more than 330,000 residents. The Authority is governed by a seven-member Board of Directors, appointed by the cities of Reno and Sparks and Washoe County.

TMWA’s water sources include Lake Tahoe, upstream reservoirs, the Truckee River and tributaries, and wells, all of which provide source water that is of high quality, meeting, and in many cases exceeding, all required standards. A Water Quality Assurance program has been implemented to ensure this high standard continues to be met in the future. While there is a risk to source water reliability from turbidity and toxic spill events, TMWA has sufficient well capacity and distribution storage to meet customer demands during a water quality emergency; additional actions are available to TMWA in the event of extended off-river emergencies. An earthquake in 2008 tested TMWA’s emergency response plan with a loss in water supply and demonstrated TMWA’s ability to respond by having trained staff and available alternate water supplies. TMWA has a robust Source Water Protection Program in place designed to preserve and enhance available surface water and groundwater supplies and to address known and potential threats to water quality.



RURAL NEVADA

In 2017, the Nevada Department of Environmental Protection (NDEP) Bureau of Safe Drinking Water reviewed compliance data from 598 public water systems based on State and Federal regulations. All systems that exceeded maximum containment levels were considered non-compliant. Twenty eight systems were non-compliant with primary drinking water standards and 25 communities were non-compliant with secondary drinking water standards. The table below is the summary of findings from the subsequent report.

Table 1. Non-compliant Water System

Level	Contaminant	Number of Public Water Systems Non-Compliant	Population Size
Primary	Lead	2	36-1040
	Copper	2	40-1512
	Antimony	1	38
	Arsenic	18	40-1024
	Nitrate	5	50-100
	Organic Chemicals	1	40
	Disinfection Byproduct	1	574
	Total Coliform	2	25-40
	E. Coli	1	70
	Secondary	Manganese	8
Total Dissolved Solids		5	25-386
Fluoride		3	38-90
Iron		5	25-60
Chloride		1	41
Sulfate		3	25-150
Odor			250-1240
Aluminum		1	100

The table above illustrates that there is a divide between urban and rural communities in Nevada. The 28 non-compliant communities are all considered rural since their populations are under 10,000 people. Most of these communities rely on well water with limited treatment, and the cost of treatment for some of these items can far exceed the budgets of small community public water systems. Overall, however, Nevada’s public water systems are providing high quality water within stable infrastructure as only 0.05% of the state’s public water systems were out of compliance.



O&M & FUNDING

SOUTHERN NEVADA

To finance capital projects associated with system maintenance and expansion, the LVVWD uses funds generated through a combination of bond proceeds, water rate revenue and low-interest loans from the State Revolving Fund for drinking water systems. These three revenue streams provide access to funds for necessary improvements and save ratepayers money by reducing interest costs, a benefit of the LVVWD's AA Standard & Poor's rating and Aa1 Moody's rating. As economic activity in the Valley has started to pick up again, the 2017 Capital Improvement Projects are valued at \$616 million over a 10-year planning horizon and include new facilities such as reservoirs and pump stations, asset management including rehabilitation, and water quality improvements.

As population growth has rebounded, agencies are completing projects that have been sidelined in previous years. The City of Henderson's 2018-2023 CIP has about \$61 million set aside for water infrastructure, which includes new and replacement pipelines, reservoir rehabilitations and \$500,000 annually for a service line replacement program. In 2017, the Big Bend Water District Board of Trustees, which oversees a community of 7,300 people, approved recommendations made by a citizens' advisory committee on how to fund necessary improvements needed to maintain Laughlin's water system over the next 10 years. These recommendations included pursuing grants, increasing water rates, and phasing them in to avoid rate shock.

Over the next 10 years, Laughlin's public water system requires approximately \$9.2 million in system improvements, pipeline replacements, treatment upgrades and a new emergency well. These capital expenditures are needed to maintain a reliable water system for Laughlin's residents and businesses who depend on quality drinking water supplies.

NORTHERN NEVADA

The TMWA has developed a 5-year Capital Improvement Program (CIP), focused mainly on operation and maintenance. The 2018-2022 CIP envisions a total of \$172.8 million of spending, with approximately 74.9% or \$129.5 million of this total amount dedicated to upgrades or replacement of existing infrastructure, and approximately 17.2% or \$29.8 million allocated to construction of new water system capacity projects,

The 2018-2022 CIP will rely on various funding sources to pay for capital projects/capital outlays. TMWA relies heavily on revenues generated from water sales, hydroelectric, and other operating sales to fund the majority of projects. Developer contributions have historically been an important funding source for certain construction projects of new and expanded water system capacity. Collection of developer fees (aka "new money") have been at historical lows since the inception of TMWA. TMWA has not been reliant on these fees to fund operations or fund annual principal and interest payments on TMWA's outstanding debt. However, in fiscal year 2017, residential and commercial development activity has accelerated, providing additional resources to fund projects listed in the 2018-2022 CIP for new and expanded service. While acknowledged, TMWA's 2018-2022 CIP does not rely solely on funding from new money at this time. Investment income is also available to augment other revenue sources but is minor in relation to other funding sources.

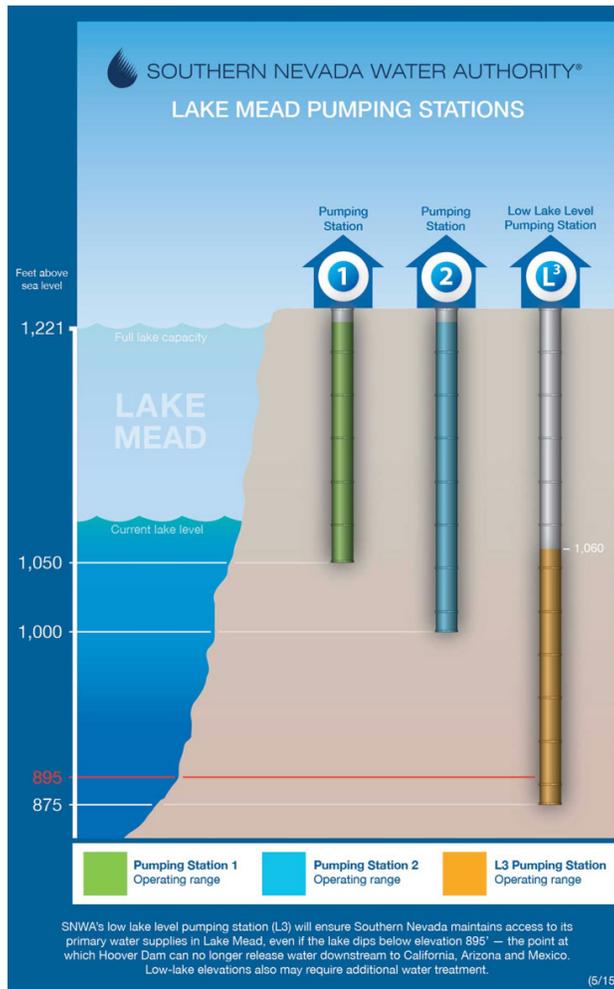


FUTURE NEED

According to the 6th Annual Drinking Water Needs Survey from the Environmental Protection Agency (EPA), Nevada drinking water infrastructure requires a total of \$5.316 billion in needed funding over the next 20 years. Most funding – \$3.964 billion of the total – will be required for large systems.

SOUTHERN NEVADA

SNWA is completing construction on a lower intake, named Intake No. 3, to Lake Mead. Intake No. 3 ensures Southern Nevada’s access to its primary water supply if lake levels continue to decline due to drought conditions. It also protects municipal water customers from water quality issues associated with declining lake levels. In addition to Intake No. 3, construction of a \$650 million low lake level pumping station is underway. This pumping station will ensure Southern Nevada still has access to its primary water supplies in Lake Mead, even if the lake dips below elevation 895’ which is where Hoover Dam can no longer release water downstream to California, Arizona, and Mexico.



Source: Southern Nevada Water Authority



NORTHERN NEVADA

The Truckee Meadows Water Authority's capital improvement plan estimates that there will be upwards of \$172 million for fiscal years 2018-2022. Approximately 74.9%, or \$129.5 million of this total amount, is dedicated to upgrades or replacement of existing infrastructure, and approximately 17.2%, or \$29.8 million, is allocated to construction of new water system capacity projects, conjunctive use construction projects, retrofit of remaining unmetered services, and potential opportunistic acquisition of water rights. However, TMWA may not have sufficient funding to meet all its capital needs each year or may divert funding to meet unexpected capital improvements. If such conditions arise, projects are prioritized based on the effect each project has on TMWA's ability to meet customer demand and maintain water system reliability. They have created three priority categories: Mandatory, Necessary and Contingency.

PUBLIC SAFETY

The public water systems in Nevada have continued to provide very high-quality water to residents within an uncertain water future. Dependence on groundwater sources, especially among rural communities, will need to be monitored as the threat of depleted groundwater sources can threaten communities.

RESILIENCE & INNOVATION

The Las Vegas Valley currently gets 90% of its drinking water from Lake Mead. An innovative approach of return credits has allowed the Valley to grow while not increasing the total volume of water removed. Wastewater from the Valley is treated to very high standards and returned to Lake Mead through the Las Vegas Wash. The volume of water returned is quantified and a credit is given to SNWA. This is indirect reuse of Lake Mead and allows the community to flourish while remaining within the tight water allotment for Nevada. Research already suggests that this method of indirectly reusing wastewater is increasing concentrations of contaminants that might impact the future health of residents. Monitoring and staying in front of the research will be essential to ensure community health for generations to come.

Though record snowfall over the winter of 2016-17 in the mountains surrounding Lake Tahoe in Northern Nevada brought the lake back to nearly full levels, the area remains susceptible to periodic drought. However, with the adoption and success of aggressive conservation programs, Nevada has become a model for sustainability in water supply. This model will continue to be tested, as the quickly growing population and drought will remain to be the two biggest challenges to overcome. These conditions also highlight the elevated importance of a well-maintained and extensive drinking water infrastructure.



RECOMMENDATIONS TO RAISE THE GRADE

- In both Southern and Northern Nevada, conservation efforts have been so effective that revenues from water sales are at all-time lows. Therefore, creative and innovative strategies must be explored to ensure funding sources remain available for capital improvement projects. These may include developer contributions, bonding, or collaboration with other government entities.
- In rural communities, alternative and/or additional treatment methods should be considered to bring drinking water into federally compliant standards.
- In areas of the state that have more abundant watershed resources, improved drainage systems and storage capacity can help preserve water as a resource in particularly wet seasons instead of a hazard due to runoff.

FIND OUT MORE

https://ndep.nv.gov/uploads/water-drinking-consumers-source-docs/2018Q1_PWS_Non-Compliance_Summary.pdf

Truckee Meadows Water Authority (2017). Five Year Capital Improvement Plan: Fiscal Year 2018-2022. Accessed from <https://tmwa.com/wp-content/uploads/docs/financial/2017-2021CIP.Packet.pdf>

<https://tmwa.com/article/where-does-tmwa-get-their-water-supply/>

Truckee Meadows Water Authority (2016). 2016-2035 Water Resource Plan: Volume I Abstract. Accessed from https://tmwa.com/docs/your_water/2035WRP/_2035_WRP_VolumeI_Abstract_Final.pdf

Drinking Water Infrastructure Needs Survey and Assessment - 6th Report to Congress
https://www.epa.gov/sites/production/files/2018-10/documents/corrected_sixth_drinking_water_infrastructure_needs_survey_and_assessment.pdf



NEVADA 2018
INFRASTRUCTURE
REPORT CARD



ENERGY



EXECUTIVE SUMMARY

Nevada's current energy needs are being met. NV Energy, the state's largest provider of electricity, generates, transmits and distributes about 83% of the state's electrical power, serving 1.3 million customers and over 40 million visitors annually. The public utility has been highly ranked among electric utilities nationwide for service reliability. Because Nevada's energy infrastructure is relatively young, operations and maintenance costs have been reasonable. The state considers itself to be a national leader in development, innovation and commercialization of renewable energy. Nevada has a Renewable Portfolio Standard which mandates that a significant fraction of electricity sold to retail customers comes from renewables. Nevada has been ranked first nationally for installed geothermal per capita. The state's high solar insolation means relatively low costs for solar power generation. Looking ahead, Nevada can benefit ecologically and economically by building its in-state capacity to generate electricity using renewables and by further encouraging innovations in clean, renewable energy for electricity and transportation, and in energy efficiency.

CONDITION & CAPACITY

According to the Governor's office, Nevada's energy consumption by sector in 2017 was 33% transportation, 25% industrial, 23% residential, and 19% commercial. About 88% of the fuel that Nevada consumes for energy comes from outside the state. We find that Nevada's current energy needs are being met. Attention is being paid to improving capacities, improving system redundancies, improving customer experiences while managing costs, and limiting environmental impact.

ELECTRICITY

NV Energy, a public utility owned by Berkshire Hathaway Energy, generates, transmits and distributes about 83% of the state's electrical power, serving 1.3 million customers and over 40 million visitors annually. The rest is provided through retail power marketers, cooperatives, political subdivisions, municipalities, the Colorado River Commission of Nevada, "Behind the Meter" solar providers, and the Western Area Power Administration. The functionality of the State's energy infrastructure can be considered to be quite good, although there are shortcomings in some rural areas.

Statewide, electric transmission lines tie north and south grids, which help with service reliability through energy sharing, managing user costs via enhanced dispatch capabilities, and advancing development of renewable energy sources in remote areas. A new DC line from Wyoming will supply wind-sourced power mainly to California but also to southern Nevada.

High voltage transmission lines, Primm Valley, Nevada (source: flickr/ Stephen Hill, creative commons)



NV Energy has been highly ranked among electric utilities nationwide for service reliability. It emphasizes energy imbalance marketing with neighboring states, grid monitoring and diagnostics, peak demand management, distribution modernization, metering, and customer service including reporting and communications. A rural electric cooperative recently made news with its plans to provide optical fiber broadband communications service to its 45,000 customers scattered across a 6,800-square mile service area.

According to the U.S. Energy Information Administration, Nevada's utility-scale net electricity generation is about 3821K MWh, which represents about 1% of the U.S. share. Of that, 65.2% is derived from natural gas, 28.1% from renewables, and 6.6% from coal. None comes from nuclear or petroleum. Electric consumption in Nevada often exceeds generation, however, with the difference made up by transmission from other states.

NATURAL GAS

In Nevada, natural gas and oil reserves are small, and no coal is produced. An extensive network of natural gas pipelines crosses the state. The fuel is transported from sources and trading hubs in Texas, New Mexico, Wyoming, Idaho, and Oregon. Most of it passes through to other states, primarily California.

Besides being the main source for electricity generation, natural gas heats more than half of Nevada's homes. Most customers are served by one of two investor-owned utilities, Southwest Gas and Sierra Pacific Power Company, now a subsidiary of NV Energy.

Electric utilities have recognized the economic benefits of energy efficiency and resource conservation. For example, Nevada's largest power plant applies high-efficiency combined-cycle technology and recycles three fourths of the water it uses to convert natural gas to electricity.

RENEWABLE ENERGY

The most significant renewable sources contributing to Nevada's utility-scale electricity generation are geothermal and solar. Nevada has been ranked first nationally for installed geothermal per capita. Nevada's high solar insolation yields favorable solar capacity factors – energy generated per installed element – and therefore low costs. For example, the lowest-cost offer of all electric project proposals that NV Energy received in 2015 came from the 100 MW Playa Solar 2 project at a record low rate of \$0.0378/kWh in a 20-year period. Some NV Energy customers can choose to pay a premium in order to be served solely from renewable sources. The State recently approved 129 MW of solar capacity from two new power plants built specifically to serve Apple and Switch.



*Crescent Dunes solar thermal power project
photo courtesy of soloarreserve.com*

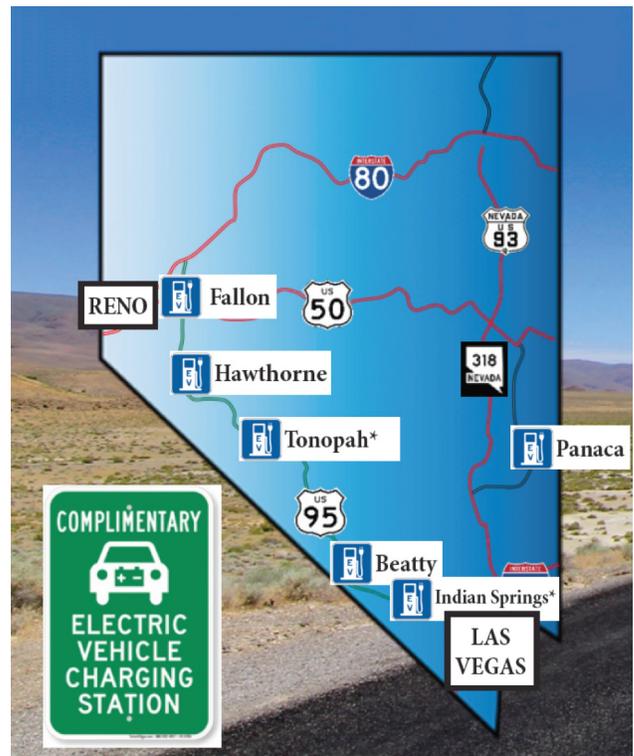


REGULATIONS AND GOVERNMENT PROGRAMS

The goal to become the nation's leading producer and consumer of clean and renewable energy is incorporated in Nevada's Strategic Planning Framework. Related objectives are completing a statewide "electric highway" system, significantly reducing the percentage of imported fossil fuels, and reducing carbon emissions to a level at or below accepted federal standards. Nevada has an office of energy that is dedicated to energy efficiency, renewable energy, and electric vehicles.

