04. SYSTEMS & SERVICES

INTRODUCTION

Physical infrastructure and public service systems are essential for the sustainability and resilience of Las Vegas. Considering the increase in population that is projected to come into Las Vegas by 2050, it is important to ensure that the physical and social networks that act as the foundation of the built environment are as flexible and innovative as possible. It is important to Las Vegas residents that infrastructure not only provide consistent and reliable services to citizens, but that it also be responsive to changing conditions like extreme weather events. As such, this plan recommends that the City move towards more localized, flexible infrastructure development.

Las Vegas has a good start, but more intentionally connecting the City's smart aspirations with conservation goals could help to better decouple development from resource-intensive growth, and also create jobs.

Considering renewable energy options in Las Vegas for new construction will be important, but so is addressing how current buildings and places consume energy.

Reconceptualizing the very definition of what constitutes infrastructure will also help position Las Vegas as a leader in resilience. For instance, streets can (and will) be ideal intersections of where mobility and ecological integration happens. Las Vegas must diversify its mobility offerings for 2050. At the same time, Las Vegas residents want to be able to make smaller, easier, trips across their neighborhoods.

Not only must Las Vegas focus on resource conservation for 2050, it must focus on providing superior public facilities and services to make it a healthy, livable, and safe city. Mitigating natural hazards that impact the entire Southern Nevada region with high quality public safety and health services by leveraging existing institutions will elevate Las Vegas in the future.

GOALS

I. TRANSPORTATION

A. Connect and enhance accessible bike and pedestrian facilities as part of a safe, efficient complete street and highway network that moves people and goods.

B. Make transit options more convenient and better integrated with vibrant neighborhood and employment centers, better connecting people to their destinations.

C. Strengthen smart transportation systems and infrastructure to foster economic development efforts.

II. RESOURCE CONSERVATION

A. Support efficient water management, reduce water consumption, and enact stronger water conservation strategies to minimize consumptive use

B. Prioritize the use of renewable energy sources and improve energy efficiency.

C. Reduce waste consumption and target net-zero municipal solid waste produced in the community.

D. Mitigate and reduce municipal and community greenhouse gas emissions.

III. PUBLIC FACILITIES AND SERVICES

A. Provide equitable access to facilities and services that help meet residents' social needs, maximize their potential for development and enhance community wellbeing.

B. Ensure healthy outcomes for all members of the community.

IV. SAFETY

A. Provide high quality emergency services, reduce crime and create safe, friendly communities that elevate social equity.

B. Strengthen resilience to climate change risks, natural and man-made hazards, and extreme events.

C. Minimize flooding risks to prevent damage to property and infrastructure

RELATION TO SOUTHERN NEVADA STRONG
INCREASE TRANSPORTATION CHOICE

Goals focus on developing a world-class transportation system and coordinating future transit investments with urban development

1. Developing a modern transit system that is integrated with vibrant neighborhood and employment centers, better connecting people to their destinations.

2. Connecting and enhancing bike and pedestrian facilities throughout the region.

3. Developing a safe, efficient road network that supports all transportation modes.

SUMMARY OF STRATEGIES BY GUIDING PRINCIPLE

EQUITABLE

- Emphasize multi-modal transportation choice
- Prioritize capital improvements across planning areas
- Create Internet access for all
- Emphasize access/proximity to work, social services and transportation options
- Prioritize fair pricing of utilities and infrastructure as portion of income
- Train for smart jobs
- Spread out recycling with low-rates for low-income zones
- Keep energy affordable even during growth

RESILIENT

- Reduce emissions
- Develop emergency evacuation plans
- Diversify energy sources
- Prioritize infrastructure maintenance
- Plan for future transportation technology
- Prioritize flood management
- Improve emergency services
- Create smart grids to ensure flexible and responsive infrastructure
- Reduce stress on landfills
- Integrate building control technologies

HEALTHY

- Incentivize walking and biking
- Utilize preventative Public Safety
- Prioritize mental health and wellness
- Improve air quality
- Develop reliable power, heating, and transport
- Empower smart decision-making
- Utilize electric vehicles reduce emissions
- Keep the desert deserted
- Transition to a low-carbon future
- Monitor and track energy and waste programs

LIVEABLE

- Provide transportation choice
- Increase parking strategies
- Connect across the street network
- Strengthen connections to cultural destinations
- Provide public WiFi in the downtown/ public areas
- Create more affordable utilities for competition
- Track and monitor consumption choices
- Increase access
- Utilize reliable utilities that are good for economic development
- Improve recycling and reduce waste stress

INNOVATIVE

- Emphasize innovation in technology
- Provide leadership regarding drones,connected vehicles and autonomous vehicles
- Improve Internet access speeds and capacity for business and industry
- Increase partnerships with private sector tech and transportation
- Create new innovation centers and districts
- Convert ethane to biogas
- Reuse waste-water to reduce water stress
- Embrace 2030 Districts

TRANSPORTATION

GOALS

A. Connect and enhance accessible bike and pedestrian facilities as part of a safe, efficient complete street and highway network that moves people and goods.

B. Make transit options more convenient and better integrated with vibrant neighborhood and employment centers, better connecting people to their destinations.

C. Strengthen smart transportation systems and infrastructure to foster economic development efforts.

I.A TRANSPORTATION: COMPLETE STREETS

NRS 278.160.1(h)(1) and (3)

CONNECT AND ENHANCE ACCESSIBLE BIKE AND PEDESTRIAN FACILITIES AS PART OF A SAFE, EFFICIENT COMPLETE STREET AND HIGHWAY NETWORK THAT MOVES PEOPLE AND GOODS

Over the coming decades, transportation will continue to be a driving force for how Las Vegas grows as a region. Transportation impacts land use decisions, community air quality, and has significant implications for the environment as it accounts for approximately thirty percent of the total U.S. emissions. This includes the movements of goods through and within the city, residents to employment, education, health care, and daily needs, and visitors to resorts and attractions.

Southern Nevada's transportation network shifted away from being a rail stop to the automobile throughout the 20th Century. With nationwide construction of the US Highway System and later the Interstate Highway System, the Interstate 15 corridor helped fuel the City's growth and cemented its linkage to Southern California and to points further north and east. From Southern California, interstates and cross-country rail transportation routes connect ports on the Pacific Coast, including the intermodal Port of Los Angeles and Port of Long Beach with the interior of the country. Southern Nevada is approximately 300 miles from the ports, which receive freight shipped from across the Pacific Rim. Because Southern Nevada lacks major agriculture and heavy industry, it relies on product importation; 90% of all goods are imported globally to the region's residents and visitors. As such, disruptions to I-15, either through traffic congestion, collisions, or natural disasters, could interrupt or slow the supply chain.

The City lacks diversified transportation infrastructure that realizes all ages and abilities because of a century of policies and growth patterns focused on expanding outwards. More than 90% of commuters drive to work alone, while less than 5% bike, walk, or take public transportation. With three work shifts in the resort industry, some commutes occur during off-peak hours, but Southern Nevada retains a heavy morning and afternoon peak rush hour. Today many areas of the Valley experience traffic congestion, which in turn bears its own transportation impacts. A large portion of Las Vegas residents experience long commutes and the amount of time spent driving continues to rise. Public transit options are at the will of traffic congestion, and do not always provide enhanced travel times. Growing traffic is linked with a higher number of traffic incidents, which account for recurring traffic delays. Freight movement is burdened by congestion. The City is improving pedestrian and bicycle access, comfort, and safety on roadways that were originally built with car-centric features, but there are still many roadways lacking this balance. The 42 million tourists that visited Las Vegas rely heavily on our transportation system, with 6 out of 10 visitors arriving by car, bus, or other form of ground transportation.

LAYERED COMPLETE STREETS NETWORK

The costs of traffic congestion, including wasted time, fuel, and emissions will continue to take a toll on the community unless a layered multi-modal, complete street network is developed. Therefore, complete streets within the City of Las Vegas are streets that safely and comfortably accommodate all users, regardless of mode, age, or ability. This includes pedestrians, bicyclists, mobility devices, public transportation, carpoolers, motorcyclists, single-occupant vehicles, trucks, public safety officials, and other users of the City's streets and highways.