- In 2018 Nevada voters passed a measure that would amend the state constitution to require Nevada has a Renewable Energy Portfolio standard which requires that 50% of electricity sales by an electric utility to retail customers comes from renewable energy resources by 2030. The measure will have to pass a second vote in 2020 to take effect.
- Nevada has had a Renewable Energy Tax Abatement program in place since 2009. According to the State of Nevada, by 2017 the program had benefited 30 new large-scale renewable energy projects and one transmission project, which have attracted billions of dollars in economic benefits or in-state investments, including capital investment, jobs, and taxes paid. The program is said to net a 10-to-1 return on the state's investment.
- Nevada has joined with 16 other states in the Governors' Accord for a New Energy Future, enabling collaboration to better capture clean energy opportunities and tackle energy challenges.
- The Emissions Reduction Capacity Replacement Plan, in place since 2013, has driven the state away from coal and into renewable energy resources and natural gas.
- Regarding motor vehicles, the Nevada Electric Highway program is expanding electric vehicle charging infrastructure. Additionally, thousands of fleet vehicles now use alternative fuels, thanks to a federally funded program.
- Regarding energy efficiency and resource conservation, the State has adopted the International Energy Conservation Code. Nevada offers economic incentives for green building of new and renovated non-residential and multifamily residential units. Nevada was ranked sixth nationally in 2015 for Leadership in Energy & Environmental Design (LEED) green building standards. State energy efficiency projects targeting residences have resulted in hundreds of homes being weatherized.

Photo courtesy of Nevada Governor's Office of Energy (http://energy.nv.gov/Programs/Nevada_Electric_Highway/)



The move toward renewables has not been without challenges. Fees and structures for management by the public utilities of net metering for residential solar customers have fluctuated drastically over recent years, generating considerable controversy. Several major consumers have negotiated release from NV Energy, allowing them to buy their electricity on the open market. The Clark County school district, fifth largest in the nation, has considered following suit. Residential customers are not allowed to leave.

A statewide New Energy Industry Task Force, convened in 2016, produced 27 legislative and policy recommendations relating to rooftop solar and net metering, community solar, integrated resource planning, clean energy financing, distributed generation pilot and demonstration programs, energy efficiency incentives, and participation in regional energy markets and trading mechanisms. Five of the energy-related bills that were passed into law in the 2017 legislative session were directly tied to the Task Force recommendations.

O&M, FUNDING & FUTURE NEED

Because most of Nevada's energy infrastructure is quite young (consider that the state population has increased seven-fold in the past fifty years), operations and maintenance costs have been reasonable. However, the utilities are not on pace with demand, which is growing from both industrial and residential sectors. NV Energy recently has issued requests for proposals for more than 500 MW of renewables-based energy. Still, dependence on natural gas imported from out of state will continue for the foreseeable future.

PUBLIC SAFETY, RESILIENCE, & INNOVATION

Public safety and resilience benefit from the youth of the state's energy infrastructure. The state is also fortunate to have relatively low exposure to natural hazards; Nevada's most pressing natural hazard to energy infrastructure is likely its moderate earthquake seismicity. As noted, most of the fuel that Nevada consumes for energy comes from outside the state, and Nevada often imports electricity. Nevada can continue to reduce its dependency on others and on fossil fuels by investing in Nevada-generated renewables, mainly geothermal and solar. Nevada has been improving redundancy in its energy supply network. The NV Energy utility embraces modern technology that enhances public safety, resilience and sustainability while also managing costs. For example, advanced metering allows them to pinpoint outages.



RECOMMENDATIONS TO RAISE THE GRADE

- Nurture and grow renewable energy in Nevada: The State is rich in potential for renewable energy, especially geothermal and solar. Capitalizing further on the opportunity will improve its economic outlook, especially as costs for renewables continue to decline, by reducing energy costs in Nevada, which directly benefits residents and also attracts business – and by producing a valuable export. Renewable energy also improves environment by reducing carbon footprint. The State can reduce reliance on costly and vulnerable large-scale transmission infrastructure by embracing distributed energy resources.
- Balance supply and demand: Reduce reliance on other states for electricity and for fuel to generate electricity in-state. Further addressing efficiency will also help.
- Educate the public about energy: Wise use of energy is up to everyone. The State can help to educate its people about opportunities and pitfalls related to energy generation and wise consumption.
- Pursue sustainability certifications: State utilities have yet to adopt Envision or another sustainability certification. Following these programs in full or even in spirit will raise awareness of issues related to environment and society that can be applied to energy infrastructure, often to economic benefit.
- Tighten targets on emissions: Current state policy is satisfied if Nevada meets federal standards for carbon emissions. Given its abundances in geothermal and solar energy, Nevada can be a leader in reducing emissions far below federal standards.
- Clean vehicles: Continue advancing beyond federal incentives to reduce fossil fuel consumption in the transportation sector. The Electric Highway initiative is a progressive step.

FIND OUT MORE

State of Nevada Status of Energy Report 2017

[http://energy.nv.gov/uploadedFiles/energynvgov/content/About/2017%20SOE%20v10.4%20\(High%20Res\).pdf](http://energy.nv.gov/uploadedFiles/energynvgov/content/About/2017%20SOE%20v10.4%20(High%20Res).pdf)

Nevada State Energy Profile 2017, US Energy Information Administration

<https://www.eia.gov/state/print.php?sid=NV>

State Leadership Driving the Shift to Clean Energy: 2016 Update, Georgetown Climate Center

http://www.georgetownclimate.org/files/report/GCC_State_Leadership_Driving_the_Shift_to_Clean_Energy_11Nov2016.pdf

New Energy Industry Task Force Existing Infrastructure and Modernization of the Electric Grid, NV Energy, March 22 2016

<http://energy.nv.gov/uploadedFiles/energynvgov/content/Programs/NVE%20Presentation.pdf>





PUBLIC PARKS



EXECUTIVE SUMMARY

Nevada is the seventh largest state in the country by area. Approximately 85% of Nevada’s land is owned by the federal government, open for public use, giving our state the title of having the highest percentage of public land in the contiguous United States. Additionally, with approximately 24 acres of land per resident and approximately 87% of the population living within the Reno or Las Vegas metro areas, Nevada is also one of the least densely populated states in the country. The state has mostly recovered from the Great Recession with revenue for parks increasing steadily over the past 10 years. However, funding for improvements to the state’s recreation areas, in addition to funding new facilities for a growing population, will continue to be the main challenge for local, state, and federal agencies who operate recreation areas in Nevada.

CONDITION & CAPACITY

The Bureau of Land Management (BLM) owns 47 million acres of Nevada’s land, which equates to approximately 67% of the state’s total area. The U.S. Forest Service (USFS) owns 6.8 million acres (10%), the National Park Service (NPS) owns 3 million acres (5%). The remainder (150,000 acres or less than 1%), is owned by the Nevada Division of State Parks (NDSP). NDSP maintains recreational lakes and reservoirs which comprise approximately 492,000 acres. Nevada also contains several thousand miles of maintained multi-use trails, with approximately 1,000 miles of trails within the Las Vegas Valley alone.

The table below summarizes the types of protected parkland that Nevada has throughout the state.

NEVADA PUBLIC RECREATION AREAS (2018)

Types of Recreation Areas	Quantity
National Parks	2
National Monuments	3
National Conservation Areas	3
National Forests	3
National Historic Trails	3
National Recreation Areas	1
National Heritage Areas	1
National Natural Landmarks	6
National Wilderness Areas	42
National Wilderness Study Areas	57
State Parks	17
State Recreation Areas	7
State Wildlife Management Areas	12
Municipal Parks & Recreation/Special Use Facilities	1000+
Recreational Lakes and Reservoirs	10
USACE Recreational Reservoirs	2*

**Both USACE reservoirs are currently dry*



Currently, the Las Vegas metro area contains approximately three acres of municipal parks per 1,000 residents, and the Reno metro area contains approximately eight acres of municipal parks per 1,000 residents. It should be noted that 10% of the Las Vegas metro population resides within master-planned communities which contain several hundred acres of privately owned and maintained parks, but park land statistics do not include privately owned facilities. Therefore, it is estimated that the actual amount of park land within the two metro areas is closer to the national average of 10 acres per 1,000 residents. Local agencies within both metro areas have stated goals to increase municipal park land acreage per capita; however, with high rates of population increases, significantly more park land will be required in order to increase per capita percentages.

Nevada's protected open spaces are increasing. Since 2014, Nevada has added a new national park and two new state parks with a combined area of over 12,350 acres. Additionally, legislation has been introduced to secure an additional 130,000 acres of national wilderness areas.

Out of the 59 million people who visit Nevada each year, 15 million (25%) visit national and state parks. It is estimated that 57% of Nevadans participate in outdoor recreation (10% higher than the national average) and it is also estimated that 1 million people participate in wildlife-related recreation (hunting, fishing, wildlife watching activities, etc.). As a result, outdoor recreation is estimated to generate \$12.6 billion in consumer spending, support 87,000 direct jobs, and generate \$1.1 billion in state and local tax revenue. These trends are only increasing; visitors to national and state parks have increased by 20% since 2012, with locations like Red Rock Canyon National Conservation Area experiencing a 150% increase since 2012, and Lake Mead National Recreation Area experiencing a 23% increase since 2012. Red Rock Canyon is the most visited and heavily recreated national conservation area within the BLM with 2.5 million visitors in 2017, and Lake Mead is the sixth most visited recreation area in the nation with 8 million visitors in 2017.

As most of Nevada's visitors and residents are concentrated near the Reno and Las Vegas metro areas, so-called "park deserts" are forming, where some parks are isolated and suffer due to lack of resources while other parks are overused and demand additional resources. This is an issue that is not uncommon throughout the country, and one that could be mitigated with the implementation of a comprehensive database that tracks usage, funding, needs, etc.; however, one does not exist yet. Another challenge for park administrators is the effects of climate change. Warmer weather patterns impact the migrating recreation seasons, influencing trail conditions, staffing requirements, maintenance needs, but also possibly having a positive influence on revenue due to longer seasons.

FUNDING, O&M, FUTURE NEED

Several different government agencies own and operate parks in Nevada, each with different funding sources, including: federal/state/local general funds, federal grants, bonds, donations, and user fees. Over 50% of NDSP's budget is funded by the Nevada general fund, approximately 42% is self-generated (by user fees, etc.), and only 1% is obtained from federal funds. Nevada's budgets for NDSP and DCNR have both increased by 65% and 43%, respectively, since the previous 2015 biennium budget, giving the NDSP \$19.5 million in funding, and the DCNR \$133.3 million in funding, over the next two years. Similarly, local government agencies have increased funding for parks and recreation as tax revenues have continued to increase over the past several years. However, government agencies in Nevada are still recovering from the extreme revenue and budget losses incurred during the Great Recession, so the backlogs of projects continue to exceed the annual budgets across all entities.

On the federal level, many parks operate with large funding shortages, yet some parks (while rare) operate with funding surpluses. Using Lake Mead and Red Rock as the examples again, Lake Mead has an annual deferred maintenance backlog of \$200 million, making it one of the highest in the nation (nationwide, NPS operates with an annual \$12 billion backlog), while Red Rock is operating with an annual surplus. Since 2011, Red Rock Canyon has spent over \$50 million on improvements, including a new visitors center, flood control facilities and a flood communications system, parking improvements, and ongoing studies for transportation, fossils, and visitor capacities.

Nevada also has several programs that help generate or direct federal revenue down to the state and local levels, such as (but not limited to): the Southern Nevada Public Lands Management Act, which allows the BLM to sell public land within a specific boundary around Las Vegas, and the proceeds are used, in part, to fund parks, trails, and natural areas around the state; Statewide Comprehensive Outdoor Recreation Plan, which serves as a guide for all public outdoor recreation programs and is required to be updated every five years in order for the state to receive critical federal grants; and Payments in Lieu of Taxes, which makes payments to local governments to offset the loss of tax revenue caused by the presence of tax-exempted federal land within their boundaries.

A 2018 report by the Division of State Parks found that roughly 30% of visitors to state parks did not pay their required entrance fees. This resulted in a conservative estimate of \$1.2 million in lost revenue in 2017. Compliance at some parks was better than others; nine parks boasted an estimated compliance of 90% or higher, while other parks, such as Cave Rock Park in Lake Tahoe and Echo Canyon only reported 23% and 36% compliance rates, respectively.

RESILIENCY

Due to the drought conditions experienced over the past 20 years in Nevada, many government agencies have had to utilize creative design and planning techniques to make parks and recreation areas more drought tolerant. Many urban parks are being built with turf grass, and local flood control detention basins are being used as multi-use recreation facilities with athletic fields, skate parks, and play areas.

Several organizations exist in Nevada which aid government agencies in long-term, sustainable planning, such as:

- Southern Nevada Strong which is a collaborative regional planning effort to develop support for long-term economic success and stronger communities;
- ImpactNV which serves as a sustainability voice and helps to create innovative partnerships among businesses, government, and non-profits; and
- Nevada Shade Tree Council which serves as the advisory board for the NDF Urban and Community Forestry Program.



INNOVATION

Over the past several years, marketing and advertising for outdoor recreation in Nevada has increased significantly, especially by the State Department of Tourism, which uses the slogan “don’t fence me in,” and heavily promotes Nevada’s vast outdoor recreation opportunities to visitors. To help increase revenue, the NDSP is now offering a “passport” for entry into all state parks at a discounted rate. The new program was implemented in 2017 and was modeled after the State of Michigan, which implemented a similar program and experienced a significant increase in revenue. Additionally, agencies like BLM have conducted research on user fees, and it has been concluded that the current fees at Red Rock Canyon are far below those charged at other comparable sites. Therefore, the BLM recently announced that user fees at the Red Rock Canyon will increase in 2018 and again in 2023 to keep up with future funding needs.

RECOMMENDATIONS TO RAISE THE GRADE

- O&M remains the single biggest infrastructure challenge for parks, so it is important that administrators ensure that existing facilities receive adequate maintenance and improvements.
- Creating statewide and urban-regionwide asset management plans would allow agencies to better allocate funding and resources for the vast array of public land within Nevada.
- As demand for parks continues to increase and budget cuts from the Great Recession have not been entirely recovered, it is important for government agencies to continue seeking innovative funding and facilitation solutions – public and private-as well as continue increasing user fees at high-demand locations.
- Federal legislation for the large NPS funding backlog should be passed to help address deferred maintenance.
- Install self-pay kiosks that accept credit and debit cards at state parks to boost entrance fee payment compliance rates.

FIND OUT MORE

<http://parks.nv.gov/>

<http://nvculture.org/>

<https://www.nps.gov>

<https://www.blm.gov/>

<https://outdoorindustry.org>

<http://sns.rtcnv.com/>

http://budget.nv.gov/uploadedFiles/budgetnvgov/content/StateBudget/2018-2019/FY2017-2019_GovExecBudgetBook-Online.pdf



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ROADS



EXECUTIVE SUMMARY

There is over 32,000 miles of roadways in Nevada. The average condition of these roads is fair. The state faces a \$450 million backlog of road and bridge repairs, mostly due to needed repairs in rural areas. Roads and bridges that are deficient, congested, or lack desirable safety features cost Nevada motorists a total of \$3.2 billion statewide annually. Higher vehicle operating costs, traffic crashes, and congestion-related delays can cost drivers \$1,744 per year in the Las Vegas urban area, while Reno-Tahoe motorists lose an average of \$1,192 per year. While the state’s gas tax hasn’t been changed since 1992, voters in the two largest urban counties in the state - Clark County and Washoe County - approved ballot measures raising funds for roads in recent years. Looking forward, the state needs to make robust, strategic investments in its roadways to accommodate the expected population growth.

CONDITION & CAPACITY

The Nevada Department of Transportation (NDOT) maintains 5,435 miles of state highways. According to Highway Statistics 2016 from Federal Highway Administration, the total public road lengths in rural areas is 32,299 miles and in urban areas is 10,283 miles. Although the state-maintained roadway network consists of only 13% of the roads in Nevada, the network is overwhelmingly important, as 51% of all automobile traffic and 74% of all heavy truck traffic travel on these roads.