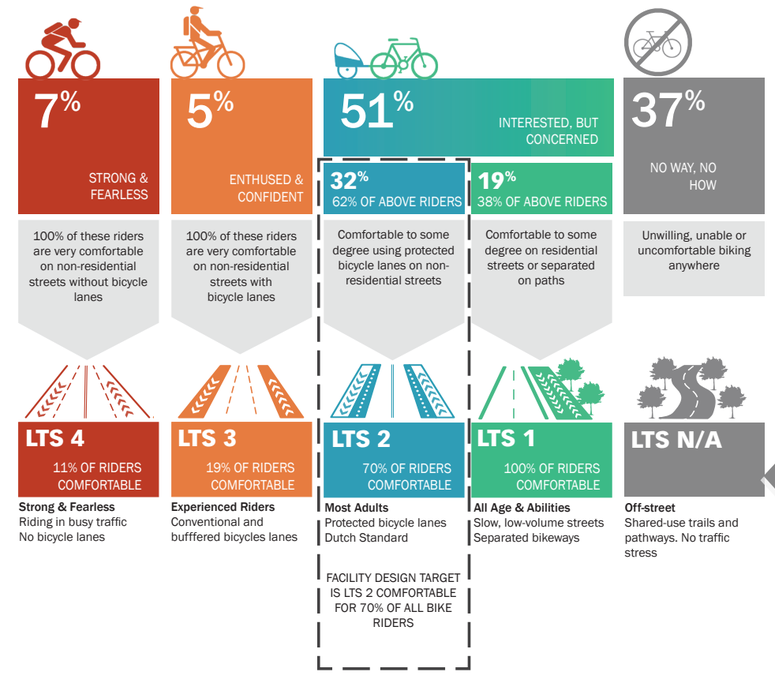
The layered complete street network will be incorporated into the City's Master Plan for Streets and Highways. With respect to design, all such streets shall be designed pursuant to Titles 11 and 19 of the Las Vegas Municipal Code and will take into account PROWAG and ADA standards to equitably accommodate disabled persons and non-motorized users of streets. At a minimum, complete streets shall includes sidewalks with amenity zones, transit stops with shelters and other passenger amenities, and bicycle facilities.

SEE ALSO

- RTC Regional Transportation Plan
- CLV Mobility Master Plan
- Master Plan of Streets and Highways
- Chapter 2: Park Connectivity

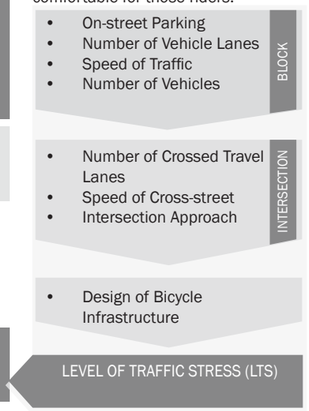
REALIZING ALL AGES & ABILITIES

Linking types of bicycle riders to level of traffic stress and facility design



BIKE RIDER TYPES AND TRAFFIC STRESS

This diagram shows the relationship between the types of bicycle riders and how their stress tolerance relates to Level of Traffic Stress (LTS) and the types of bicycle infrastructure that feels comfortable for those riders.



Source: (2016) Dill J. and McNeil N., Revisiting the Four Types of Cyclists: Findings from a National Survey, Journal of the Transportation Research Board.

OUTCOMES

- Beginning in 2025, vehicle miles traveled (VMT) within the City is reduced 0.5% annually.
- By 2050, the mode split for Drive Alone is 40%, 20% for transit, and 5% for Walking and Biking.
- By 2050, the citywide Jobs-Housing balance index is 1 - 1.25.
- By 2050, the number of pedestrian, bicyclist, and vehicular fatalities caused by road crashes is zero.
- By 2050, 100% of sidewalks are PROWAG compliant, 70% of crosswalks are marked and if on street parking is present, have bulb-outs.
- Maintain a minimum "Silver" level Bicycle Friendly Community designation from the League of American Bicyclists.

KEY ACTIONS

- To reduce VMT and diversify the City's modal split, adopt the "Layered Complete Street Network" as part of the Master Plan for Streets and Highways, and construct the recommended improvements essential for traffic management, safety, and regional economic development.
- Achieve a jobs-housing balance through the adoption of TOD place types
- Infrastructure must be well maintained by properly allocating funding and resources
- Further reduce VMT, congestion, wasted time, and emissions by working with regional partners to embrace transit, TDM, TSM, carpooling, ridesharing, and other transportation solutions.

To facilitate the Layered Complete Street Network as part of its Master Plan for Streets and Highways, the city must work closely with the following entities:

- The Nevada Department of Transportation (NDOT) is responsible for planning, constructing and maintaining interstate and state highways and bridges. Among NDOT's important functions is obtaining Federal funding from the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) for significant transportation capital improvements through the Statewide Transportation Improvement Program (STIP). The STIP is prepared in cooperation with the state's four Metropolitan Planning Organizations (MPO) and includes the projects identified in their respective Transportation Improvement Programs (TIP).
- The Regional Transportation Commission of Southern Nevada (RTC) serves as the region's MPO. In this capacity, RTC is uniquely responsible for the administration of:
  - The Regional Transportation Plan (RTP), which is intended to align with this Master Plan.
  - Streets and Highways funding, engineering, and capital project construction.
  - The provision of public transportation and paratransit services,
  - Transportation System Management (TSM) and Intelligent Transportation Systems (ITS), overseen by RTC's Freeway and Arterial System of Transportation (FAST). FAST monitors and manages traffic on Southern Nevada's freeways and arterials on behalf of Clark County and the cities.
  - Transportation Demand Management (TDM) Programs and incentives through "Club Ride."
- The Union Pacific Railroad (UPRR) owns and operates the sole Class I freight rail lines directly through the City of Las Vegas. Passenger rail service has yet to resume service into Las Vegas since it was discontinued in 1997.
- A variety of intracity bus services and motorcoaches operate to destinations across the region; as a low cost alternative, these services provide an important service, especially to those who may have no other means of travel available.
- The Clark County Department of Aviation operates McCarran International Airport and four other general aviation airports within Southern Nevada, including North Las Vegas Airport adjacent to the Rancho planning area. McCarran connects 150 national and international direct destinations and served 50 million passengers in 2019, making it consistently among the top ten busiest airports in the country.

Other state and local agencies are responsible for regulating transportation and ensuring public safety. They include:

- The Nevada Department of Motor Vehicles (DMV) which licenses drivers and registers vehicles
- A variety of police and traffic enforcement entities that are responsible for motorist, pedestrian and bicyclist safety, including the Nevada Highway Patrol (NHP), Las Vegas Metropolitan Police Department (LVMPD), and the Las Vegas City Marshals. Each enforce and state and local traffic laws codified through NRS 484 and Las Vegas Municipal Code Title 11 (Vehicles and Traffic).
- The Nevada Transportation Authority administers and enforces Federal and state laws on passengers, motor carriers, autonomous vehicles, freight transportation, and transportation network companies (TNC's). In Clark County, the Nevada Taxicab Authority licenses and regulates taxis.

Finally, City of Las Vegas departments also oversee different aspects of transportation:

- The Public Works Department oversees capital project and infrastructure planning, construction management, and traffic engineering and operations services. The City regulates Streets and Highways pursuant to LVMC Title 11 (Vehicles and Traffic) and Title 13 (Streets, Sidewalks, and Public Places), including a wide range of local laws like speed limits, crosswalks, speed control devices, bicycles and other mobility devices, and the City's Master Plan of Streets and Highways.
- The Department of Operations and Maintenance is responsible for the maintenance of more than 1,300 miles of city roadways, sidewalks, paths, and trails. This includes the management of pavement, street rehabilitations, street sweeping, streetlights, and traffic signals.
- The Economic and Urban Development Department's Parking Services Division is charged with operating City-owned parking facilities, parking enforcement, and permitting for the City, with direct oversight of parking management within Downtown Las Vegas.

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
By developing a layered complete street network, users of all ages and abilities can move quickly and safely with choices of a variety of modes and the ability to move goods.	A layered complete street network allows for efficiency and reduced energy and fuel consumption with multi-modal transportation choices that help reduce VMT and congestion.	Active transportation modes like biking and walking and the provision of wide sidewalks, trails and bike lanes, promote healthy lifestyles and reduces vehicular emissions.	A diversity of modal choices, paired with livable urban place types that balance housing and jobs will enhance the livability of the City.	New, rapidly evolving transportation innovations play a role in developing a transportation system that provide travelers information.

A DAY IN THE LIFE

PROVIDING MORE FOR PEDESTRIANS

Abigail Irving

A native of LA, Abigail moved to Las Vegas in 2012 when she lost her vision. While she made the move for economic reasons, she hasn't regretted it. She loves the retirement complex where she lives and makes good use of the city's free, door-to-door paratransit services. The city's Blind Center of Nevada has also proven to be an excellent social and cultural hub for her. And at the time of her move the city provided mobility trainers to come to her home and work with her.

A good thing they did: "The city is extremely pedestrian-unfriendly," she says. Often, Abigail can feel the traffic whizzing by right next to her. She encounters telephone poles and even bus stops situated in the middle of already-narrow sidewalks. The sense of a lack of safety prevents her from feeling comfortable enough to use public transit.

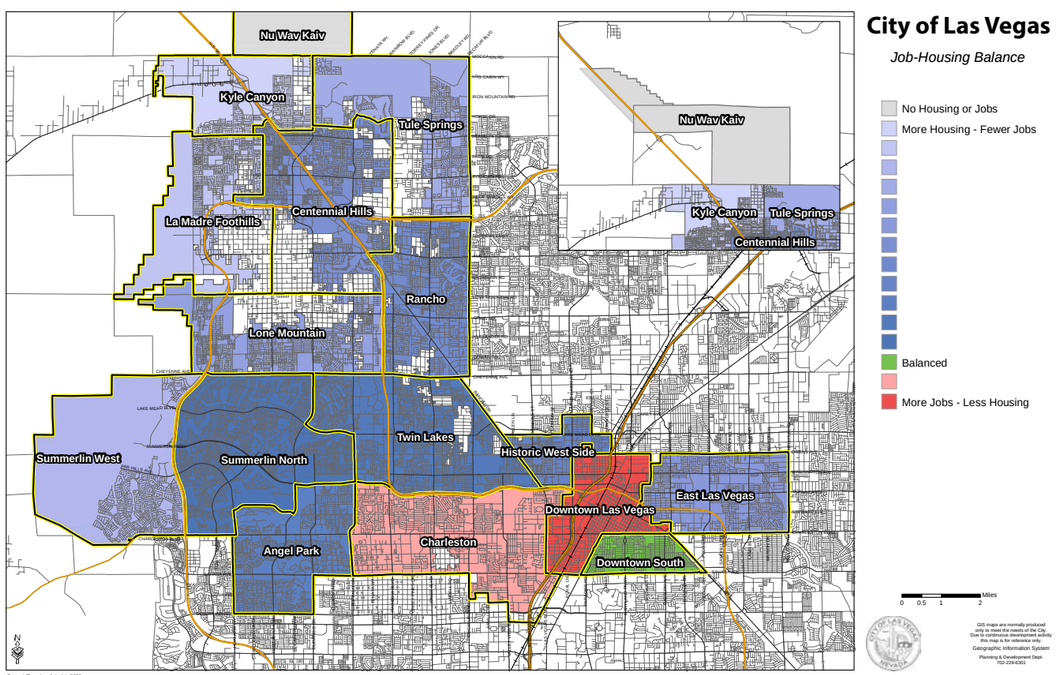
Personally, Abigail doesn't feel challenged to live a healthy life in Las Vegas. But she can imagine how others with more limited accessibility might be. And, yes, she can envision how her own lifestyle might be better.

"I'd take my dog and go walking in my neighborhood without the risk of a car jumping the sidewalk," she says.

- The Planning Department has established complete street cross-sections, right of way design, and parking standards enacted throughout Las Vegas Municipal Code Title 19. The procedure by which street names and numbered addresses are assigned has been previously established and is detailed in Title 19.04.050 of the Las Vegas Municipal Code as well as in the City of Las Vegas Street Naming and Address Assignment Regulations, 2009 Edition. This system utilizes the intersection of Main Street and Fremont Street as its initial point, and it has been developed through the combined effort with all other jurisdictions in the Las Vegas Valley. A procedure to change the name of any street is detailed in Title 19.16.230 of the Las Vegas Municipal Code. The City Council may approve a name change if the change is in the best interest of the public and no person will be materially injured. At the request of the property owner or developer, the City may grant the approval of an address change. However, the proposed address change must not conflict with the addressing system, unless a waiver is approved by the City Council. Property owners do not have vested rights to street names and numbers, even if the address has been used for many years. When the City finds inconsistencies, and the Director of Planning or designee determines a correction is needed, the property owner will be notified that a change may occur.

In addition to this Master Plan, the City's Mobility Master Plan serves as a detailed blueprint for mobility infrastructure within the city boundary. It is the result of a planning process led by the Department of Public Works, and lays out a total of $3.2 billion of transportation investments.

SEE ALSO CHAPTER 2
Areas of the City
Park Connectivity



LAYERED COMPLETE STREET NETWORK

TRAILS

- **Regional Trails:** Major regional trailways and greenways for pedestrians and bicyclists that have minimal street crossings, grade-separated overcrossing or undercrossings, and dedicated rights of way, sometimes sharing space with a major freeway, highway, utility corridor, or regional flood control facility
- **Shared-use Trails:** Varied wide and improved sidewalks that accommodate major pedestrian (or bicycle) movement and feature diverse public amenities, especially trees, bike racks and bike infrastructure
  - Pedestrian Malls and Plazas: Exclusive pedestrian zones (such as Fremont Street Experience)
  - Urban Paths: Marked and designated routes, especially within Downtown Las Vegas
  - Shared Use Paths: Paths
  - Equestrian Trails: specifically dedicated for horse-use using different materials, but can also be utilized by hikers and pedestrians