NDOT classifies state roadways into five prioritization categories. The current pavement condition goal is to maintain a minimum of 95% of roads in fair or better condition in each road prioritization category. The majority of the pavement in road categories 1 through 4 is in fair or better condition. The majority of pavement in road category 5 is in mediocre or worse condition.

Category	Type	Percentage of Roadway Maintained at “Fair or Better” Condition as of 2016
Category 1	Freeways	98.2%
Category 2	Expressways	94.2%
Category 3	Regional Highways	96.5%
Category 4	Rural Highways	81.3%
Category 5	Principal Arterials	49.0%

The largest metropolitan areas, and where the majority of the population is concentrated, includes Las Vegas, Henderson, and North Las Vegas in Clark County and Reno in Washoe County. Roads and bridges that are deficient, congested or lack desirable safety features cost Nevada motorists pay a total of \$3.2 billion statewide annually. Higher vehicle operating costs, traffic crashes, and congestion-related delays can cost drivers \$1,744 per year in the Las Vegas urban area, while Reno-Tahoe motorists lose an average of \$1,192 per year. These costs are well above the national average of \$533 per driver. Vehicles miles of travel increased 48% in Nevada between 2000 and 2015, the largest increase in the nation, in part due to a population increase in the area.

	Vehicle Operating Costs	Safety	Congestion	Total
Las Vegas	\$356	\$404	\$984	\$1,744
Reno-Tahoe	\$482	\$327	\$383	\$1,192
STATEWIDE TOTAL	\$812 Million	\$804 Million	\$1.6 Billion	\$3.2 Billion

O&M AND FUNDING

From snow removal and accident traffic control to repaving and repainting, NDOT performs nearly 100 different types of road maintenance-related tasks. These tasks help ensure public safety and mobility. And through many of these tasks, NDOT protects and upkeeps state roads with expertise, dedication and a recognition of the invaluable public investment of each roadway.

NDOT’s maintenance work are categorized into three areas: Routine Maintenance, Capital Improvement, and Emergency Categories. A \$216.1 million expenditure was invested for maintenance and rehabilitation repair work in fiscal years 2015 and 2016. This expenditure included \$130.8 million investment of state funds, \$85.2 million investment of federal funds, and \$0.1 million investment of funds from other sources. More than \$187 million of repair work was contracted out to private contractors and \$29 million of repair work was performed by NDOT Maintenance personnel. The \$187 million of contracted repair work restored 450 total miles of pavement to acceptable condition levels. Of the 450 total miles of improved pavement, maintenance repair work was performed on 348 miles and rehabilitation repair work was constructed on 102 miles. Figure 2 displays the funding sources and construction expenditures information that includes both maintenance and rehabilitation repair work for fiscal years 2015 and 2016.

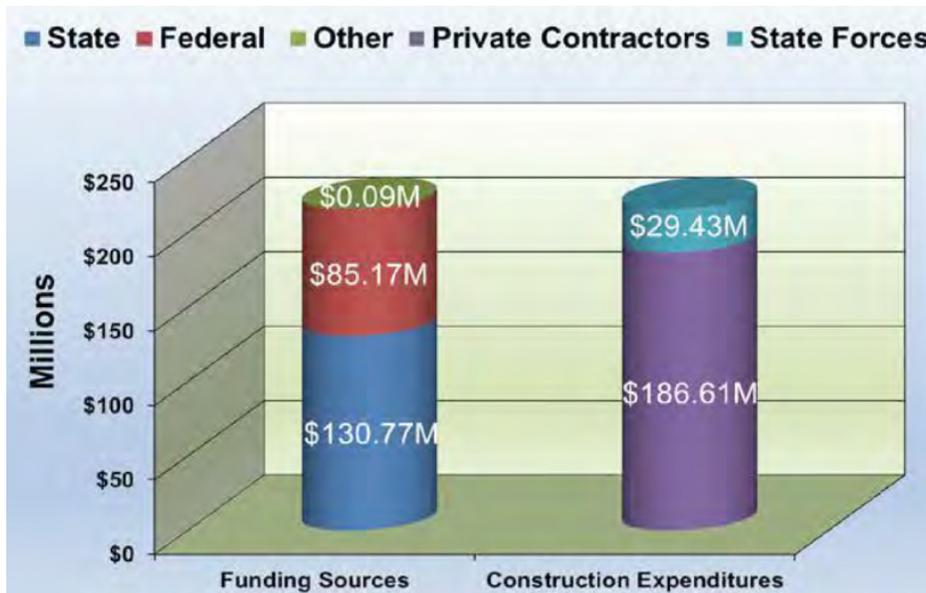
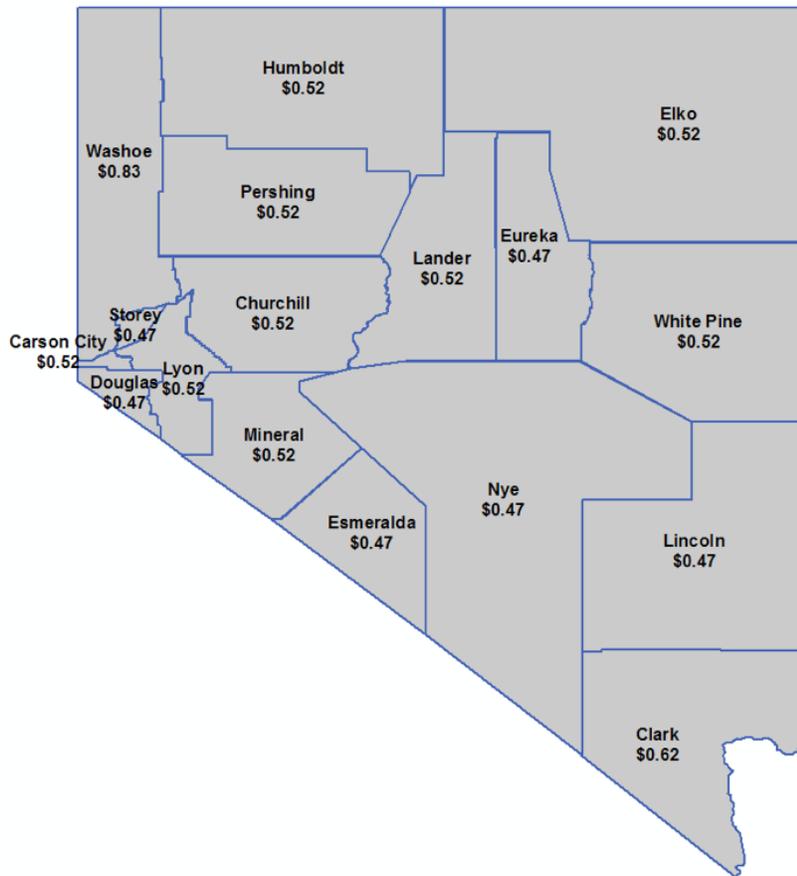


Figure 2: Funding Sources and Construction Expenditures

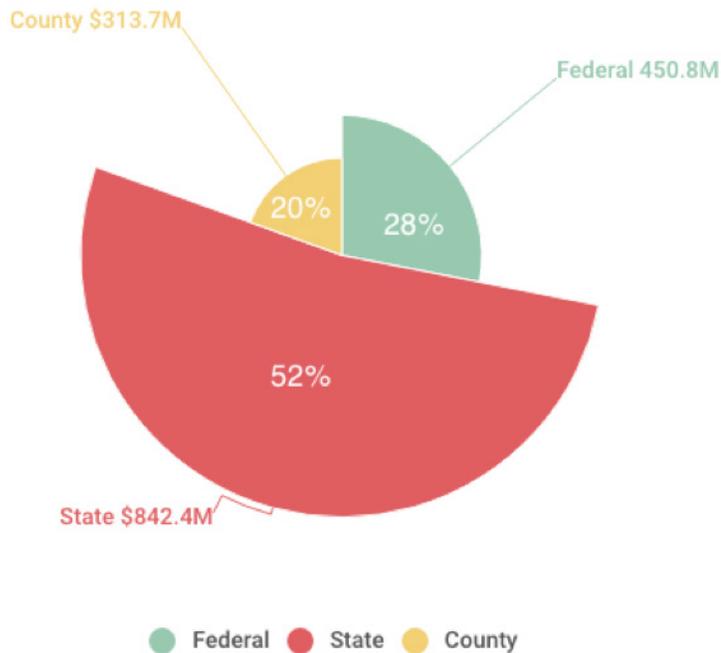
The Nevada Department of Transportation works hard and effectively to clear Nevada roads for safe winter travel, with maintenance experts plowing and applying anti-icing and deicing chemicals and sand to keep winter roads safe for winter driving.

The funding for roads for the State of Nevada is primarily funded by gas and diesel taxes. The state gas tax and diesel tax is currently 24 cents per gallon and 28 cents per gallon, respectively, and hasn't been changed since 1992. Due to inflation, the purchasing power today is 13 cents per gallon. Voters in the two largest urban counties in the state - Clark County and Washoe County - approved ballot measures raising funds for roads. Clark County approved a fuel tax measure in November 2016 that will raise the motor fuels tax by 3.6 cents per gallon annually for 10 years, raising \$3 billion for road funding. Washoe County voters approved a similar fuel revenue indexing bill in 2010. A map is shown below with gas taxes by county.



Map of Gas Tax Per County in State of Nevada

The funding from local areas has increased significantly with the passage of recent bills and will continue for quite a few years. However, funding for rural counties remains low which impacts freight across the state and the areas outside urban areas of Las Vegas and Reno.



Road Funding in State of Nevada (based on 2015 report)

Nevada transportation officials say most of the state’s \$450 million backlog of road and bridge repairs is in rural areas, but a small slice of that needed work involves some of the highest traffic areas. Busy roads across the state account for \$10 million of the repair backlog. The vast majority of the work is dedicated to rural roads and streets that see fewer than 1,600 vehicles daily.

The costs for maintenance and rehabilitation repair work on highways fluctuate from year to year. The periodic year-to-year fluctuations are typically due to price spikes in the costs of steel and energy. However, the costs for maintenance and rehabilitation repair work on highways always increase over the long-term.

FUTURE NEED

Las Vegas has a challenge most communities would like as their own: a strong industry in need of greater connectivity. As the federally-designated transportation planning agency for Southern Nevada, the Regional Transportation Commission (RTC) develops the Regional Transportation Plan (RTP) to guide the region's future multimodal transportation system. The new 2040 RTP is a 20-year transportation action plan for Southern Nevada. By the year 2040, the region is expected to grow by roughly 700,000 people and support nearly three million residents, excluding the 43 million annual visitors, 60% of which drive.

The state needs to make robust, strategic investments in its roadways to accommodate this projected growth. Fortunately, Las Vegas is planning for an Eastern Beltway. Additionally, initial plans are underway to build out the Sheep Mountain Highway. These enhancements should improve the state's ability to move increasing volumes of goods and a growing population.

PUBLIC SAFETY

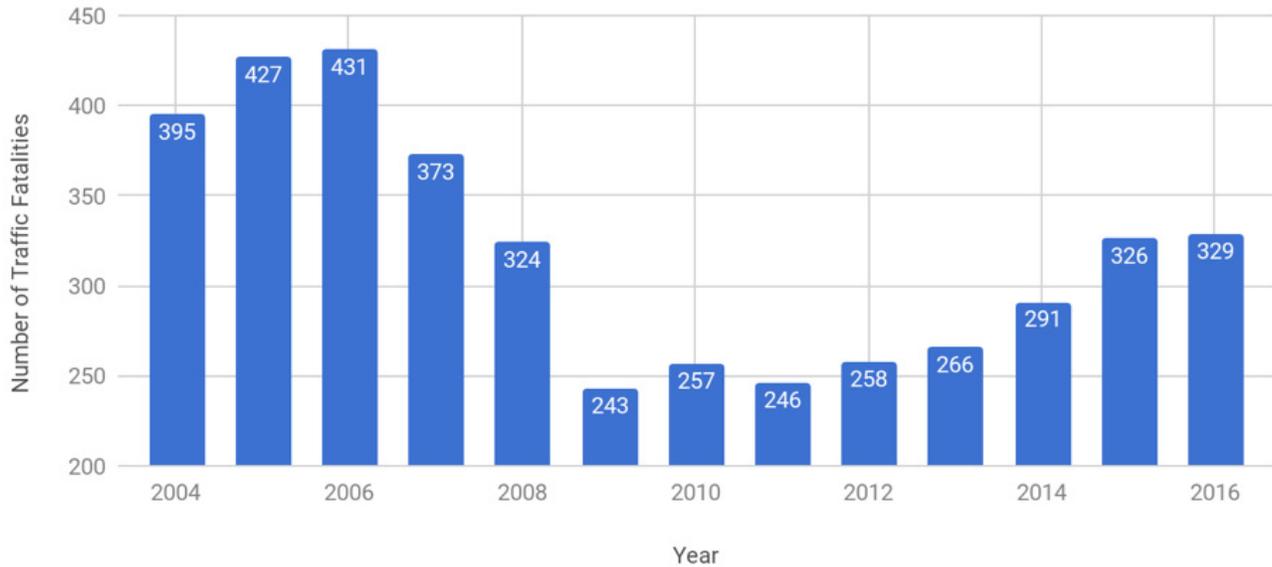
The State of Nevada has coordinated with local agencies in a number of safety programs. They include the Zero Fatalities program to update the Strategic Highway Safety Plan and identified goals for the State:

- Always buckle up
- Don't drive impaired
- Focus on the road
- Stop on red
- Be pedestrian safe
- Ride safe

There is a state budget of \$10 million each year from state highway funds for pedestrian safety improvements. These go towards enhanced crosswalks, pedestrian activated flashing beacons and improved lighting and signage.

Traffic fatalities in the state have trended upward over the last few years according to NDOT data represented in the graph below.

Nevada Traffic Fatalities by Year



An increase from 243 fatalities (1.20/Million Vehicle Miles Travelled) in 2008 compared to 329 fatalities (1.28/Million Vehicle Miles Travelled) in 2016 may be due to increased population and not enough funding for safety improvements. While this growth mirrors a national trend, Nevada’s traffic fatality rate is higher than the national average and calls for increased safety measures.

RESILIENCE

Nevada is well-prepared for emergency roadway situations and has a strong track-record of rapid response. For example, in 2016, I-15 washed out North of Las Vegas but was repaired within four days. While the quick action is commendable, the incident was a reminder of the importance of keeping people and goods moving along the corridor.

INNOVATION

The State of Nevada is one of the first states to allow autonomous driving on its roads, including a driverless van in downtown Las Vegas. Other notable innovations include a partnership between the City of Las Vegas and WayCare to predict traffic and traffic accidents. Meanwhile, the RTC of Southern Nevada has teamed up with Nexar to turn smartphones into dashboard information systems. RTC of Southern Nevada also teamed up with Audi to provide connected car data to display traffic light information on the dashboard and with Waze to provide traffic data to local users.

Other innovations help lower construction costs and speed up project delivery times. NDOT has utilized Design-Build construction processes on selected projects like Project Neon, allowing for faster project delivery.

RECOMMENDATIONS TO RAISE THE GRADE

- Utilize more programs like Envision and Greenroads to increase sustainability for road projects.
- Increase the state gas tax, which hasn't been raised since 1992, to help provide funds for items mentioned below.
- Increase funding and research for road safety to decrease traffic fatalities.
- Increased investment in transportation improvements at the local, state and federal levels could relieve traffic congestion, improve road, bridge and transit conditions, boost safety, and support long-term economic growth in Nevada.
- Continue to expand transit programs to increase mobility in the urban and rural areas.

FIND OUT MORE

- Highway Statistics 2016, FHWA
- NDOT Facts and Figures 2016 Report
- NDOT State Highway Preservation Report, February 2017
- 2018 NDOT Statewide Transportation Improvement Plan (STIP)
- One Nevada Transportation Plan, NDOT
- Southern Nevada RTC Transportation Improvement Program 2015-2019
- Regional Transportation Plan, RTC
- Transportation Investment Business Plan (TIBP), RTC
- Urban Institute Reforming State Gas Taxes November 2014 Report
- Nevada DMV Fuel Tax Summary 2016
- TRIP, a National Transportation Research Group
- <https://www.usnews.com/news/nevada/articles/2017-02-21/nevada-needs-450-million-to-address-backlog-of-road-repairs>

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SCHOOLS



EXECUTIVE SUMMARY

In Nevada, there are 17 school districts, each of which are coterminous with the 17 counties in the state. The two largest districts are Clark County (320,523 students and 369 campuses) and Washoe County (63,919 students and 104 campuses). Clark County has identified \$4.1 billion in available funding for capital projects to accommodate a quickly-growing population. However, a recent study has shown that the county's unfunded needs are in excess of \$8.3 billion, with over \$4.6 billion expected to be needed for modernization of existing facilities. In recent years, Clark County School District has twice gone to the voters for tax increases for school funding and has been voted down both times. Meanwhile, Washoe County voters approved a 0.54% sales tax that will fund a minimum of \$1 billion towards maintenance and new construction of 18 new schools. For rural schools, public private partnerships have been enacted in the past year which are being used to improve schools as well. Nevada has stated that it has a long-term goal of having modern facilities that can prepare students for high-tech jobs of the future.