BIKE STREETS

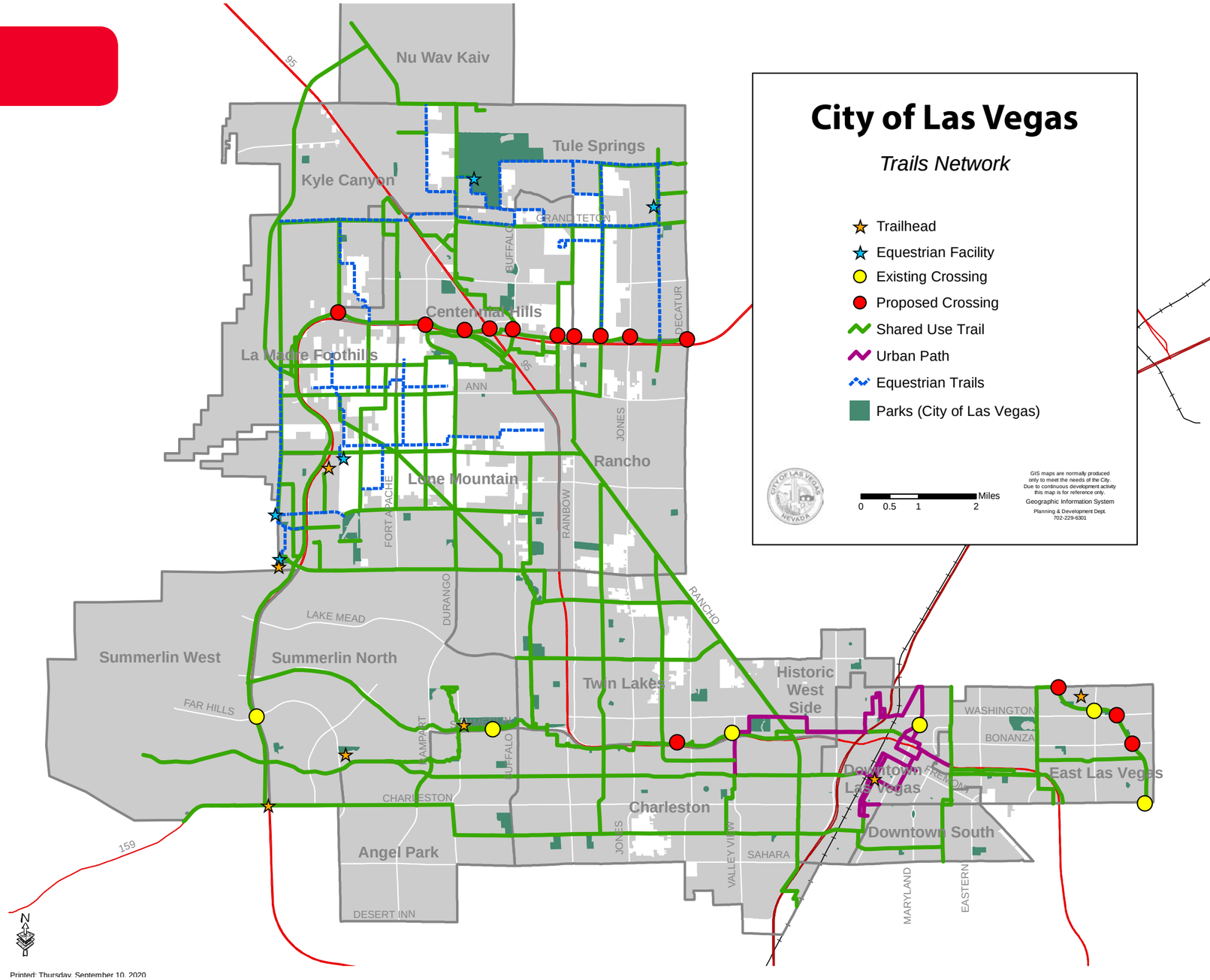
- **Separated Bike Lanes and cycletracks**: Bicycle facilities that provide physical barriers, two-way configurations or dedicated space separated from roadways
- **Buffered Bike Lanes**: Higher priority marked on-street bike facilities providing three-feet of dedicated space for bicyclists to ensure safe movement
- **Bike Lanes**: Marked on-street facilities providing minimum dedicated space for bicyclists

STREETS, TRANSIT, AND FREEWAYS

- **Local Streets**: Low speed bike and pedestrian friendly neighborhood streets that allow residents different alternatives
- **Collector Streets** (As Identified in the Master Plan for Streets and Highways): Lower speed streets that distribute cars, bikes, and pedestrians between arterials and neighborhoods. Access to adjacent land uses has lower levels of management and intersections between collectors have passive controls such as roundabouts. Some of these facilities may have overlaps with the network of Bike Streets.
- **Transit Streets** (as identified in the On Board Mobility Plan): Major and Minor arterial corridors that include mixed-use corridors that connect Regional Centers with other transit-oriented development and neighborhood mixed-use centers, each repurposed to move high volumes of people in-lieu of cars. LRT and BRT corridors feature center-running transitways in dedicated lanes, while Rapid Bus corridors allow for limited-stop service at key intersections. Intersections prioritize transit service.
- **Major and Minor Arterials** (As Identified in the Master Plan for Streets and Highways): Higher speed boulevards and roadways whose purpose is to move large volumes of traffic, local or rapid bus transit. Designated arterials also serve as truck routes to facilitate the distribution of freight. Special protections are included for bicyclists and pedestrians to ensure their safety and ability to cross streets at major intersections. Intersections between arterials feature protected turning movements, as warranted. Access to adjacent land uses has higher levels of management.
- **Freeways and Highways**: Limited access facilities or major state highways whose purpose is to move interstate, intrastate, and regional traffic, freight, and express transit over longer distances; can accommodate ridesharing and carpooling with an integrated HOV network that incorporates direct access interchanges.

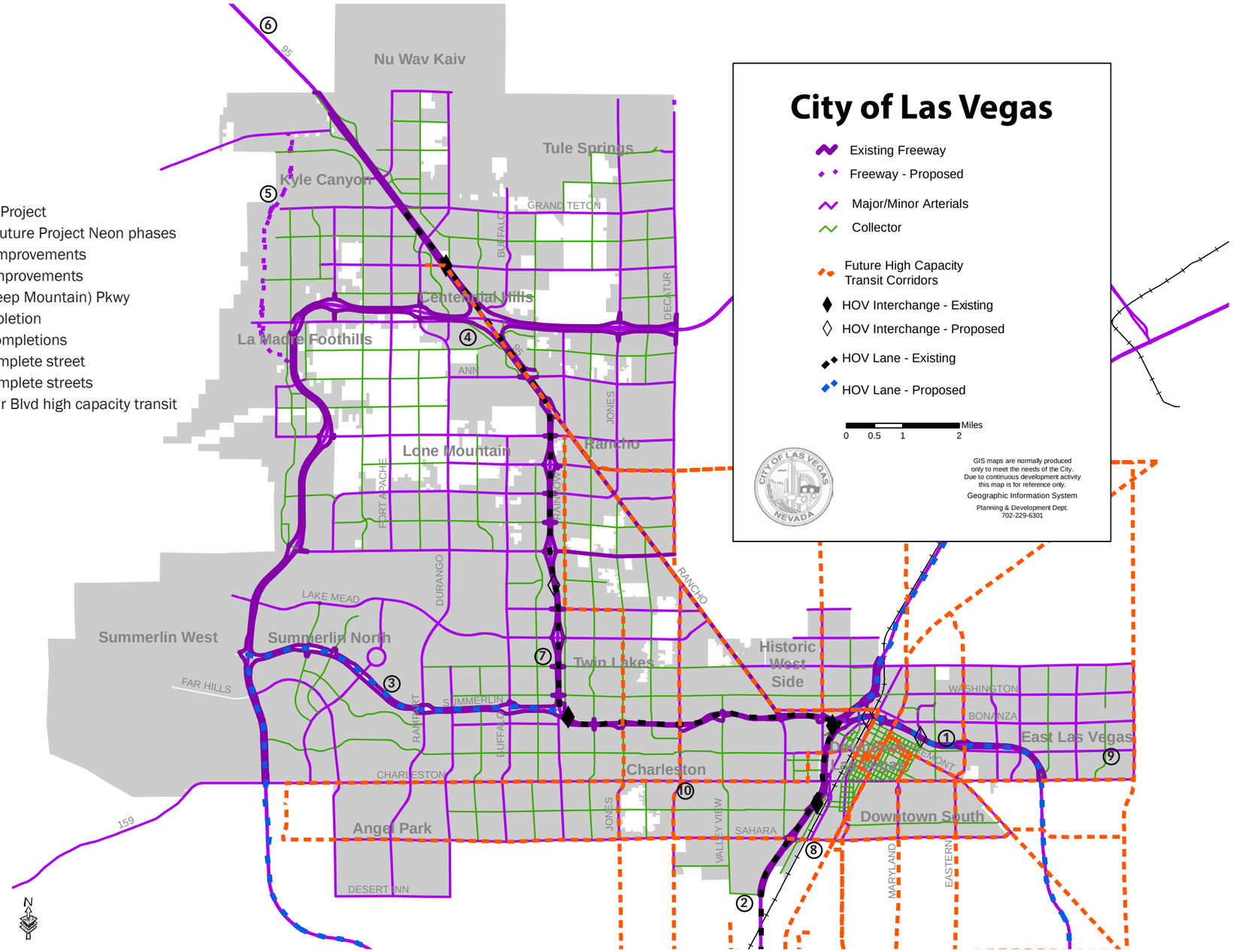
TRAILS & BIKE STREETS MAP

SEE ALSO CHAPTER 2
Park Connectivity



STREETS, TRANSIT, AND FREEWAYS MAP

① Downtown Access Project
② I-15 - Flamingo / Future Project Neon phases
③ Summerlin Pkwy improvements
④ Centennial Bowl improvements
⑤ Nah Gah Kaiv (Sheep Mountain) Pkwy
⑥ Interstate 11 completion
⑦ US 95 overpass completions
⑧ Las Vegas Blvd complete street
⑨ East Las Vegas complete streets
⑩ Charleston-Decatur Blvd high capacity transit



THE CITY'S MODAL SPLIT MUST CHANGE DRAMATICALLY OVER THE NEXT THIRTY YEARS TO REDUCE CONGESTION, IMPROVE AIR QUALITY, AND REDUCE EMISSIONS

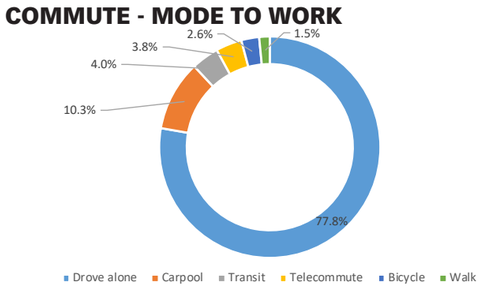
Like most cities in the United States, Southern Nevada residents use solo personal vehicles as the primary mode of choice to commute and for smaller trips. Two-thirds of Las Vegas residents commute into the center of the Valley to Downtown Las Vegas and the Resort Corridor for work each day.

Within Clark County, there are approximately 7,300 miles of streets and highways; together with the resident population and tourists, more than 18.77 billion miles were travelled in 2018. Of that street and highway system, the City of Las Vegas is responsible for 1,370 miles. This abundance of road supply, coupled with historic usage factors and fueled by rapid population growth have been the perfect recipe for all of the negative effects of automobile use. Simply put, street and highway transportation by private automobile alone is not sustainable in terms of economics, the environment, or in terms of equity.

Several factors explain why the car is Las Vegas's mode of choice:

- As Southern Nevada rapidly grew over time, its arterial roadway network followed the north-south and east-west grid system that follows the township and range lines of the Public Land Survey System. The car was the only mode of transportation, and as such, influenced development patterns outside of Downtown Las Vegas throughout the latter half of the 20th century.
- Vehicle ownership data reflects the necessity of a car in Las Vegas, for which a typical resident owns approximately 2 per household.

COMMUTE - MODE TO WORK



Source: City of Las Vegas, ACS Estimates

- Approximately 6% of residents use some form of alternative transportation. For the decades prior to RTC forming and taking ownership of public transit, the provision of bus service in Las Vegas was poor, even with a small, relatively compact service area. Choice ridership, therefore, is considerably low. Lower income residents (that are less likely to own a vehicle) and those living within the urban core are more likely to take public transportation, bike, or walk. For example, within Downtown Las Vegas, 16.8% of people take public transportation and 12.2% use it in West Las Vegas.

Southern Nevada does have higher residential densities and is a well connected city in terms of roadway infrastructure; 16% of people live within a 15 minute travel time of their place of employment (compared to 25% nationally), while nearly half of the City's residents live within a 30-minute travel window, compared to only 36% of people nationwide. However, the largest and most noticeable effect felt by commuters is traffic congestion. Most major street and highway routes experience some form of congestion, but the median Las Vegas commute to work is 25 minutes. Still, the number of trips by car on city roadways has continued to steadily increase, with many streets and highways reaching Level of Service (LOS) "D" "E" and "F" during peak commuting times. This represents thousands of hours wasted, lost economic output, and reduced productivity. Even as vehicle fuel efficiency has increased, the impact on vehicle based emissions and air quality has been detrimental.

To accommodate new residents, some improvements to the freeway system and street network may be necessary to move people conveniently and safely. While there is a need to increase transportation infrastructure capacity to serve future growth, the focus must be on increasing transportation choices. As noted in this goal and the City's Mobility Master Plan, streets and highways cannot be the only solution to shifting modes, when considering:

- The cost of streets and highways are expensive, in excess of $10 million per mile for an urban freeway and more than $50 million for an interchange.
- The cost of right of way.
- The indirect costs of congestion, lost time, safety, and economic output.

TRANSIT-ORIENTED DEVELOPMENT (TOD) PLACE TYPES (AS DESCRIBED IN THE LAND USE CHAPTER) ARE CRITICAL TO ACHIEVING A BALANCE BETWEEN JOBS AND HOUSING AND CAN AID IN MODAL SHIFTS

The relationship between jobs and housing is critical to planning because it influences where people live, where businesses locate, and how people travel. The "jobs-housing balance" is an indicator for where people live relative to work, measuring the number of jobs per resident employee and is key when considering movement, land use, and environmental impact. Low values indicates a housing-rich area while a high value indicates a job-rich area.

The City of Las Vegas has relatively few concentrated areas with a jobs-housing balance. Implementing the City's place types described in Chapter 2 will help facilitate a new balance of jobs and housing by providing affordable housing options near identified transit corridors described in the goals on Housing and Transit. Each recommended place type plays a role in redevelopment and infill opportunities given a mixture of complementary uses suitable for certain types of targeted employment. In some instances, there will be an increased probability residents may take jobs there.

VMT MUST SIMILARLY BE REDUCED BY EMBRACING COMPLETE STREETS, TRANSIT, ACTIVE TRANSPORTATION PRINCIPLES, AND TRANSPORTATION DEMAND MANAGEMENTS

Walking and bicycling are necessary active modes of transportation, and getting around without the need for using vehicles is something that offers a great degree of freedom as well as an affordable way of communing. Together with transit, they offer a reasonable alternative to driving by car that can reduce VMT. As reflected in this goal's Complete Streets statement, they are roadways designed to maximize public right-of-ways to accommodate all users and modes of transportation including pedestrians, public transportation, bicycles, and automobiles. Currently, there are no protected bike lanes within the City, but there are 23 centerline miles of buffered bike lanes, 240 miles of conventional bike lanes, 2 miles of sharrows, and 32 miles of off-street trails.

The transit-oriented built environment envisioned in this plan is intended to be designed as walkable and human scaled. The City has worked with RTC and other regional partners to create communities that are conducive to walking and biking, resulting in hundreds of miles of new paths, trails, and pedestrian oriented areas. The City's premier pedestrian area is the Fremont Street Experience in Downtown Las Vegas, the canopied five-block pedestrian mall, operated as a public-private partnership between the City and a consortium of neighboring casinos. Other notable examples include the Las Vegas Wash Trail, the Beltway Trail, and Summerlin's trail network. Design and construction should be coordinated with Chapter 2's Park Connectivity goal.

The City, RTC, and community stakeholders have worked hard to improve conditions for bicyclists. One of the primary ways has been through engagement with the League of American Bicyclists, a nonprofit organization that works to create bicycle friendly communities by advocating and promoting best practices. These are centered upon five core areas (the 5 E's):

- Engineering: Creating safe and convenient places to ride
- Education: Giving people of all ages and abilities the skills and confidence to ride
- Encouragement: Creating a strong bike culture that welcomes and celebrates bicycling
- Enforcement: Ensuring safe roads for all users
- Evaluation and Planning: Planning for bicycling as a safe and viable transportation option.

The League's Bicycle Friendly Community program provides the City a tiered rating to improve conditions for bicycling, for which the City is currently rated as a Silver Bicycle Friendly Community.