CONDITION & CAPACITY

There are 681 school campuses in Nevada, which are estimated to cover over 47 million square feet. Of these, 369 are located in Clark County and 104 in Washoe County. The remaining schools are sprinkled throughout the rest of the state, most of which can be classified as located in "rural" areas. In 2016, it was reported that 62% of school buildings in Clark County would be reaching the 20 year mark. In Washoe County, 25% of the schools are over 50 years old. In other parts of the state, there are facilities that are even older. For example, in White Pine County, two of the 10 school buildings are over 100 years old.

In the 2016-17 school year, there were 473,647 students enrolled across the state. Again, Clark County and Washoe County make up the majority of the enrollment numbers with over 384,000 students. Both of these counties have been experiencing higher than average growth over the last few decades, which has led to over-capacity concerns. Clark County this past year, according to the U.S. Census, added the second highest number of new residents in the country. To accommodate the larger population, Clark County utilized over 2,000 portable classrooms. Thirty eight elementary schools are operating at maximum capacity. In Washoe County, it is estimated that 50% of elementary schools and 25% of middle and high schools will be at over-capacity within approximately five years. While there are plans for four new schools (three middle and one elementary) to open before the 2019-20 school year, as growth continues, capital funding will remain a crucial element.

O&M

The industry standard benchmark for keeping schools in "good repair" is spending 3% of the Current Replacement Value (CRV) on operations and maintenance. As Clark County School District officials have noted, "deferred maintenance costs more in the long run by forcing the district to replace machinery and renovate schools sooner." For every \$1 spent on maintenance, school district officials estimate that districts will end up paying \$4 in capital costs over time because emergency repairs or replacements will be needed, but deferred. As of 2014, only one county in Nevada met the benchmark spending goal of 3% on operation and maintenance. The two largest counties, Clark and Washoe, were at just 2.6% and 2.5%, respectively. The remaining counties collectively spend an average of 2.3% of CRV on operations and maintenance. The following table illustrates this:

TABLE 1: ACTUAL MAINTENANCE EXPENDITURES COMPARED TO INDUSTRY EXPENDITURE STANDARD

A	B	C	D	E
Name	Current Replacement Value (CRV) Estimate (2014 Dollars)	Maintenance Standard (3% of CRV)	Average Maintenance and Operations Expenditures FY2008 - FY2012 (2014 Dollars)	Meet Standard?
Carson City	308,231,360	9,246,941	8,015,060	No
Churchill	203,559,120	6,106,774	5,033,680	No
Clark	10,295,692,993	308,870,790	289,580,716	No
Douglas	287,775,867	8,633,276	7,896,567	No
Elko	436,741,941	13,102,258	12,995,741	No
Esmeralda	11,590,377	347,711	471,484	Yes
Eureka	53,845,440	1,615,363	1,455,009	No
Humboldt	190,317,741	5,709,532	4,561,392	No
Lander	65,910,384	1,977,312	1,237,850	No
Lincoln	81,224,540	2,436,736	1,301,563	No
Lyon	421,249,813	12,637,494	9,121,502	No
Mineral	65,707,510	1,971,225	1,134,555	No
Nye	365,288,231	10,958,647	7,970,093	No
Pershing	72,232,778	2,166,983	1,027,436	No
State Charters			3,559,559	
Storey	40,863,787	1,225,914	847,937	No
University Schools				
Washoe	2,190,525,041	65,715,751	55,246,040	No
White Pine	107,953,841	3,238,615	1,955,946	No

Source: Guinn Center calculations. Data from <http://tax.nv.gov/LocalGovt/PolicyPub/ArchiveFiles/Redbook/>

Part of the reason for this neglect developed from a mindset that started during the economic downturn that occurred during the latter part of the '00 decade. Deep budget cuts heavily impacted school facility maintenance budgets and districts are still struggling to recover. Additionally, while school districts are authorized to create funding for “Extraordinary Maintenance,” Nevada has no requirements for earmarking monies for maintenance.

FUNDING & FUTURE NEED

There are three main potential sources of capital funding for our state’s school districts. These are: (1) taxes authorized by the Legislature and counties; (2) voter-approved funding; and (3) other local and Federal revenues.

School districts in Nevada receive money from several different taxes that have been earmarked for capital expenditures. Some examples of these include sales taxes, residential construction taxes, real property transfer tax and room tax. However, the availability of these monies is not equal across the state, as there is a loose authorization process that takes into account population size. Additionally, school districts must rely on the Legislature to impose the taxes, as they do not have the power in Nevada to impose taxes themselves.



Voter approved funding accounts for the largest source of money for school districts’ capital needs in the state of Nevada, as can be seen in Column E of Table 3 below. These funds are primarily generated through property and mineral taxes, but can also be subsidized by general obligation bonds. School districts that have voter support in setting up bonding opportunities also gain access to a portion of Governmental Service Tax (GST), which again creates inequalities across the state, as those without general obligation bonds do not have access to GSTs.

In 2015, the Legislature approved two Senate bills (SB119 & SB207), which extend expired rollover bond authority for school construction and renovation of schools for 10 years. Under prior law, voter approval would have been necessary to extend this bonding authority. For Clark County and Washoe County, these bills extend authority to issue bonds through 2025, using each district’s respective debt tax rate. For other school districts, the legislation will extend bonding authority for 10 years once the original authority expires.

TABLE 3: FY 2015 ACTUAL CAPITAL FUNDS RECEIVED^{4,5}

A	B	C	D	E	F	G	H	I	J
District	Sales Tax	Residential Construction Tax	Real Property Transfer Tax & Room Tax	Ad Valorem (Voter-Approved)	Governmental Services Tax	Other Local Revenue	Federal Support	Total	Total Per Pupil
Carson City	0	0	0	5,551,923	493,103	55,387	0	6,100,413	811
Churchill	0	11,610	0	3,683,337	338,081	274,500	109,389	4,416,917	1,266
Clark	0	0	103,444,759	307,869,927	25,573,939	2,683,704	5,630,347	445,202,677	1,400
Douglas	0	223,344	0	2,558,345	1,073,895	6,512	353,719	4,215,815	696
Elko	0	0	0	12,716,166	0	330,186	0	13,046,352	1,323
Esmeralda	0	0	0	0	0	10,269	0	10,269	139
Eureka	0	0	0	55	0	0	0	55	0
Humboldt	0	0	0	2,063,272	278,795	26,969	0	2,369,036	682
Lander	0	0	0	0	0	286,503	0	286,503	273
Lincoln	0	0	0	601,925	166,001	34,435	0	802,361	791
Lyon	0	222,560	0	6,860,865	585,012	121,800	0	7,790,236	966
Mineral	0	0	0	350,128	42,342	568	0	393,038	827
Nye	0	116,033	0	7,374,704	611,623	269,106	0	8,371,466	1,620
Pershing	0	0	0	852,350	151,045	34,034	0	1,037,430	1,499
Storey	0	6,435	0	737,653	50,288	2,270	0	796,646	1,987
Washoe	0	0	0	48,960,291	3,512,462	5,423,622	0	57,896,375	917
White Pine	331,854	0	0	717,048	97,128	95,272	0	1,241,302	993
Statewide	331,854	579,982	103,444,759	400,897,989	32,973,714	9,655,137	6,093,455	553,976,891	1,288

Source: NRS 387-303 Report and FY 2015 Nye County School District Audit²⁸

Note: Ad valorem taxes (column E) are used primarily for servicing debt (payment of bonds).



In regards to future needs, the following is a synopsis of where we stand until at least 2025:

- **Clark County School District:** Based on the rollover bond authority provided by SB119/SB207, the Clark County School District estimates that it can issue \$3.3 billion in general obligation bond revenue and \$745 million in revenues backed by the room tax and real property transfer tax over the next 10 years. This provides total funding of \$4.1 billion. However, this is only about half of the projected need of \$8.3 billion (an amount which does not include deferred maintenance costs).
- **Washoe County School District:** The Washoe County School District estimates that it has sufficient debt capacity to issue an average of \$35 million per year over the period 2016 through 2024, with the first issuance is being planned for 2016. Given that the district’s total assessment of new construction needed and significant renovations and repairs amounts to \$933 million (\$103.7 million per year over nine years), there is an annual shortfall of \$68.7 million per year.
- **Other School Districts:** Full information is not available on the debt capacity for other school districts. However, Table 4 provides insight into the limitations faced by small school districts. The outstanding debt for each school district varies from \$980,000 in Mineral County to \$81 million in Nye County (Column E). The 2015-16 debt service payment is shown in Column F and can be compared to projected revenue from the debt tax rate (Column G). The difference between revenue and the debt service helps illustrate how difficult it is for many small school districts to issue any substantial additional debt given their current tax rate (Column H). For four districts (Douglas, Mineral, Nye and White Pine), the amount of debt service exceeds property tax revenue (Column H). In these districts, the difference is being paid by reserves in the debt fund, federal subsidies, or the governmental services tax.

TABLE 4: BONDING AUTHORITY AND DEBT CAPACITY ANALYSIS³³

A	B	C	D	E	F	G	H
District	Bonding Authority	Debt Tax Rate	Current Maximum Combined Tax Rate	Outstanding Debt (1)	2015-16 Debt Service Payment-GO Bonds	2015-16 Projected Revenue from Debt Tax Rate	Difference Between Tax Revenue and Debt Payment (G - F)
Carson City	Rollover expires 2030	0.4300	3.5200	49,790,000	5,389,663	5,413,938	24,275
Churchill	Rollover expires 2028	0.5500	3.6600	38,845,000	2,749,794	3,706,938	957,144
Clark	Rollover expires 2025	0.5534	3.4030	2,060,045,000	308,114,326	320,175,713	12,061,387
Douglas	Rollover expires 2028	0.1000	3.6600	40,925,000	2,820,089	2,594,432	-225,657
Elko	Pay as you go expires 2022		3.6600				0
Esmeralda	None		3.0195				0
Eureka	None		1.9896				0
Humboldt	Rollover expires 2028	0.1350	3.1716	2,935,000	221,581	1,329,578	1,107,997
Lander	None		3.6600			0	0
Lincoln	Traditional expired 2014	0.2231	3.6600	5,130,600	457,916	551,700	93,784
Lyon	Rollover expires 2026	0.5867	3.6600	66,670,000	6,613,542	7,100,030	486,488
Mineral	Traditional expired 2002	0.2800	3.6600	980,000	507,050	381,701	-125,349
Nye	Rollover expires 2026	0.5850	3.6600	81,180,000	8,609,421	6,698,758	-1,910,663
Pershing	Rollover expires 2028	0.4000	3.6592	6,572,071	427,801	902,221	474,420
Storey	Rollover expires 2032	0.1447	3.4607	8,660,300	698,748	713,915	15,167
Washoe	Rollover expires 2025	0.3885	3.6600	467,005,00	46,815,224	50,867,721	4,052,497
White Pine	Rollover expires 2028	0.2490	3.6600	8,600,000	815,080	722,077	-93,003

(1) Outstanding debt as of June 30, 2015 for all districts except Clark, which includes issuances made through November 2015



PUBLIC SAFETY & RESILIENCE

In Clark and Washoe counties, work has been done in the larger school districts to modernize their aging buildings including making them more energy efficient, as well as ensuring that they are still meeting local building codes. In Clark County during the 2016-17 school year, they began the implementation of the new Facilities Asset Management Information System (FAMIS) to help provide better service to all schools.

RECOMMENDATIONS TO RAISE THE GRADE

- School boards should continue to assess their education facilities and present options for revenue to ensure Nevada's schools remain fit for our children.
- Develop a strategic and comprehensive initiative to improve Nevada school facilities at all levels to compete globally in high-tech markets. As it would be a statewide effort, it may be best initiated by the creation of a sub-committee of the Assembly Committee on Education in the Nevada Legislature.
- Encourage and leverage the use of public/private partnering to boost opportunities for funding for upgrading and modernizing the state's schools. An example of this occurred in 2018 when Switch, a large data center based out of Las Vegas and Reno, brought high-speed internet connection to Yerington High School.

FIND OUT MORE

2017 Report Card General Recommendations

<http://www.infrastructurereportcard.org/solutions/>

<http://vea.coop/content/high-speed-communications-coming-rural-nevada>

Nevada School Facilities Construction and Maintenance (2016). Published by the Guinn Center for Policy Priorities.

Accessed from: <https://guinncenter.org/wp-content/uploads/2014/01/Nevada-School-Facilities-Construction-and-Maintenance-February-2016.pdf>

Comprehensive Annual Budget Report: Fiscal Year Ending June 30, 2018. Published by Clark County School District.

Accessed from: <https://www.ccsd.net/departments/budget-finance-department/comprehensive-annual-budget-report-budget-and-statistical-reports?y=2017-2018>





SOLID WASTE



EXECUTIVE SUMMARY

In Nevada, over 90% of all Municipal Solid Waste (MSW) goes to one of two major, privately owned landfills: Apex in the South and Lockwood in the North. In 2016, the estimated MSW per capita generation in Nevada was just short of 8 lbs. per person per day, nearly double the national average of 4.4 lbs per person per day. However, data suggests that per capita waste generation is heavily influenced by the tourism corridors, including Las Vegas. Encouragingly, projections show that the capacity of the two main landfills will be able to handle current MSW generation rates for 100 or more years. Unfortunately, in the rural parts of the state, resources are scarce and the choices for how to handle MSW are few and expensive. While the Reno and Las Vegas regions are meeting or exceeding their goals of recycling at least 25% of their MSW each year, rural regions are struggling to catch up. Nevada's statewide recycling percentage fell short of the 25% goal, reported to be 22.3% in 2016. To meet that goal, Nevada will need to recycle the equivalent of nearly 100 Olympic size swimming pools more worth of waste each year.

INTRODUCTION

In Nevada, over 90% of all Municipal Solid Waste (MSW) goes to one of two major, privately owned landfills: Apex in the South and Lockwood in the North. While the state's population continues to grow, so does the number of tourists visiting the state, both of which contribute to the amount of MSW generated. Luckily, projections show that the capacity of the two main landfills will be able to handle current MSW generation rates for well into the future (> 100 years). However, in the rural parts of the state, resources are scarce and the choices for how to handle MSW are few and expensive.

Being a state divided by large areas of rural land, there are two main challenges Nevada still faces. First, as with most other states, proper handling of electronic waste (aka e-waste) is becoming a more prevalent issue. There have been attempts at various legislation to address this issue in Nevada, but each attempt has died before becoming law. Another challenge is the streamlining and expansion of recycling programs within the state. Though there have been strides made in the right direction, including legislation, there is a large amount of work needed to increase the efficacy of recycling in Nevada.

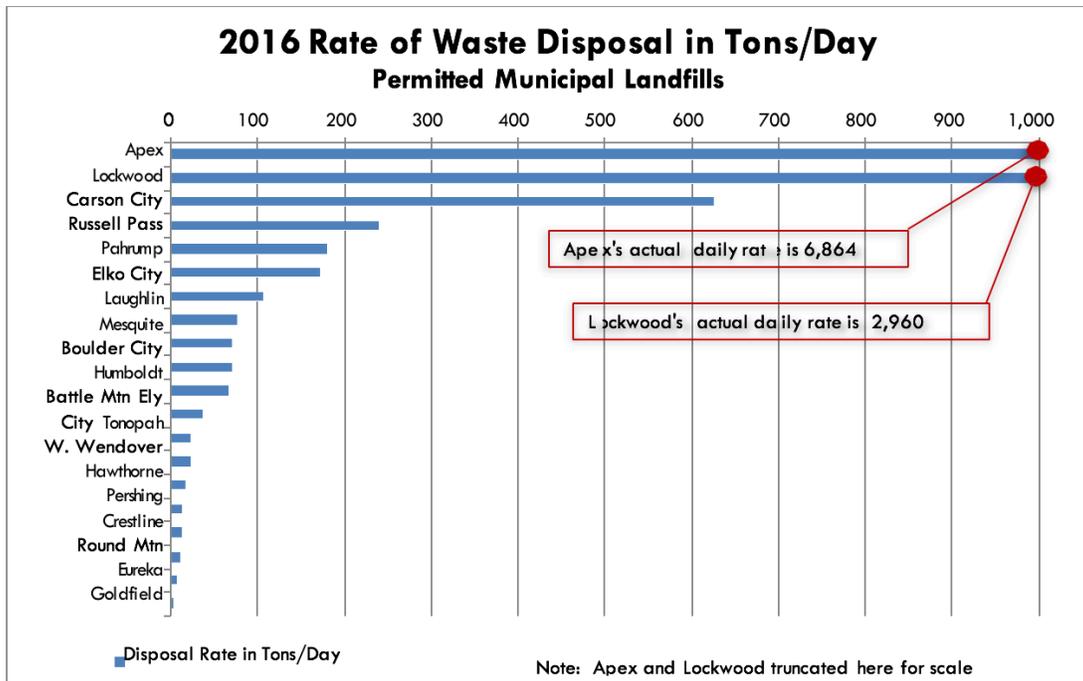
CONDITION & CAPACITY

The Solid Waste Management Authorities (SWMA) in Nevada are comprised of both the northern and southern health districts, as well as the Nevada Department of Environmental Protection (NDEP). In general, the NDEP is responsible for most of rural Nevada, while the two health districts are in charge of Washoe and Clark counties, respectively. Each SWMA handles their own permitting and regulation compliance, including fee and fine collection.