Funded by the RTC, the Regional Bicycle and Pedestrian Plan established a guiding vision and goals related to the provision of a "safe, connected, and convenient walking and bicycling system" through the entire Valley. That plan's recommendations are incorporated as a part of the Layered Complete Street Network, and are intended to be designed utilizing NACTO Urban Street Design Guide for best practices

for bike facilities, with the specific projects to be included in the City's Capital Improvement Plan.

Finally, RTC's Club Ride program, carpooling, and other TDM strategies, facilitated with dedicated managed facilities that reserve exclusive space and capacity for their proper functioning is a necessary tool for communities to effectively manage traffic congestion, make modal shifts, and increase public transportation ridership.

MAJOR STREET AND FREEWAY IMPROVEMENTS, ESPECIALLY THE DOWNTOWN ACCESS PROJECT AND THE COMPLETION OF INTERSTATE 11, ARE ESSENTIAL FOR TRAFFIC MANAGEMENT, SAFETY, AND REGIONAL ECONOMIC DEVELOPMENT

While it is true that a dramatic mode shift must be made, the street and highway network for 2050 must include a number of major capital projects that are currently included in RTC's Access 2040 RTP, the Mobility Master Plan or are under development and will be included in the City's Capital Improvement Plan. Instead of solely making street and highway expansions based on adding additional highway capacity or access, new street and highway projects must be further assessed for their ability to better improve a facility's mobility and operations, improve motorist, bicyclist, or pedestrian health and safety, or enhance transit operations. Ultimately, this 2050 network's focus is on moving people or freight by providing a variety of modal choices that reduce VMT. Major projects, some of which are listed in the Mobility Master Plan, include:

- Replacement and upgrade of the I-515 viaduct as part of the Downtown Access Project.
- Safety improvements through future Project Neon phases around the "Spaghetti Bowl" interchange and along I-15.
- Completion of the Centennial Bowl (US-95 / I-215) interchange and associated local access roads around Centennial Hills .
- Expansion of Summerlin Pkwy from I-215 to US-95 from 4 to 8 lanes, including extension of existing HOV lanes and completion of a system-to-system interchange at I-215.
- Construction of I-11 north, including interchanges at Nah Gah Kaiv Pkwy, Niviganti Pkwy and Tsoariuwav Pkwy in Nu Wav Kaiv.
- Construction of Nah Gah Kaiv Pkwy (Sheep Mountain Pkwy).

Improvements to streets that calm traffic, reduce speeds, improve pedestrian or bicycle movements, or enhance transit operations, must be given greater priority for capital improvement project funding. These may include street and intersection recommendations and design elements from the NACTO Urban Street Guidelines (as incorporated into LVMC Title 19.04, - Complete Streets or Title 19.09 Form-Based Code), including, but not limited to:

- Reduced lane widths
- Wider sidewalks with amenity zones
- Curb extensions, pinchpoints, chicanes or bus bulbs
- Midblock crosswalks, scramble intersections, safety islands
- Roundabouts

LAS VEGAS IS OPTIMALLY LOCATED TO CONTINUE GROWING AS A HUB FOR LOGISTICS, DISTRIBUTION, AND INTERMODAL FREIGHT

The City is strategically situated geographically to have rapid access to major domestic and international markets with the presence of relatively new highway, rail, and airport infrastructure. Because the region is dependent upon freight movement for economic competitiveness, the City must ensure the safe movement of freight, whether by truck, air, or rail, work to ensure major infrastructure corridors are well-maintained and preserved, and that the overall transportation network is focused on efficient and reliable multimodal movement for both shippers and receivers, whether within the City or as a stopping point to another destination.

The Union Pacific Railroad (UPRR), whose tracks parallel Interstate 15, accommodates rail traffic that connects large coastal ports with the major cities to the east. Nevada is a "pass through" state with more than 95 percent of mainline freight rail traffic traveling to and from Southern California's ports. I-15 is also important because it connects the West to the rest of the country. Goods traveling east must travel north along I-15 to connect east via I-70 in Central Utah or I-80 in Salt Lake City.

Trucks move more than half of the freight tonnage in the United States and can be used for both short (less than 750 miles) and long haul (more than 2,000 miles) distances; rail, conversely, is used to move goods traveling intermediate distances between 750-2,000 miles, but moves less than 40 percent of freight tonnage. Due to heavy truck use on Interstate highways, road maintenance and repair are frequently needed. Trucking is also a heavy contributor to emissions and air quality issues, with almost eighty percent of greenhouse gas emissions coming from trucks, but only eight percent from rail.

Southern Nevada's economy relies heavily upon trucking for necessary imports and its tourism, highway infrastructure changes, and fuel price volatility could have the potential of leaving Las Vegas vulnerable. Each could disproportionately affect tourism, lower-income residents, and other populations. Interstate 15 has historically been identified through Federal transportation and trade acts as a major trading route part of the CANAMEX (NAFTA) transportation corridor connecting Mexican, Canadian, and American trade. As a vital trade route, the U.S. Department of Transportation similarly designated US 93 in Arizona (slated to be upgraded to interstate standards as the new Interstate 11) as an emerging transportation corridor.

Overwhelmingly, the most important factor in freight logistics and route selection is free-flow movement with minimal congestion and impedance. However, the Spaghetti Bowl interchange where I-15 and I-11 converge currently has over 270,000 vehicles daily in central Las Vegas. Unless VMT is greatly reduced, the Spaghetti Bowl represents a major choke point on a essential trucking corridors. Additionally, I-515 (future I-11) includes the Downtown Viaduct, but is in dire need of replacement. Despite calls for an eastern leg of the Las Vegas beltway, (a corridor that presents too many logistical challenges from a land use, routing, and cost standpoint to make it worthwhile) and rerouting trucks along the Southern and Western beltway, it is vital that this transportation corridor be upgraded through the Downtown Access Project.

Goods exported from Las Vegas are mostly distributed regionally around the Southwest. Trucks haul 83 percent of this volume. Within Southern Nevada, more than 90 percent of the tonnage moved was handled by trucks. This amount of importation requires warehousing, logistics, and distribution centers to store goods before further shipment to retailers or customers. Because more than 50 million people live within one day's drive of Las Vegas and due to Nevada's inexpensive operational costs and favorable tax climate, Las Vegas can capitalize as a hub for logistics, distribution, and intermodal freight, provided that other transportation and logistic factors are mitigated.

Because the I-15 corridor is the region's major freight corridor, many regional trucking and intermodal facilities have been constructed in major industrial zones and business parks. Relatively few major logistics hubs exist within the City of Las Vegas; Spectrum in East Las Vegas, the Las Vegas Tech Center in Twin Lakes, and the Las Vegas Business Park in West Las Vegas, as well as historic Downtown Las Vegas industrial uses around the Spaghetti Bowl, are among the major locations. Clustering has helped common infrastructure to be shared and used efficiently; however, this results in increased air and noise pollution for residents in adjacent areas, roadway wear and tear, and truck traffic. The City regulates freight distribution, and truck routes pursuant to Title 11.48 and the appended Master Plan of Streets and Highways, which permit truck routes on primary and secondary arterials. The development of a business park in Nu Wav Kaiv, serving as a northwestern gateway and economic development hub, has the potential to create a new logistics hub along the I-11 corridor.

Over the past decade, rail traffic on UPRR tracks has declined due to rerouting trains with Midwestern and Eastern destinations; there has not, however, been a decrease in demand for services to, from, or through Las Vegas. Extending track sidings, upgrading rails and railyard facilities could increase the routing potential along the rail corridor and could present an opportunity to reroute freight onto rails and off of trucks on I-15. Finally, McCarran International Airport is the 36th busiest cargo airport in the world, handling more than 370 million tons of freight through the Marnell Air Cargo Center. This freight distribution facility houses large cargo haulers and sits on a designated foreign trade zone and is designed to handle future air cargo demand. Given the increased speed of global commerce and the need to remain economically competitive with other major metro areas and to further support economic development efforts, the City must resolve to support capacity and efficiency upgrades at McCarran, and if necessary, a new airport in Ivanpah Valley. With growth in trucking projected to rise 150 percent by 2050, the largest growth level of all transportation modes, it is clear that it will remain an important transport component in the future. The City must further work with NDOT, RTC, and other trucking stakeholder to study and plan for interstate and inter-city freight movement, electrify any future truck-stops to reduce truck emissions and prepare for the possible innovations in delivery methods, such as unmanned aerial vehicles (UAVs) and autonomous trucks.

THROUGH FUEL REVENUE INDEXING, ROADWAY IMPROVEMENTS HAVE BEEN MADE, BUT OVERALL STREET AND HIGHWAY FUNDING MECHANISMS MUST BE ADDRESSED AT ALL LEVELS OF GOVERNMENT

For nearly thirty years, the Federal motor fuel (gas) tax has remained unchanged at 18.4 cents per gallon for gasoline and 24.4 cents per gallon for diesel; similarly, Nevada's gas tax, has remained at a rate of 33.8 cents per gallon for gasoline and 28.6 cents per gallon for diesel. Fuel taxes can only be used for the construction, maintenance, and repair of roadways, pursuant to Article 9 of Nevada's Constitution. Because of this, the economic means of internalizing the externality by using fuel taxes on alternative modes of transportation to reduce VMT cannot be done. Meanwhile, as vehicles become more technologically advanced and fuel efficient, state fuel tax revenues have declined.

To address this as funding gaps grew, Fuel Revenue Indexing (FRI) was authorized in 2013 in which the gas tax in Clark County is annually indexed against inflation to keep pace with material and labor costs. FRI funds generated from every gallon of gas sold are used to repay bonds. Projects funded by FRI have been included the initial three year period between 2014-2016 and raised approximately $750 million in funding. A ballot question in 2016 was approved to continue to index fuel taxes through 2026; this extension is projected to generate an additional $2-3 billion. As of 2019, 338 street and highway projects have been approved, of which 220 have been completed. The overall funding gap will likely be further exacerbated during and at the conclusion of FRI; long term, funding for needed improvements will continue to be needed especially as efforts to electrify vehicular transportation increase, more alternative fueled vehicles are on the road, and traditional vehicles increase in efficiency.

THE AIRPORT WILL CONTINUE TO BE AN IMPORTANT GLOBAL HUB, BUT OPPORTUNITIES TO PROVIDE ALTERNATIVES TO INTERSTATE 15 MUST BE EXPLORED AND TAKEN ADVANTAGE OF

Aviation is the economic lifeblood for the City and the Southern Nevada region as a whole. With six civilian airports for general commercial aviation and passenger traffic and two air force bases, Nellis and Creech, preservation of air space and careful limitations on building heights and design in airport overlay zones, especially for flight paths and air traffic for McCarran International Airport and North Las Vegas Airport, shall be enforced by the City by regulation under the Title 19 Unified Development Code. This may also apply to helicopter traffic and future development of other aviation-oriented technologies as they evolve and develop, including UAV's and other aircraft. Since defense and military

facilities are tied to an important economic diversification sector, coordination with the Air Force and US Department of Defense must take place for any new subdivisions and suburban development in the City's northwestern planning areas; the Nu Wav Kaiv area is particularly important to coordinate on given the potential for economic development efforts that may include defense and unmanned aerial vehicle research, testing, and development.

Usage trends and passenger volumes indicate that the airport may eventually reach a carrying capacity within the next decade. Because it is crucial as an airline hub, for air cargo, and for bringing millions of passengers to Las Vegas, the City must resolve to support regional efforts to bring funding for aviation infrastructure, maximize flight efficiency, and ensure no additional delays or flight cancellations occur for passengers. The introduction of a "metroplex" strategy by the Federal Aviation Administration will likely maximize air traffic in commercial airports while minimizing noise and disruption for city residents both short and long term. Short-haul flights between Southern California and Southern Nevada represent an increasing share of passenger traffic and serve as an alternative to driving along the I-15 corridor, but a few other alternatives must be addressed to alleviate pressure on the region's airports:

- The City must continue its regional call for action for Caltrans to add additional capacity along Interstate 15 in California between Primm, NV and Barstow. Weekend and holiday traffic from California that results in hours-long delays represents a major threat to the tourism economy and freight movement. NDOT serves as a major partner to interface with California officials while efforts to support corridor improvements can take place with the state's Congressional delegation.
- Intercity bus service has helped provide low-cost options for residents between cities throughout the West; these private efforts from motor carriers represent an additional option to shift modes, but they are still reliant on I-15 for trips to and from California.
- Construction and completion of high-speed rail between Las Vegas and Southern California, with an intermodal connection to Downtown Las Vegas. The provision of an additional mode may help alleviate pressure on both passenger air service and I-15. Efforts to re-establish passenger rail service since Amtrak's Desert Wind service was discontinued in 1997 have been ongoing through a variety of public and private commissions, authorities, and efforts from bi-state and regional levels. Financing, public money, Federally backed loans and bonds, however, have fallen through on previous proposals. Usage of Union Pacific tracks have also posed issues. The most recent high-speed rail efforts appears promising; largely paralleling the I-15 alignment with a station located near Warm Springs Road and I-15, the construction of high-speed rail could both shorten travel times, be competitive with private autos, and reduce emissions by using overhead electric. While ultimately such a connection must tie into California's future high-speed rail network or major passenger stations like Union Station in Downtown Los Angeles, any form of rail service would provide a new alternative for more than 25 million Southern Californians to get to Las Vegas.
- When passenger and flight volume warrant, the City should resolve to support the construction of the proposed "Ivanpah Airport," a commercial reliever airport located south of Las Vegas near Primm at the I-15 and Nevada-California state line, which may be necessary to increase regional passenger and freight capacity and may receive approval to be constructed within the next thirty years.

STREETS, HIGHWAYS, AND BRIDGES WITHIN THE CITY MUST CONTINUE TO BE IN GOOD CONDITION AND WELL-MAINTAINED

Nevada, and Las Vegas in particular, has among the best and well-maintained streets, highways, and bridges in the country. According to the American Society of Civil Engineer's 2018 Infrastructure Report Card, most of Nevada's roads and bridges, especially those in Southern Nevada, are in excellent condition since street and roadway infrastructure is so new and because FRI has helped raise funding for roadway repaving and street rehabilitation projects. Overall, less than 2% of Nevada's bridges are estimated at being structurally deficient, none of which are located in Southern Nevada. However, as noted, the I-515 viaduct in Downtown Las Vegas, is perhaps the single best example of the need to proactively rehabilitate or replace bridge structures, particularly because of the risk of seismic activity described under Hazards. Other structures throughout the City must also be similarly be assessed, especially for any bridge

reaching a design age of 50 years given that the design life will continue to increase over time as more are added.

Additionally, as new bridges and new miles of streets, highways, sidewalks, and trails get added, the cost to maintain that infrastructure will similarly increase over time. The City's Public Works and Operations and Maintenance Departments will continue to proactively assess the condition of these facilities and structures to make sure they are not a threat to public safety, damage property, or create additional liabilities for the City. The City will continue to maintain a five-year street arterial and asphalt reconstruction plan and the ten-year street rehabilitation and slurry seal program for local neighborhood streets. To help municipalities address this, the City must lobby the state to fund the recently created Nevada State Infrastructure Bank to assist in paying for critical infrastructure that could not otherwise be easily paid for by the City.