WASTE GENERATION

In 2016, it was estimated that the amount of municipal solid waste generated in Nevada was just over three million tons. This number does not take into account the amount of imported waste from neighboring states, which accounts for about 7.5% of the MSW placed in Nevada landfills (namely Lockwood) each year. The following is a list of all permitted landfills in Nevada and the estimated daily amount of MSW each receives:





Source: State of Nevada Solid Waste Management Plan, NDEP 2017

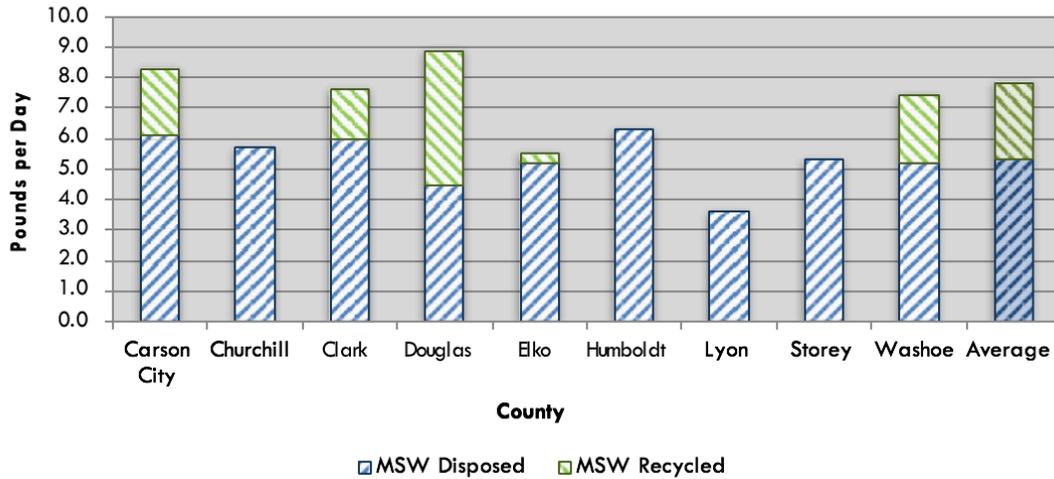
The larger, urbanized landfill sites use scales, which are estimated to reflect 95% of the state’s waste. In 2016, the estimated MSW per capita generation was just short of 8 lbs. per person per day. This is nearly double the national average of 4.4 lbs per person per day, largely because of the state’s tourism. The most populous areas of Nevada are also tourist attractions, particularly southern Nevada, which is included in the per capita waste generation data. With over 42 million tourists visiting just the Las Vegas area in 2016, data suggests that per capita waste generation is heavily influenced by the tourism corridors.

RECYCLING

In 1991, Assembly Bill 320 was enacted which brought Nevada into the “recycling age.” In 1992, a goal was set for each municipality to recycle 25% of its MSW. Since then, the state has moved closer to the goal of 25%, with some counties continually meeting or exceeding the goal regularly since 2012. While there have been some discrepancies noted in the averaging calculations from county to county, there is growing evidence that Nevadans’ access to “single-stream” recycling programs has increased the average. “Single-stream” recycling is a system that allows for customers to deposit all recyclables in one container and leave the sorting to the collection agency. It is now estimated that 90% of Nevadans are on a “single-stream” recycling program, thanks to the efforts of the larger municipalities. However, even with easier access to recycling programs, Nevada’s statewide recycling percentage fell short of the 25% goal, reported to be just 22.3% in 2016. The three SMWAs have recently agreed to a standard set of reporting criteria and are now working with individual communities and landfill facilities to improve the collection and reporting of recycling data. However, this is a large undertaking and will require more time and resources in order for it to be implemented and maintained across the state.



2016 MSW Generation per Capita at Facilities with Scales



Source: State of Nevada Solid Waste Management Plan, NDEP 2017

O&M, FUNDING & FUTURE NEED

URBAN AREAS

In Nevada’s largest municipalities, Las Vegas and Reno, the Apex and Lockwood (respectively) landfills are privately owned and operated. Both of these facilities are projected to remain in operation well into the future and both have the ability to expand, if necessary. In fact, a proposal has been made to increase the capacity of the Lockwood facility from 65 million cubic yards to over 300 million cubic yards. Apex, under its current permit, is projected to remain in operation without expansion for over 100 years.

RURAL AREAS

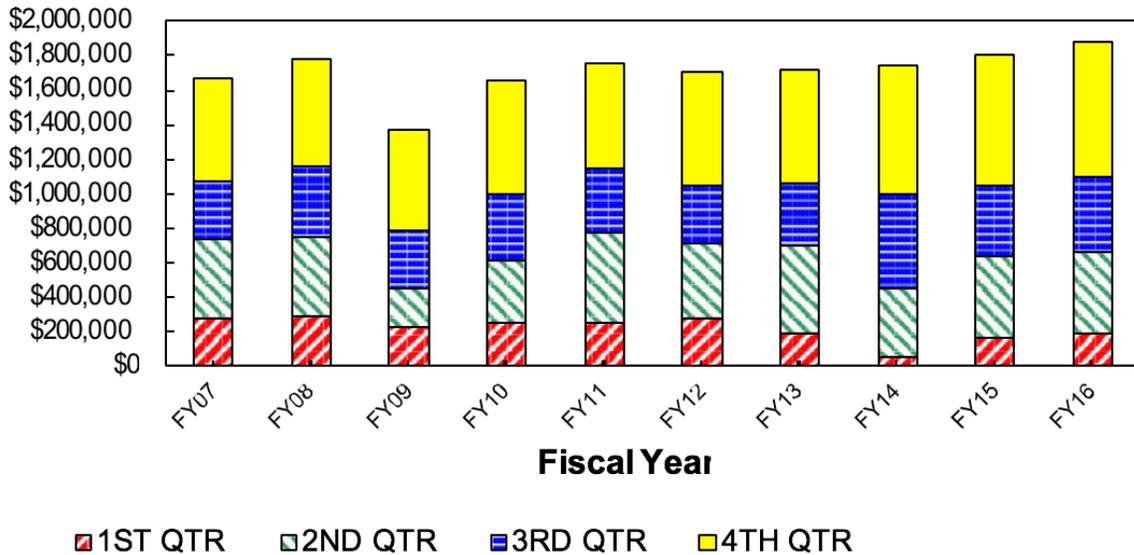
With only a couple of exceptions, Nevada’s rural landfills are owned and operated by their local governments and operated by the public works departments. While the landfills in rural Nevada are subject to much less MSW than the urbanized areas of the state, they face special conditions. One is the lack of recycling or reuse alternatives. While the larger municipalities have access to “single-stream,” curbside recycling options, rural Nevadans have to undergo much more effort in order to recycle. Another issue faced in rural Nevada is the lack of tax revenue in many sparsely populated counties. The cost of building and maintaining a federally-compliant landfill, as well as the probability of staffing disparities, has led to some landfills operating in violation of regulations and permit requirements. The only other option rural communities have is to transport their waste, which is another major cost contributor.

FUNDING

Each of Nevada’s three SWMA’s are statutorily approved to collect fees and fines through permitting and fines. In addition, the state legislature signed a bill in 1991 that added a \$1 fee to each tire sold in the state, which became the state solid waste management account and must be used for waste management only. The figure below shows a 10-year history of the tire revenue generated for the solid waste fund:



Tire Revenue by Quarter



Nevada currently does not collect tipping fees, however, there is a proposal to establish a fee for each ton of solid waste disposed in landfills across the state.

Though the two largest municipal landfills generate a hefty permit fee keeping two of the three SWMA’s adequately funded, the NDEP struggles with keeping rural Nevada up to date. In order to increase revenue, some rural governments are considering importation of waste from neighboring states as a source of revenue. While the logistics of this are not quite in place, the idea would be to either establish and operate a landfill themselves, or negotiate a “host” fee with existing, larger private landfills.

PUBLIC SAFETY, INNOVATION, & RESILIENCE

Every municipal waste landfill in Nevada must conform to Federal Standards adopted under RCRA Subtitle 2. For new, or expansion of, Class I landfills (>20 tons per day), a composite liner is required to protect the waters of the state from leachate. Leachate is the product of a liquid (ie. water) percolating through landfill layers, becoming contaminated with suspended or soluble solids. In Nevada, the most common landfill design is what is known as “dry tomb.” This method excludes liquids from buried waste, with the idea that it will minimize leachate generation. However, this method has been criticized because the process delays waste decomposition. This has led to the state looking at an alternative known as “bioreactor” landfills. This design utilizes leachate through a re-circulation process to quicken decomposition, while at the same time providing a way to actually manage leachates. However, while this technology has proven effective in other locations, there is very little data on its use in arid climates. Thus, the “dry tomb” landfill will likely remain the standard in Nevada for the near future.



Another topic of concern in Nevada's landfills is methane gas. While popular belief has been that gas generation in arid landfills is negligible, this has been proven otherwise. In fact, at both the Lockwood and Apex facilities, gas retrieval processes have been implemented and onsite gas-to-energy facilities have been producing significant amounts of power to the grid: Lockwood is currently producing 3.2 Megawatts of power and Apex is at 11 Megawatts. Both are considering expanding their power generation capacities at this time.

When a landfill is closed, it is capped, or covered, and the owner is required to provide post-closure care for a period of 30 years. However, this time-period has been questioned recently and a proposal is being drafted to revise this standard to hold owners accountable for care on a risk basis. This could work in the owner's favor should the abandoned landfill be determined to pose no further risk for gas explosion or groundwater contamination before 30 years. While the 30-year period is currently the standard in Nevada, each SWMA has the authority to alter that timeframe as they see fit.

The current standard for landfill cover consists of an 18-inch "infiltration" compacted clay layer, topped by a six-inch erosion layer capable of supporting vegetation. However, this design has been found by researchers to become compromised after only a few wetting-drying cycles. There is currently research being done to examine an alternative cover known as an "evapo-transpiration" cover which has shown promise for Nevada's arid climate, while performing as well or better than conventional covers. However, the move toward adopting an innovative new design is stalemated at this point in time. It is speculated that this may be due to lack of education regarding alternative final covers coupled with the reluctance for landfill owners and operators to enter into a regulatory review and possible delay.

Another challenge that is becoming more prevalent as time progresses is the generation of e-waste, or electronic waste. There is currently no regulated handling of e-waste which has led to stockpiling at various warehouses across the state. Over the past decade, there have been numerous attempts to pass legislation to help address the issue, but each has died at various levels within the house. As this problem is only likely to get worse as we move into the future, it may be prudent to at least perform a study of proposed and existing e-waste recycling programs to find a best fit for the state.

Similar to e-waste, Nevada also has no regulation for hazardous waste if it is generated by households. While there are local governments as well as citizen groups that are actively seeking alternatives to landfilling household hazardous wastes (HHW), the access to such programs is limited. Therefore, without a convenient and cost-free mechanism to curb it, most HHW will remain in the municipal waste stream until legislative regulatory measures are developed and implemented.

RECOMMENDATIONS TO RAISE THE GRADE

- In order to accurately gauge the effectiveness of MSW recycling statewide, more consistent methodology to measure recycling rates is needed.
- Nevada should look at passing legislation to better regulate e-waste.
- Implementation of a statewide fee to assist in setting up rural areas with recycling efforts.
- Future studies regarding tourism generated or "transient" waste are warranted to determine the true impact on the state.

FIND OUT MORE

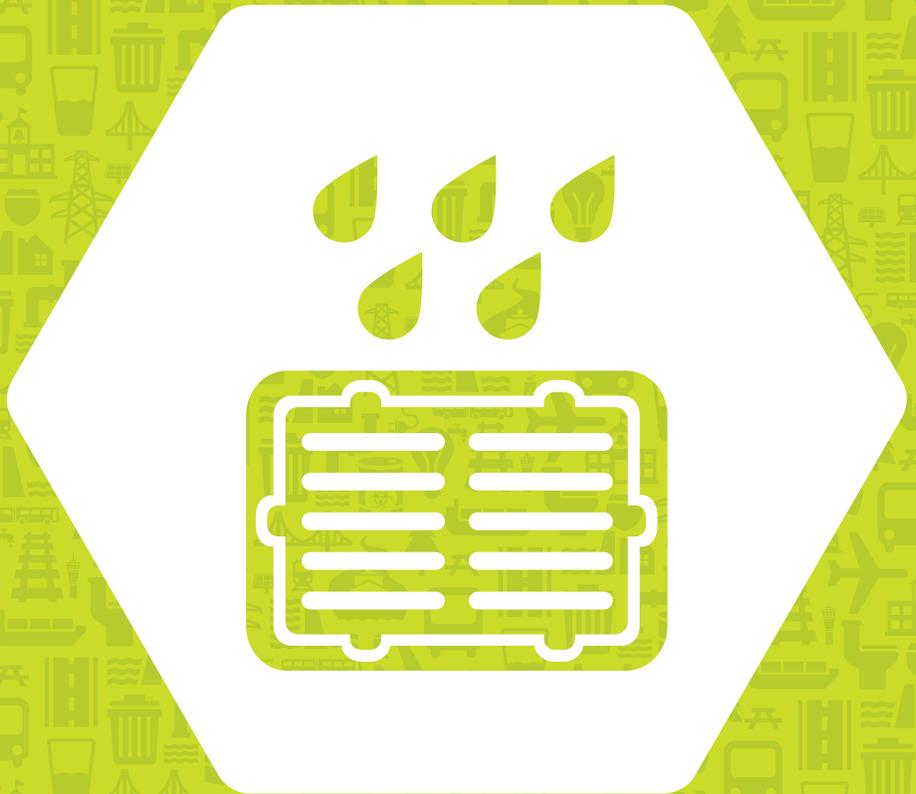
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Southern Nevada Health District (2016). 2016 Annual Recycling Report. Accessed from www.southernnevadahealthdistrict.org





STORMWATER



EXECUTIVE SUMMARY

Nevada can experience severe flash flooding as a result of rapid snow melt or short duration, high-intensity thunderstorms, both of which can result in significant stormwater runoff problems for its residents. To effectively manage stormwater and associated infrastructure, southern and northern Nevada have established cross-jurisdictional facilitating organizations. The Clark County Regional Flood Control District (CCRFCD) and the Truckee River Flood Management Authority both have comprehensive plans to address flooding issues, regulate land use in flood hazard areas, and fund and coordinate the construction of flood control facilities. The CCRFCD has a \$868 million, 10-year construction program which is primarily funded by quarter-cent sales tax and bonds. In Northern Nevada, the \$400 million Truckee River Flood Project includes levees, floodwalls, terracing, bridge replacement, mitigation measures. However, statewide, there continues to be projected funding shortfalls upwards of \$400 million during the next 10 years for necessary flood mitigation projects.

INTRODUCTION

Nevada is well known for its desert climate, however its name is derived from the Spanish term “snow covered mountains” which suggests a contradiction. Nevada generally has a relatively low average yearly rainfall rate of approximately 7 to 10 inches but can experience severe flash flooding from rapid snow melt or short duration, high intensity thunderstorms, both of which can result in significant stormwater runoff problems for its residents.

Stormwater runoff represents the portion of a precipitation event that does not infiltrate into the ground and drains overland to creeks, rivers, and streams. Stormwater infrastructure includes storm drains, culverts, and detention/retention basins that attempt to safely convey runoff through urban areas and under roadways.

Nevada’s residents primarily reside (with 94.2%) in the urban areas of the Clark County (Las Vegas, Henderson, and Southern Nevada) and Washoe County (Reno, Sparks, and Northwestern Nevada). Understandably, these two areas are also where most of the funding and projects are located to address stormwater problems. Stormwater runoff problems generally exist in urban areas due to higher amounts of runoff from impervious surfaces and development that has occurred close to natural drainage ways. Stormwater runoff problems for Northern Nevada include agricultural irrigation ditches and development in closed basins. Irrigation ditches are problematic when, in non-irrigation periods, the empty ditches fill with stormwater runoff and are overtopped and damaged when the amount of runoff exceeds the ditch carrying capacity. Closed basins are problematic when periods of high precipitation result in runoff accumulating in the basin threatens development near the bottom of the basin. In these locations, runoff can only leave the basin through infiltration and evaporation which are much slower processes than overland conveyance.

Cities and counties are often the primary facilitators of stormwater management. In addition to cities and counties throughout the state, the most active managers of stormwater management are the Clark County Regional Flood Control District (CCRFCD) in southern Nevada, the Truckee River Flood Management Authority (TRFMA) in northern Nevada, and the Nevada Department of Transportation (NDOT). The CCRFCD was created in 1985 to develop a coordinated and comprehensive Master Plan to solve flooding problems, regulate land use in flood hazard areas, fund and coordinate the construction of flood control facilities, and to develop and contribute to the funding of a maintenance program for Master Plan flood control facilities. Similarly, in Northern Nevada, the TRFMA creation began in 1998, in part, to plan and design projects that help reduce the impact of flooding on the Truckee River. The Truckee River floods roughly every decade and these floods can come at tremendous costs to the community (i.e. in 1997 there was well over \$1 billion worth of flooding damages from that event alone).

CONDITION & CAPACITY

Stormwater infrastructure condition and capacity is tracked by each agency and is generally managed through the development of asset management plans. These plans are typically updated on a recurring basis and used to identify stormwater infrastructure needs. Generally, funding is the limiting factor for agencies to be able to fully address their stormwater issues and significantly improve the condition and capacity of their stormwater infrastructure.



O&M, FUNDING & FUTURE NEED

The Clark County Regional Flood Control District operates a capital program and implements a Regional Master Plan that has now funded over \$1.83 billion in projects with local contributions and has funded \$2.1 billion when Federal contributions are added. The CCRFCD has 10-year construction program for 2018 to 2027 which is primarily funded by a quarter-cent sales tax revenue and bonds. CCRFCD's resources for this 10-year construction program is estimated as \$868 million. Since its creation, the CCRFCD has completed 617 miles of conveyance facilities and 93 detention basins in Clark County.

The TRFMA currently receives a 1/8-cent infrastructure sales tax for the financing of a regional emergency dispatch facility, a public safety training facility, and the Truckee River Flood Project. The nearly \$400 million Truckee River Flood Project includes levees, floodwalls, terracing, bridge replacement, mitigation measures, and more and is considered the largest public works project ever undertaken in Northern Nevada. Funding will also include an authorized Federal cost share and a fee to be paid by properties receiving direct benefit from the project. Additional funding was sought through a 2018 Washoe County ballot initiative which would have allowed completion of the whole project in a 25-year window. However, the ballot initiative did not pass.

The City of Sparks is an example of an urban Nevada community who has adopted both a storm drain and river flood control fee which is collected on residents' sewer bill. The storm drain fee is primarily used to maintain storm drainage infrastructure while the river flood control fee was implemented to facilitate the construction of the North Truckee Drain, which is expected to be completed in 2018.

It is also important to note that Nevada's rural communities have their own capital improvement plans to maintain or improve their flood control systems. As an example, the town of Pahrump, initiated a \$315 million program in 2008 to construct flood channels, detention basins and dams. Statewide, there continues to be projected funding shortfalls upwards of \$400 million during the next 10 years.

PUBLIC SAFETY & RESILIENCE

In Nevada, effective management of stormwater runoff is critical to improving public safety and community resilience. The flash flooding and rapid snowmelt threats in Nevada have consistently threatened public safety and challenged the resilience of affected communities. Water quality is also a challenge for Nevada. Generally, water quality issues are limited to sediment mobilization in erosion prone areas, surface contaminants in urban areas, and fertilizer in agricultural areas. Nevada has made significant improvements over the last several decades to improve stormwater management, however further steps are needed. In the last couple years, NDOT has significantly improved their stormwater management program by creating an entire new division to protect Nevada's waters and address concerns by the Nevada Division of Environmental Protection (NDEP).

INNOVATION

Infiltration basins are becoming more common and attempt to more effectively use the first flush of storm events to recharge aquifers and improve surface water quality. The NDEP is responsible for conducting monitoring, assessment, reporting, and Total Maximum Daily Load development for the State of Nevada. These improvements and other water quality measures are attempting to protect Nevada's 303(d) listed waters from further impact associated with stormwater runoff contaminants. 303(d) listed waters are impaired waters listed by the NDEP.

RECOMMENDATIONS TO RAISE THE GRADE

- Identify, plan, and rally support for additional funding for infrastructure to address areas significantly impacted by stormwater runoff.
- Fund and build the Truckee River Flood Control Project.
- Work with communities to minimize development in identified flood hazard zones and at-risk areas.
- Continue to identify projects that can improve surface water quality and recharge groundwater aquifers.
- Address problems with irrigation ditches that convey stormwater runoff during the non-irrigation calendar months.
- Address problems with development and increased runoff in closed basin systems where infiltration and evaporation are the only methods of stormwater runoff removal.
- Incorporate historical maximum flood inundation maps into emergency management plans and encourage insurance companies and jurisdictions to understand and utilize these maps. (This becomes especially critical as communities expand and develop into areas that previously may have been avoided due to hazard risks such as flooding.)



TRANSIT



EXECUTIVE SUMMARY

Meeting the needs of Nevada's forecasted growth will require increased investment in its public transportation systems to make them more accessible and reliable and ensure transit is a viable mobility choice for residents and visitors. Fortunately, the two major transit agencies in the state are very effective in the management of their systems and the services they provide. RTC of Southern Nevada (RTCSNV) serves the Las Vegas metro area and had over 64 million boardings on its bus system in 2017. RTCSNV is recognized nationally for its cost efficiency, having the lowest cost per boarding, lowest subsidy and nearly the highest farebox recovery of any other public bus system in the country.

The RTC of Washoe County (RTCWC) continues to provide reliable service to the residents of the Reno-Sparks area, and a recent report shows the transit mode share increasing to 7.6 percent. Looking ahead, the state should consider investment to expand and enhance the bus systems and add higher order transit – i.e. fixed guideway – to support additional residents and visitors.

INTRODUCTION

SOUTHERN NEVADA AND CLARK COUNTY

The Southern Nevada region is rapidly growing, from reconstruction and expansion of the Las Vegas Convention Center to new resorts, sports teams, arenas and a stadium to serve record visitor volumes. At same time, the area is home to an ever expanding residential population and with it, new hospitals, master planned communities, employment centers and education facilities. The current population of 2.2 million is expected to increase to 2.7 million by 2025, while the number of annual visitors is projected to grow from nearly 43 million today to 53 million in the same period. This growth may be positive for the economy; but increasing demands on the roadway network will likely increase congestion and travel times while also affecting air quality.

Public transportation is a key element to mobility, as it can efficiently move larger numbers people in less space than automobiles. In the Las Vegas metropolitan area, which includes the cities of Las Vegas, Henderson and North Las Vegas as well as unincorporated Clark County, transit service is provided by the Regional Transportation Commission of Southern Nevada (RTCSNV). Smaller communities, such as Mesquite, Boulder City, and Laughlin are served by the Southern Nevada Transit Coalition with a portion of the funding coming from RTCSNV and the Nevada Department of Transportation.

NORTHERN NEVADA AND WASHOE COUNTY

Transportation infrastructure and service investments offer the opportunity to shape the region's economy and land use, creating new opportunities for prosperity. Transportation investments promote safety, a healthier community, regional connectivity, and neighborhood livability in Northern Nevada. All of these ideas are reflected in the RTCWC 2040 Regional Transportation Plan (RTP) for the Reno-Sparks metropolitan area of Washoe County, Nevada. The RTP is the region's long-range, multimodal transportation plan. It defines the policies and priorities for the community's future transportation system and is the blueprint to achieving clean air, making roadways accessible to all regardless of age or ability, and providing transportation options. It is a key component to improving the region's quality of life.



RURAL AND SMALL URBAN PROGRAM

Outside of the urbanized areas, many Nevada residents depend on rural transit systems for connection to the urbanized areas as well as maintaining their quality of life. Buses in rural Nevada provide more than 1 million rides and travel over 5 million miles per year.

The Nevada Department of Transportation (NDOT) Transit Section is responsible for helping in the creation and continuation of these services by administering the following Federal Transit Administration (FTA) Grants on an annual basis: Elderly and Disabled (5310), Rural and Small Urban (5311) and Bus and Bus Facilities (5339).

CONDITION & CAPACITY

SOUTHERN NEVADA AND CLARK COUNTY

RTCSNV is a regional entity with jurisdiction over transit, traffic management, transportation planning and funding in southern Nevada, which includes the cities of Las Vegas, Henderson, North Las Vegas and unincorporated Clark County. The transit service area in the Las Vegas metropolitan area covers nearly 280 square miles and comprises 39 fixed routes, including a center running fixed guideway in downtown Las Vegas, four freeway based commuter express routes, and specialized services for seniors and veterans. All of the RTC buses and its five transit centers provide free WiFi to patrons and a mobile fare payment system.

In fiscal year 2017, the fixed route bus system served more than 64 million passenger trips with on time performance of nearly 87 percent and an average of 41.7 boardings per revenue hour. RTCSNV also provides door-to-door paratransit service, which represents another 1.3 million trips in the same reporting period. In addition to serving residents, nearly 34,000 passengers per weekday are visitors traveling in the resort corridor, representing about 19 percent of the total system ridership and 29 percent of fare revenue.

Today, the Las Vegas region is heavily car-centric with just over 1 percent of residents reporting that they walk or bike to work, 4 percent ride public transit, and 90 percent drive. Comparatively, 33 percent of New Yorkers, 10 percent of Seattle and Philadelphia residents, and 7 percent of Portland commuters rely on transit to get to and from work each day. However, access to transit remains essential for southern Nevada's residents. Nationally, 8.7 percent of households lack access to a vehicle, but in the Las Vegas area, the rate is 10.5 percent. Providing alternative sources of transportation is critical and transit a key element.

The rapid and extended population growth over the past 20 years has put pressure on natural resources and public sector funding for infrastructure, social service, and schools. If development continues as it has in the past, our current challenges will only continue to get worse. We also will miss the opportunity to use remaining developable land in a way that creates healthy, desirable neighborhoods with deliberate and efficient connections between jobs, transit and housing. If we fail to create these types of places in our region, we will lose out economically as potential employers and residents elect to invest in other, more livable cities.

Recognizing that roadways alone cannot satisfy these demands, we should consider focusing investments on multi-modal options by expanding and enhancing their current bus network and adding new fixed guideway systems, such as bus rapid transit (BRT), modern streetcars, and light rail to make public transportation faster and more reliable. To do this requires stable funding sources for capital investments as well as ongoing operations & maintenance that keep pace with area growth, increases in costs and provide for improving service to customers.



RTC NORTHERN NEVADA AND WASHOE COUNTY

The Regional Transportation Commission of Washoe County (RTCWC) serves as the metropolitan planning organization, regional street and highway constructor and public transit operator. RTCWC offers fixed route, paratransit, regional commuter bus, and vanpool services. The service area is approximately 136 square miles. RTCWC operates fixed route service in the cities of Reno and Sparks, with a fleet of 64 buses on 26 routes. In 2017, fixed route transit supported 7.4 million trips while demand responsive paratransit and taxi service supported another 231,438 trips. RTCWC also operates the INTERCITY Regional Connector. In partnership with the Carson City Area Metropolitan Planning Organization (CAMPO), RTC INTERCITY, now branded Regional Connector, provides a connection between Reno and Nevada's state capital during peak commute hours. This route is 33 miles each way and offers free WiFi. Ridership in 2017 was 27,181.

The network also includes transit centers in both downtown Sparks and downtown Reno that are designed to accommodate service to 2030 and beyond. All fixed route vehicles offer free WiFi. Currently, the RTCWC operates 21 Proterra electric vehicles in their fixed route and regional commuter services-the largest electric public transit fleet in the U.S. The RTCWC launched its electric bus program in 2014, the first public agency in the State of Nevada to use electric buses for public transportation, with a pilot program and four electric buses. In 2018, the RTC added 17 new electric buses to its fleet which overall represents 1/3 of its buses. RTCWC plans to achieve an all-electric fleet in the future.

All RTCWC fixed route vehicles are maintained and stored at the Jerry L. Hall Operations and Maintenance Facility located underneath I-580 and Villanova Drive. This facility was opened in 1982. RTC recently invested over \$13.0 million to add additional maintenance bays for electric vehicles and articulated coaches as well as electric charging equipment for the Proterra vehicles. With the completion of these improvements, the RTCWC facility is at capacity. Should the RTCWC expand the number of fixed route coaches it operates, it will need to build a new maintenance facility in the Truckee Meadows. The RTCWC maintains its paratransit fleet at the Sutro facility which was opened in 1992. This facility provides for compressed natural gas fueling and maintenance as well as paratransit operations support. This facility can accommodate approximately 10 more paratransit vehicles to reach its capacity of 50 vehicles.

The investment priorities of the RTCWC and driven by the Regional Transportation Plan which represents well over \$6 billion in multimodal investments in Washoe County. Decisions on investments are guided by the following four principals: Safe and Healthy Communities, Economic development and diversification, sustainability, and increased travel choices. The center piece of the RTP are multimodal investments that include such recently completed projects as the Southeast Connector/Veterans Parkway, 4th Street Prater Way Lincoln Line, and the Pyramid McCarran Intersection. RTCWC's design approach focuses on the integration of each user-pedestrian, bicyclist, transit passenger and auto- to address safety, connectivity, mobility, and efficient operations.

Those living in the Reno-Sparks area also benefit from BRT with the Virginia Street RAPID transit service that runs from downtown Reno to Meadowood Mall. RTC RAPID includes level-boarding stations with more amenities served by modern 60-foot articulated hybrid diesel/electric vehicles. The service includes technology that allows the buses to communicate with the traffic signals to extend the green time several seconds for the bus. In 2015, ridership was 1.3 million, with 29,175 revenue vehicle hours, translating to 45.3 passengers per service hour.



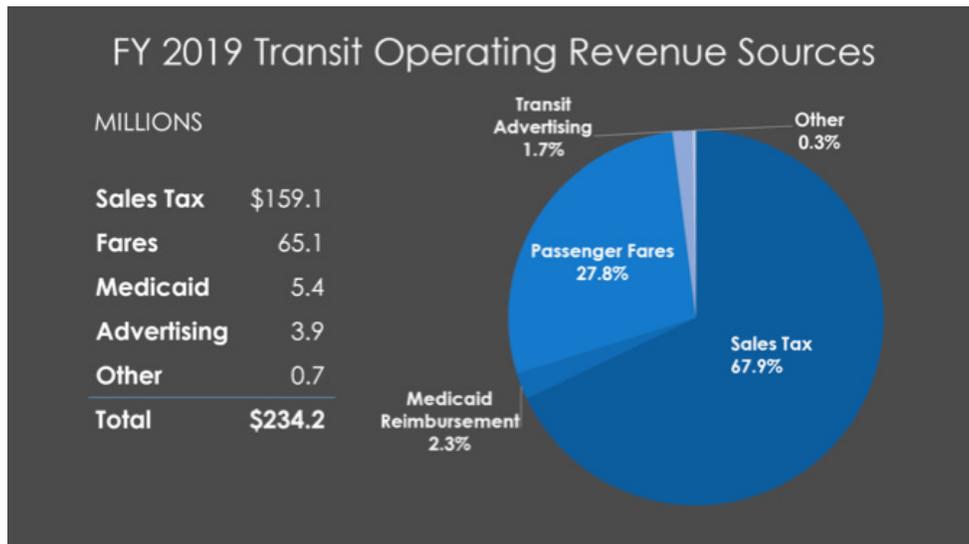
The RTCWC will introduce a new Bus Rapid Transit service in the 4th Street/Prater Way corridor in December 2018 providing transit users more access to jobs and education opportunities. Additionally, the RTCWC is currently building transit and road improvements on the Virginia Street corridor which will expand Bus Rapid Transit service from Meadowood Mall into Midtown to the University of Nevada, Reno (UNR) area. These improvements are scheduled to be delivered in 2020 in Midtown and UNR in 2022. The purpose of these improvements is to reduce operating cost by reducing dwell times at stations and using electric vehicles to reduce fuel costs. These two corridors represent the most heavily utilized corridors.

In 2014, Census records showed 2.8% of Reno residents walked to work, 0.4% biked, 1.9% relied on transit, and 89.5% used a car. The regional transit agency in the Reno-Sparks area conducted a more recent study that demonstrates 7.6% of residents use transit to get to work, perhaps indicating the utilization of transit is rising. Access to transit services remains important to ensuring all residents have the ability to get to work and around their communities. In Reno, 10.8% of households lack access to a car, compared to 8.7% of households nationally.

O&M, FUNDING & FUTURE NEED

SOUTHERN NEVADA AND CLARK COUNTY

RTCSNV funds transit infrastructure and operations with a combination of sources, including 0.375 percent of the sales tax, passenger fares, bus advertising, and federal funding. Before 2016, the RTC generated upwards of \$6 million per year in surplus fare revenue in the resort corridor, which was used to support capital, operations and maintenance needs for the larger system. However, since the introduction of transportation network companies, such as Uber and Lyft in late 2015, the transit ridership in the resort corridor has decreased along with the surplus fare revenues. Total revenue for fiscal year 2018-19 is estimated to be \$234.2 million. A breakdown of revenue is included in the chart below.



For FY 2018-19, RTCSNV has programmed \$86.4 million in capital expenditures. This includes \$7.5 million for new compressed natural gas fueling infrastructure to support the transition of the fleet from diesel and \$2.5 million for bus shelters and safety improvements. It also authorizes the purchase of 50 new paratransit buses, 40 new 60-foot buses, and 15 new 40-foot buses. New bus purchases will total approximately \$50.8 million in FY 2019. RTCSNV contracts its fixed route and paratransit operations to private contractors. For FY 2018-19, RTCSNV has budgeted \$114.3 million for fixed route and \$47.6 million for paratransit services.

RTCSNV has historically been ranked first in the Federal Transit Administration's National Transit Database for fare recovery on fixed routes, due in part to its relatively low cost per boarding and route efficiencies. However, with the surplus funding from the resort corridor being diminished since 2016, more funding for capital investments as well as operations and maintenance will most likely have to come from either growth in sales tax revenues or passenger fares.

While RTCSNV should be applauded for providing reliable service and spending funding effectively, southern Nevada has experienced years of uncoordinated development that focuses infrastructure investments on automobiles and limits the viability of other modes, such as walking, bicycling, and riding transit.

NORTHERN NEVADA AND WASHOE COUNTY

The RTCWC relies on a 5/16 cent sales tax to fund transit operations. For the Fiscal Year 2019 budget, RTC will have \$25.0 million in sales tax revenues available, \$6.4 million in fare box revenues, \$2.0 million in state funding (for paratransit services) and \$600,000 in advertising revenues. RTC operating cost for 2019 for both fixed route and paratransit services is \$41.0 million- a shortfall that is being made from reserves. The RTCWC revenues have not kept pace since the Great Recession and RTCWC may reduce service in order to have long term balanced budgets.

RURAL AND SMALL URBAN PROGRAMS

The NDOT uses Section 5311 federal funds to assist with administration, capital, and operating expenses in the provision of general-public transportation services in rural and small urban areas. Section 5311 funds can be used for up to 80% of administration expenses, up to 95% of capital expenses, and up to 60 percent of operating expenses. Funding under this program can also be used for intercity routes and mobility management programs.



PUBLIC SAFETY

The Transit Watch campaign is a nationwide safety and security awareness program designed to encourage the active participation of transit passengers and employees in working together to maintain a safe transit environment. The campaign provides information and instructions to transit passengers and employees so that they know what to do and who to contact in the event of an emergency in a transit setting. Transit Watch invites riders and employees to be the “eyes and ears” of their local transit system. In December 2018, RTCSNV incorporated a ‘See Something, Say Something’ Transit Watch feature into its mobile ticketing application, enabling its customers to conveniently report any concerns from their smart phone.

RTCWC administers similar programs as RTCSNV, including participation in the Safe Place program for youth. Additionally, the RTCWC, in partnership with local agencies, has established a Vision Zero task force to improve pedestrian and traffic safety in the Reno/Sparks area. The RTCWC is also a member of the Reno Downtown Business Improvement District helping to deal with a wide variety of capital and human service needs including assistance with social and medical services for the homeless, improving information to visitors and working to improve the appearance of downtown. With over \$100.00 million invested in transit capital improvements (the 4TH STREET STATION and the new BRT Lincoln Line) and a \$100.00 million to be invested in the RAPID Extension from Midtown to UNR, RTC believes infrastructure and social service provision must be coordinated to promote safe and healthy communities- an RTC guiding principal.

RESILIENCE

While Nevada’s exposure to natural disasters is relatively limited, Las Vegas remains a potential high-density target for terror. In the event of an incident, transit will play a critical role in rapid evacuation. RTCSNV also manages the region’s traffic management center, which is housed with the Department of Public Safety and Nevada Highway Patrol, and coordinates with law enforcement in response to incidents on a daily basis. In addition, RTCSNV participates with the joint task force to oversee major events, such as New Year’s celebrations on the Las Vegas Strip as well as manage and support first responders during any incidents.

RTCWC works with its cooperating entities to provide support services to natural disasters such as fires and severe winter storms.



INNOVATION

PARATRANSIT SERVICE

Federal law mandates that transit agencies must provide demand responsive service to customers who are physically or cognitively unable to access the fixed route bus system. While essential, paratransit operations cost considerably more to provide than regular bus. As an example, RTCSNV, which is well regarded nationally for its cost efficiencies, pays just over \$2 per boarding on its fixed route bus system and gets nearly half that cost back from fare revenues. By comparison, a paratransit trip costs nearly \$32 and just over \$2 of that cost is covered by passenger fares. To help mitigate these cost differences, RTCSNV began a pilot program with Lyft to allow paratransit customers to use the on-demand service and would subsidize up to \$15 per ride. Since the pilot was initiated in February 2018, RTCSNV has seen its costs for those trips drop to half of the regular paratransit service.

RTCWC also operates a paratransit service. Currently, cost per trip is \$25.00. RTC has recently reduced the service area to help control cost. Despite this change, RTC is forecasting an increase in paratransit trips for ADA eligible passengers.

AUTONOMOUS VEHICLES

Nevada was the first state in the U.S. to authorize operation of autonomous vehicles on its roadways and since then has seen some key demonstrations. In November 2017, AAA, Keolis and the city of Las Vegas partnered to provide the first public transit service via autonomous shuttles in the U.S in downtown Las Vegas as part of a one-year pilot program. Self-driving technology provider Aptiv and ride-hailing company Lyft also ran a pilot program of self-driving, on-demand ride hailing during CES in Las Vegas in 2018, offering transit between major destinations along the Strip. The program was continued beginning in May 2018 and they're already in talks to expand a second pilot to another market located elsewhere in the U.S. While limited information is available, it's clear the companies were encouraged by the Las Vegas pilot's early and ongoing success.

RTCWC, the University of Nevada, Reno, and other partners are participating in an autonomous vehicle study to allow the testing of synchronized mobility technologies in complex urban environments aimed at making transportation more efficient, sustainable and safe. Researchers and partners will test, develop and refine systems in which vehicles sense their environment and communicate with other vehicles, infrastructure and individuals through mobile devices. This is a multi-year project and is in its first phase of data collection, vehicle instrumentation and intelligent transportation system assessment. There are three project phases to the study.

SHARED MOBILITY

In a broad sense, shared-use mobility comprises transportation services that are shared among users, including public transit, taxis and limos, bike sharing, car sharing (round-trip, one-way, and personal vehicle sharing), ridesharing (carpooling, vanpooling), ride sourcing (Transportation Network Companies such as Uber and Lyft), scooter sharing; shuttle services, and commercial delivery vehicles providing flexible goods movement. Shared-use transportation is becoming increasingly common in urban areas and utilizes wireless technology to improve the options and ease of access for users.

While technology and the market may support these some options, others may not be as feasible based on lower density development patterns and public rights of way that are built with a heavy emphasis towards cars instead of people. Roadways should be built as complete streets with more emphasis given to walking, bicycling and transit options in balance with automobiles.



RECOMMENDATIONS TO RAISE THE GRADE

- To continue to provide and improve the transit level of service to the communities in Nevada, lawmakers at all levels, need to increase investment in transit as a share of total transportation funding. In the metropolitan areas of Clark and Washoe counties, consider focusing investments on multi-modal options by expanding and enhancing their current bus network and adding new fixed guideway systems, such as bus rapid transit (BRT), modern streetcars, and light rail to make public transportation faster and more reliable. Developing a complete street projects is also a best practice decision makers should emphasize. Similarly, in rural communities, expand and enhance transit services to increase accessibility and convenience. All of this requires stable funding sources for capital investments as well as ongoing operations & maintenance that keep pace with inflation and growth.
- Nevada continues to experience rapid and sustained population growth. Decision-makers should prioritize investment in transit that adds capacity to the corridor to move people, improves air quality, quality of life, and mobility while increasing access to jobs.
- Roadways should be built as complete streets with more emphasis given to walking, bicycling and transit options in balance with automobiles. In the long term, this will help create accessible pathways for disabled persons and contribute to the reduction in paratransit usage and cost.
- New development in Nevada should be purposeful about incorporating transit opportunities into future communities and building in a way to make transit more accessible and viable as a transportation choice.
- Transportation network companies are being shown in some cities to have a dramatic and detrimental impact worsening congestion. While the services they provide may be complementary to transit, there is often a net increase in the number of single occupant vehicles (the driver) deadheading to pick up another passenger. In Nevada, fees for these services are collected by the state of Nevada; but it's the local communities that are dealing with increased demands on their roadway networks and drops in transit ridership. Consider regulating these companies by limiting the number of permits in highly congested areas and assessing fees that are directed to transit agencies to bolster their operations.

FIND OUT MORE

<https://www.rtcnv.com/planning-engineering/transportation-planning/>

<https://www.rtcwashoe.com/metropolitan-planning/>

<https://www.nevadadot.com/mobility/transit-providers/rural-and-small-urban>

<https://www.nevadadot.com/mobility/transit-providers/public-transit>

<https://techcrunch.com/2018/01/17/aptiv-and-lyfts-vegas-self-driving-pilot-to-expand-beyond-ces/>

<http://onboardsnv.com/>

<https://www.prnewswire.com/news-releases/aaa-and-keolis-launch-nations-first-public-self-driving-shuttle-in-downtown-las-vegas-300551187.html>





WASTEWATER



EXECUTIVE SUMMARY

Approximately 6,775 miles of sewer pipeline in Nevada connect to 50 different wastewater treatment facilities. Many of Nevada's collection systems are relatively new compared to other states. While the majority of Nevada's population is concentrated in the Reno and Las Vegas metropolitan areas and served by a few facilities, the majority of wastewater treatment facilities in Nevada serve rural communities. The 2008 Great Recession had a large impact on the state's economy and rate of growth; new construction came to a halt and agencies prioritized rehabilitation of existing infrastructure. However, recent spending has ticked up. Federal grants and loans have leveraged state and local funds to upgrade facilities. The Environmental Protection Agency reported in 2012 that wastewater projects in Nevada required approximately \$3.08 billion, down from \$3.3 billion in 2008. Nevada is the driest state in the U.S. and supporting a growing population requires innovation and conservation.

BACKGROUND

The origins of wastewater treatment in Nevada begins with Lake Tahoe before the Clean Water Act was passed in 1968. During the 1950s and 1960s, the combined effects of leeching from residential septic tanks, discharge from sewage treatment plants, and accelerated development fueled by the construction of casinos, led to the degradation of Lake Tahoe. The visible impact of wastewater discharge prompted the local community to form the first wastewater agency in the state. Other agencies formed in Nevada over the next two decades.

There are two main population centers in Nevada, the Reno area in the northwest and the Las Vegas area in the south. In 2017 an estimated three million people were residents of the state, with approximately 350,000 people living in rural communities. For this report, rural communities are defined as communities with less than 10,000 residents. Rural communities of Nevada face similar challenges and compliance requirements as the urban areas of the state, but with additional hurdles due to their small sizes and proportionally limited funding sources.

CONDITION AND CAPACITY

There are approximately 6,775 miles of sewer pipelines in Nevada that connect to 50 different wastewater treatment facilities. The majority of pipelines are concentrated in the urban areas of Nevada. Nevada has seen exponential growth since the 1950s, making most of the older pipes only 60 years old; the majority of population growth has occurred in recent decades making much of Nevada's collection systems relatively new compared to other cities. In 2014, the largest wastewater utility in southern Nevada installed 13 miles of gravity interceptor sewer, the largest expansion in its history. Similar programs have been completed in Northern Nevada out of necessity to meet the needs of an expanding population.

The Clean Watersheds Needs Survey (CWNS), which is produced by the Environmental Protection Agency (EPA), is a voluntary assessment of the needs of local agencies to meet water quality and other water-related public health goals of the Clean Water Act (CWA). In Table 1 below, from the 2012 CWNS, 76% of all treatment facilities in the state were "no-discharge" facilities. No-discharge facilities provide a minor level of treatment to wastewater and typically store wastewater lined ponds until all water evaporates. Figure 1 below is an example of a no-discharge facility located in Nevada. No-discharge wastewater facilities typically have minimal negative impacts on the local environment.



FIGURE 1. PANACA TREATMENT POND



Panaca's Wastewater Treatment Ponds
One of Nevada's Communities that has benefitted from the Circuit Rider Program

Photo courtesy of: ndep.nv.gov

The number of treatment facilities in Nevada is projected to remain generally unchanged, while the state population is anticipated to increase by up to 140% by 2032 as shown in Table 1. Table 1 also shows that Nevada's urban areas are projected to densify and become more populous. By 2032 approximately 89% of the state's population will be serviced by 20% of the treatment facilities in Nevada. All wastewater facilities in urban communities of Nevada have on-going plans for expansion to meet the needs of a growing population.

Table 1 also demonstrates that the wastewater treatment plants in urban communities are treating effluent to an advanced level which includes nitrification, denitrification, and advanced filters. This highly treated water can be used for environmental uses, being returned to a natural stream, or economic uses, such as for irrigation. Nevada is the driest state in the USA, treating and reusing wastewater has been an essential component of the state's growth.

TABLE 1. CLEAN WATERSHEDS NEEDS SURVEY NUMBER OF FACILITIES AND POPULATION OF NEVADA 2004-2032

Number of Facilities				Population Served				
				Population	% Total	Population	% Total	
Treatment Level	2004	2012	2032*	2004		2012		2032
Less than Secondary	0	0	0	0	0	0	2%	0
Secondary	8	3	3	200,000	13%	<0.1		<0.1
Advanced	3	9	10	900,000	60%	2,600,000	87%	4,000,000
No Discharge	44	38	38	300,000	20%	300,000	10%	500,000
Partial Treatment	0	0	0	0		0		0
Total	55	50	51	1,500,000	93%	3,000,000	99%	4,400,000

Notable examples of rural communities that have upgraded their infrastructure with federal United States Department of Agriculture (USDA) grants, state, and local funds are the City of Winnemucca and Boulder City, which both recently completed advanced treatment facilities with capacities three times their current average daily use rates.

TABLE 2. NPDES PERMIT VIOLATIONS IN NEVADA FROM 2015-2018

Area	Average Number of Quarters in Non Compliance	Effluent Violations	Number of Inspections	Formal Enforcement Actions
North	3	16	7	0
South	3	6	6	2
Rural	1.3	40	15	0

Table 2 was developed from the EPA’s Enforcement and Compliance History Online (ECHO) tool. Six facilities in rural areas, one serving a population of 16,000, one in the north, and one in the south, have been cited by EPA Region 9 for violating their respective national Pollution Discharge Elimination System (NPDES) permits over a three-year period from 2015-2018.

Overall, the effectiveness of wastewater treatment facilities in Nevada have met and exceeded EPA and NDEP guidelines, with only 16% experiencing any type of violation in a three-year period. The number of sanitary sewer overflows (SSOs) in the state could not be verified as only paper records are kept, although the system is transitioning to an electronic format.



FIGURE 2. LAS VEGAS VALLEY WASH

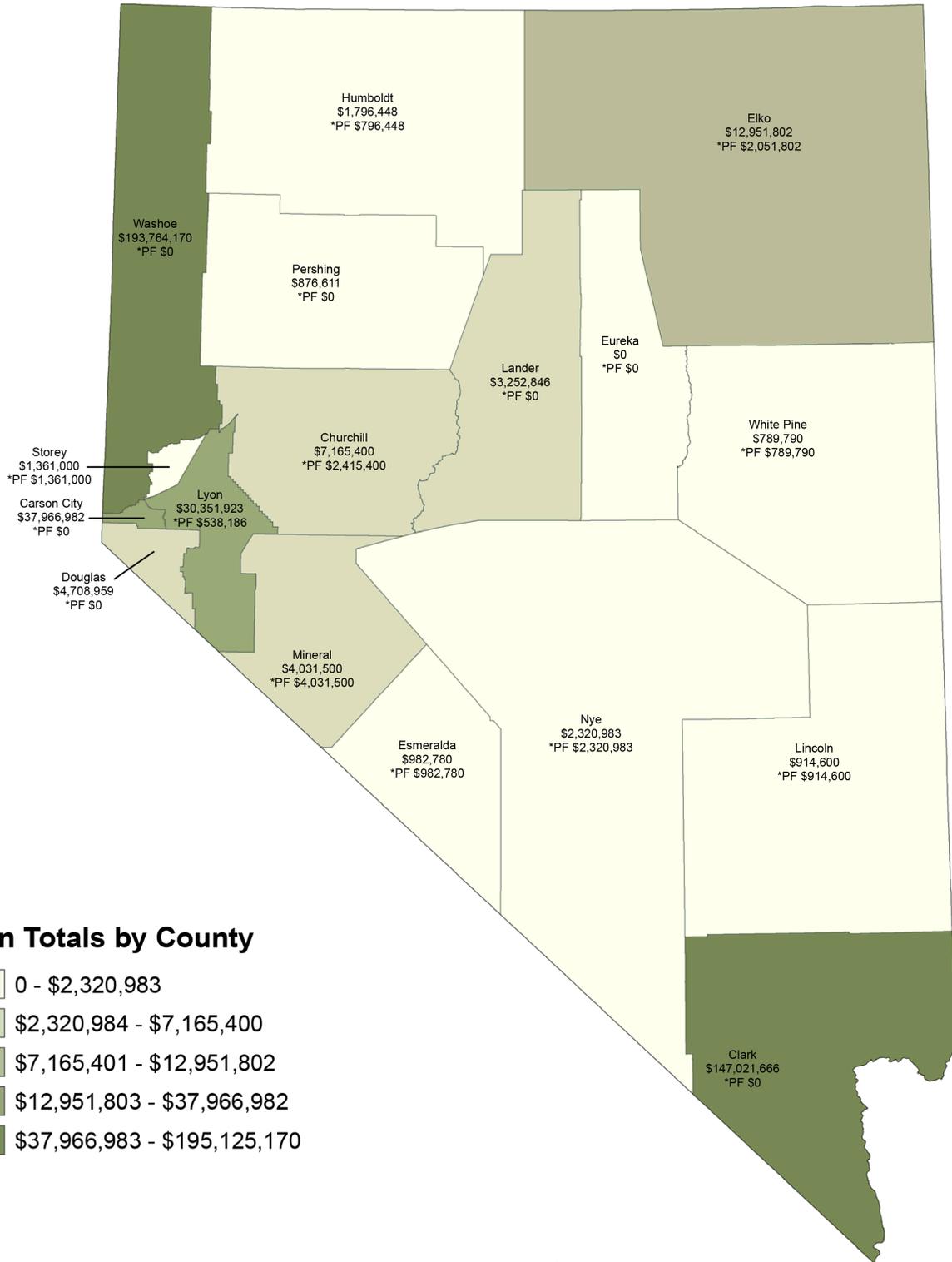


The average number of residents in each city that are still on septic systems and not connected to treatment facilities is estimated between 1% and 5%. The state-wide septic program is monitored by the NDEP and requires a permitting process and regular maintenance.

FUNDING AND FUTURE NEEDS

While the majority of Nevada's population is concentrated in the Reno and Las Vegas metropolitan areas and served by a few facilities, the majority of wastewater treatment facilities in Nevada serve rural communities. USDA's Community Programs provided \$28 million worth of loan and grant funding to clean water and wastewater projects in rural Nevada. These funds were used to replace pipelines and pump stations, and as an example, connected the community of Gold Hill to the Virgin City wastewater system after its septic system failed. Funds are also dispersed through the EPA and NDEP through the Clean Water State Revolving Fund. The map below shows funds distributed throughout the state through December 2016. The highest concentration of funds was provided to the most populous counties of Clark and Washoe; however, more than half of the total number of projects were completed in other counties.

FIGURE 3. CLEAN WATER STATE REVOLVING FUNDING BY COUNTY, 2016



Loan Totals by County

- 0 - \$2,320,983
- \$2,320,984 - \$7,165,400
- \$7,165,401 - \$12,951,802
- \$12,951,803 - \$37,966,982
- \$37,966,983 - \$195,125,170



FIGURE 3., CONTINUED

PROJECTS BY COUNTY - DECEMBER 2016

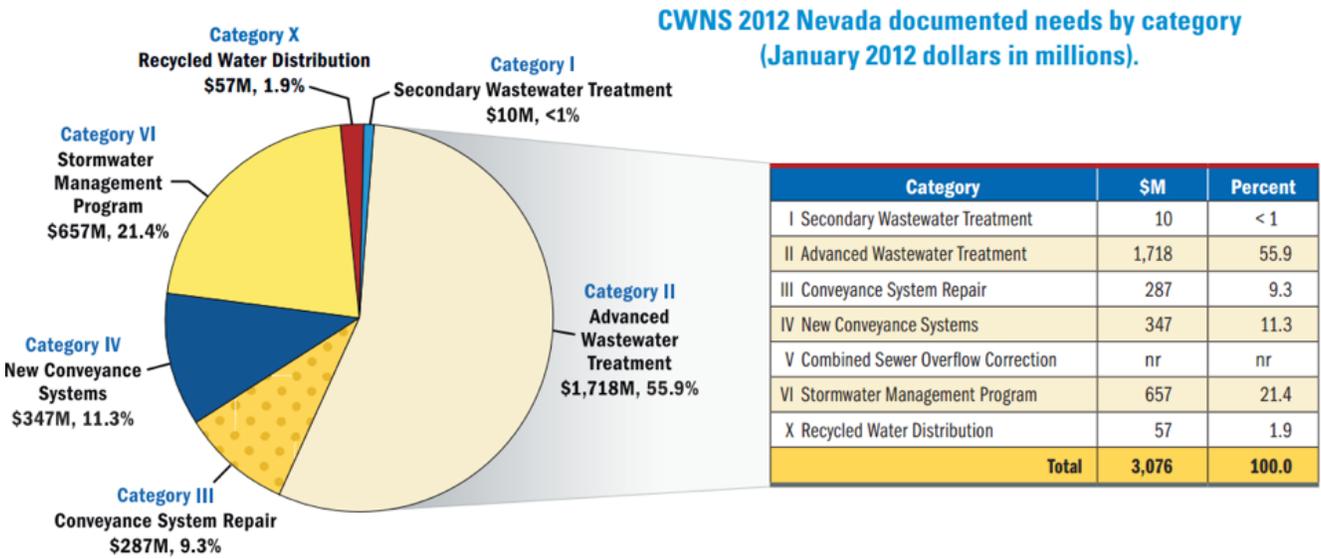
County	Loan Recipient	Contract Date	Total Disbursements	County	Loan Recipient	Contract Date	Total Disbursements
Carson City	Carson City	6/24/1994	\$2,400,000	Mineral	<i>*Hawthorne Utilities</i>	5/21/2009	\$1,531,500
	Carson City	9/8/1995	\$2,120,000		<i>*Hawthorne Utilities</i>	10/7/2010	\$2,500,000
	Carson City	8/14/1998	\$6,000,582	Nye	<i>*Nye Co/Gabbs</i>	7/16/2009	\$709,968
	Carson City	10/22/2010	\$2,748,556		<i>*Tonopah</i>	3/9/2012	\$1,121,890
	Carson City	4/4/2014	\$23,336,086		<i>*Nye Co/Gabbs</i>	5/5/2014	\$489,126
	Carson City	7/10/2015	\$1,361,757				
Churchill	Fallon	11/1/1999	\$4,750,000	Pershing	Lovelock	8/14/1998	\$876,611
	<i>*Churchill County/Oasis MHP</i>	5/3/2009	\$2,392,900	Storey	<i>Canyon GID</i>	6/17/2009	\$1,361,000
	<i>*Churchill Co/Pine Grove</i>	9/2/2016	\$21,000				
	<i>*Churchill Co/Casey Rd MHP</i>	11/22/2016	\$1,500	Washoe	Incline Village GID	10/29/1992	\$3,925,398
Clark	Mesquite	9/27/1991	\$1,280,000	Sparks	8/31/1995	\$4,700,000	
	Henderson	10/21/1991	\$7,221,110	Sparks	5/15/1996	\$6,814,488	
	Henderson	10/29/1992	\$12,300,000	Washoe County	8/13/1997	\$1,249,137	
	Henderson	6/30/1994	\$12,410,431	Washoe County	3/26/1998	\$5,957,456	
	Henderson	9/14/1995	\$9,504,950	Sparks	2/29/2000	\$3,070,670	
	Mesquite	10/27/1995	\$6,600,000	Washoe County	6/6/2000	\$899,228	
	Mesquite	9/22/2009	\$20,301,000	Washoe County	6/6/2000	\$178,316	
	Clark Co Water Reclamation District	10/16/2009	\$5,744,780	Washoe County	1/18/2001	\$21,000,000	
	Henderson	1/8/2010	\$1,659,396	Sparks	9/10/2001	\$7,038,807	
	Clark Co Water Reclamation District	3/25/2011	\$40,000,000	Sparks	6/27/2002	\$2,718,203	
	Clark Co Water Reclamation District	7/13/2012	\$30,000,000	Incline Village GID	10/28/2002	\$1,720,380	
	Douglas	Indian Hills GID	9/1/1999	\$1,300,000	Sparks	11/19/2003	\$8,243,494
Douglas County SID		5/25/2006	\$878,889	Reno	4/9/2004	\$46,523,205	
Douglas County SID		8/28/2007	\$694,766	Washoe County	6/11/2004	\$3,000,000	
Douglas County SID		4/11/2008	\$354,312	Reno	7/13/2004	\$10,919,947	
Minden Gardnerville Sanitation District		10/27/2009	\$1,427,583	Reno	8/25/2004	\$15,690,010	
Douglas County		4/29/2016	\$53,410	Sparks	4/19/2005	\$4,091,227	
Elko	Elko	12/2/1991	\$1,000,000	Reno	7/27/2005	\$8,033,095	
	West Wendover	10/27/1992	\$2,500,000	Sparks	9/28/2005	\$5,160,261	
	Elko Co/Jackpot	6/9/1994	\$900,000	Incline Village GID	3/29/2006	\$3,000,000	
	Elko	6/21/1994	\$2,500,000	Washoe County	8/25/2006	\$6,500,000	
	Elko	8/14/1998	\$4,000,000	Spark	11/9/2006	\$13,385,606	
	<i>West Wendover</i>	6/25/2009	\$604,302	Sparks	8/27/2009	\$2,509,299	
	<i>Elko Co/Jackpot</i>	8/18/2009	\$1,100,000	Sparks	8/27/2009	\$4,772,645	
	<i>*Elko Co/Mountain City</i>	9/10/2012	\$347,500	<i>*Gerlach GID</i>	4/25/2014	\$111,682	
				Washoe County	8/18/2015	\$2,551,616	
				<i>*Washoe Co/Panther Valley</i>	12/6/2016	\$0	
Esmeralda	<i>*Esmeralda Co/Goldfield</i>	7/7/2009	\$982,780	White Pine	<i>*Ely</i>	1/25/2010	\$789,790
Humboldt	Winnemucca	12/10/1991	\$1,000,000				
	<i>*McDermitt</i>	7/9/2009	\$284,647				
	<i>*Orovada GID</i>	3/2/2012	\$511,801				
Lander	Battle Mountain	12/21/2000	\$3,252,846	Total			\$450,257,461
Lincoln	<i>Alamo Sewer & Water GID</i>	5/26/2009	\$914,600				
Lyon	Femley	10/28/1992	\$2,000,000				
	Yerington	10/29/1992	\$1,325,313				
	Silver Springs	7/10/2000	\$2,700,000				
	Lyon County	8/19/2005	\$15,980,733				
	<i>*Lyon Co/Dayton</i>	10/29/2014	\$500,000				
	Lyon Co/Dayton	10/29/2014	\$2,000,000				
	Femley	8/6/2015	\$5,807,691				
	<i>*Femley</i>	8/11/2016	\$0				
<i>*Lyon Co/Dayton</i>	9/19/2016	\$38,186					

**Note: Loans in italics were Principal Forgiveness (PF) - no money repaid*



From the 2012 CWNS, the total financial needs for wastewater projects in Nevada were approximately \$3.08 billion with 55.9% of the total attributed to advanced wastewater treatment processes. However, the financial need of 2012 was less than the \$3.3 billion financial need in 2008, and the primary need shifted from secondary treatment to advanced treatment as facilities have been upgraded. This decrease of about \$300 million demonstrates the effectiveness of USDA grants, as well as state and local funds, which were used to upgrade facilities. The Clean Water State Revolving Fund provided \$450 million worth of funds in 2016, while the USDA funded approximately \$30 million in wastewater grants.

FIGURE 4. DOCUMENTED FUNDING NEEDS BY CATEGORY, 2012



The remaining \$2.5 billion worth of improvements will need to come from a combination of rate payer and new connection fees. The figure above breaks down the projected financial needs. A total of \$1.7 billion is projected to upgrade systems to advanced treatment. However, EPA data does not specify if these are improvements to Nevada’s three secondary plants and 10 advanced treatment plants, or if this is a greater need to have all public treatment systems functioning at their highest potential. Ultimately, the utilities must weigh the benefit to their customers and the impact to the environment with the cost of upgrades.

In Nevada’s urban areas, funding for wastewater utilities is typically collected through a sanitation fee on all customer’s bills, in addition to new connection fees. The sanitation fee is stable relative to population while new connection fees fluctuate depending on economic conditions. The combined capital improvement budgets (of just the wastewater categories) of the five largest wastewater utilities in the state for fiscal year 2018 to fiscal year 2022 are approximately \$762.6 million. Although not the \$3 billion of projected need, the improving CIP budgets of utilities in the state indicates that utilities are prepared and planning for the future.



O&M/PUBLIC SAFETY

Rehabilitation of existing wastewater infrastructure is a priority for Nevada public wastewater agencies and is listed in the Capital Improvement Projects (CIP) of all agencies surveyed. Nevada utilities have taken proactive measures to extend the useful life of equipment, such as re-lining existing pipelines to extend life expectancy. The economic recession of 2008 had a large impact on the state's economy and new construction came to a halt, since then agencies have been prioritizing rehabilitation of existing infrastructure rather than focusing on new growth. The recession also slowed the rate of population growth, which in turn extended the amount of time before facilities would meet capacity.

From an operation stand point, one challenge facing rural facilities is the need for qualified wastewater treatment operators. In order to receive a level 3 or higher certification, the operator must work in a facility of that level, and those facilities are concentrated in the urban areas. NDEP has a circuit rider program where senior operators can travel to rural communities to provide assistance and training, but the need is greater than supply.

Awareness of public safety is important for wastewater treatment in Nevada as recycled water is used for multiple applications in the state and produced by every large wastewater utility. In the south, wastewater is treated and returned to Lake Mead, which serves as a drinking water source to the Las Vegas Valley and multiple other communities. Ensuring only high quality water safe for the environment and people is paramount to all utility operations. In 2018, the Nevada State Legislature begin requiring all wastewater plant and collection system operators take a certain number of continuing education credits each year to keep education levels high and ensure the best trained people are working in this field to maintain public safety.

RESILIENCE AND INNOVATION

Often Las Vegas is identified as a poster child for unsustainable development due to the limited amount of rainfall received in the state. However, the critics could not be more wrong. The Las Vegas Valley is able to use the virtually unlimited storage capacity of Lake Mead as an almost infinite water source. Approximately 40% of all wastewater generated in the Las Vegas Valley is reused as drinking water. This return of effluent helps the Las Vegas Valley maintain water supplies within the limited water allocation of the Colorado River Compact by providing a consumptive credit, meaning that the returned flow is subtracted from the water pulled out of Lake Mead for treatment to drinking water standards. Producing high quality effluent is essential for the Las Vegas Valley to ensure a reliable supply of water into the future.

In the Reno-Tahoe area, proactive and stringent wastewater discharging rules have kept Lake Tahoe and the Truckee River pristine and reduced the many contaminant issues of the past. Since 2000, Washoe County provides an average of 800 million gallons of Class A reclaimed water every year. Communities across Nevada use treated wastewater as irrigation for crops and golf courses, which offsets the use of drinking water in their communities.



RECOMMENDATIONS TO RAISE THE GRADE

- Increase funding to the State Revolving Loan Fund.
- Continue to fund low-interest loans.
- Increase volume of wastewater treated for return flow credits.
- Continue to encourage industrial, agricultural, and municipal partnerships to explore sustainability in each of its practices as it pertains to recovering resources from wastewater.
- Establish a statewide infrastructure needs inventory administered by the state's municipal planning organizations that would help increase public awareness of problems and needs facing the state's physical infrastructure and would help the State Legislature focus on programs devoted to long-term growth and productivity.
- Continue to fund research for new wastewater treatment technology.

FIND OUT MORE

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