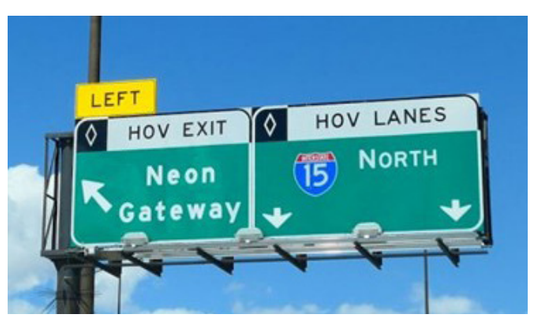
RIDESHARING, CARPOOLING, VANPOOLING, AND CAR SHARING ARE VIABLE ALTERNATIVES TO SINGLE OCCUPANT TRAVEL

Carpooling, vanpooling, and other high occupancy modes account for the next largest portion of modal share, albeit still less than 15% of trips by mode. Carpooling can be facilitated by having dedicated managed facilities that reserve exclusive space and capacity. It is also a necessary tool to effectively manage traffic congestion, make modal shifts, increase public transportation ridership, and reduce VMT. A freeway or surface street lane operating at capacity will handle approximately 2,000 vehicles per hour. However, when demand exceeds that capacity and heavy congestion ensues, a lane handles as few as 900 vehicles per hour. The greater number of people in each vehicle in an exclusive managed lane simply moves more people.

Since 2005, both NDOT and RTC have invested in a combination of HOV lanes and bus only lanes as a part of new BRT projects. Southern Nevada now has 22 miles of HOV lanes and 23 miles of exclusive bus-only lanes for RTC's BRT routes. Construction of these lanes has provided dedicated space for transit and has corresponded to increased ridership along these new routes. HOV lanes and direct-connection facilities not only facilitate carpooling, but also the use and deployment of freeway express transit routes that connect RTC's suburban park and rides and transit centers to major employment centers in Downtown Las Vegas, the Las Vegas Strip, UNLV, and McCarran Airport.

One major form of carpooling is ridersharing. Prior to the development of app-based ridesharing programs and the authorization of "Transportation Network Companies" (TNC's), taxicab and taxicab companies represented substantial modal and market share, particularly for the visitors to Las Vegas. Widely popular since their introduction, TNC's have offered convenience, better quality door-to-door service, and competitive pricing with taxis. However, their popularity, combined with the degree of regulation and oversight, has contributed to issues for the entire transportation system, including increased traffic congestion and emissions, as well as personal safety concerns. In addition, in many cases, they have made themselves easier to supplant taxis, rather than be used as a chained carpool or vanpool trip.

The biggest impact has been ridership and revenue, which have been down consecutive years since the approval of TNC's by the Nevada Legislature. According to the Nevada Taxicab Authority, there were 27.5 million taxi rides and $425 million in revenue in 2015. Taxi rides from the region's 16 approved taxicab companies dropped to about 20 million taxi trips and a combined $323 million in revenue, more than a 13 percent decline from the prior year. Ride share use has continued to rise in the ensuing years, while taxicab usage has dropped considerably. A similar upheaval has occurred in public transportation ridership. Because TNC's are not required to share data, it is difficult to determine how many trips are actually being taken by TNC. Finally, as a new driver-based economy has emerged from the advent of TNC's, issues may eventually emerge with innovations like autonomous vehicles. Autonomous vehicles, whether driver assisted or driverless, may further provide mobility options, but could present new challenges for existing TNC drivers



and taxi drivers. Regardless of what happens with these innovations, TNC's represent a continuous and rapidly evolving challenge and opportunity.

For many visitors, car rentals are a key way to allow for personal mobility without having to rely on taxis, TNC's, or public transportation. The majority of visitors arriving by air rent from a consolidated car rental facility south of McCarran Airport that opened in 2007 and houses eleven rental car companies; many hotels and casinos also have on-site car rental locations. Car rentals can also be a necessity for resident use in the event no other transportation options are available. However, one option that has seen only limited deployment in Las Vegas are car share programs. Like rentals, they provide a short term car-based mobility option for short, in-city trips. By joining a car-share program, a user can share in the use of a fleet of cars for trips positioned within a defined geographic area, charged on a mileage or hourly rate. They can reduce transportation costs for residents by avoiding ownership, insurance, and maintenance costs. Car sharing's deployment has been limited to Downtown Las Vegas and hasn't seen continuous operation or success, partly because of the lack of permanent residents in Downtown and destinations nearby, despite higher densities. However, as development and redevelopment progresses and as other place types are developed, car sharing may emerge as another viable option for private companies to pursue or for the City to partner on.

For all forms of transportation, whether for drop-offs, taxis, TNC's, or car-share programs, the City has the authority to regulate and enforce curb space by designating loading zones, taxi-stands, and parking areas, pursuant to LVMC Title 11. As with parking, City must continually assess both the supply of these dedicated locations for these modes and balance and regulate them with actual demand.

ZERO FATALITIES IS POSSIBLE, BUT ACTION MUST BE TAKEN TO ADDRESS CRASHED THAT CAUSE INJURIES AND DEATHS

Sharing the road must be a continued focus as part of this plan, especially with respect to safety. Across Nevada, especially within Las Vegas, fatalities and injuries for motorists, motorcyclists, bicyclists, and pedestrians have reached epidemic proportions; streets in Southern Nevada have proven to be especially hazardous to vulnerable street users given the dramatic increase of pedestrian and bicyclist fatalities and injuries over the past decade. While that number of pedestrian fatalities fell to 60 in 2018 and 50 in 2019, there are still far too many people that have been killed or injured, especially for low-income populations that are more likely to be transit users, bicyclists, or pedestrians and must walk or bike along busy, high-speed arterial streets.

Due to a combination of distracted driving, impairment, roadway and intersection design, and failure to obey lane markings or traffic control devices, Las Vegas has seen a steady rise of vehicular collisions resulting in deaths and serious injuries, especially on weekends and in the evening.

As a result, the number of collisions, and fatalities have also contributed to Southern Nevada having among the top ten highest auto insurance premium rates in the country.

To reinforce the message of sharing the road, the Zero Fatalities program encourages Nevadans to always buckle up, never drive impaired, focus on the road, stop on red, be pedestrian and bicyclist safe, and to ride motorcycles safely. By employing a variety of strategies with respect to education, enforcement, and engineering, the City of Las Vegas will contribute efforts to reducing deaths and injuries on roadways from all modes to achieve "Zero Fatalities."

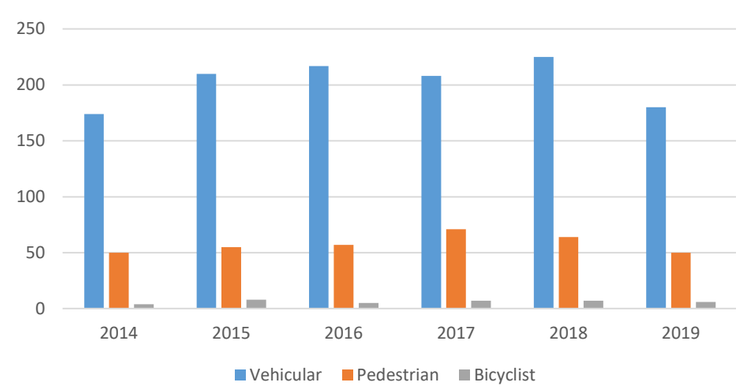
- From an enforcement perspective, reinforcement of traffic safety laws, including aggressive driving, distracted driving, DUI, motorcyclist use of helmets, the three-foot law for bicyclists, seat belts, speed limits, and obeying traffic control devices and lane markings.
- The provision of alternative modes of transportation like taxis, TNC's, public transportation provides alternatives to impaired driving. This is a message that must continue to be reinforced.
- Continue to make complete street engineering improvements that reduce speeds, increase visibility for drivers, pedestrians, and bicyclists, provide
- Educate all roadway users, whether motorists, motorcyclists, pedestrians, or bicyclists, basic safety information. This is especially important for "Safe Routes to Schools" to ensure the City's school children can walk or bike to school from their neighborhood safely.
- Ultimately, the completion of RTC's On Board Mobility Plan, designation of TOD and other walkable place types and development of the layered complete street network with dedicated locations and facilities for bicyclists and pedestrians will contribute to an increased number of transit users, pedestrians, and bicyclists.

PARKING HAS HIGH COSTS, TAKES UP CONSIDERABLE SPACE, IS EXPENSIVE TO PROVIDE, AND IS PLENTIFUL

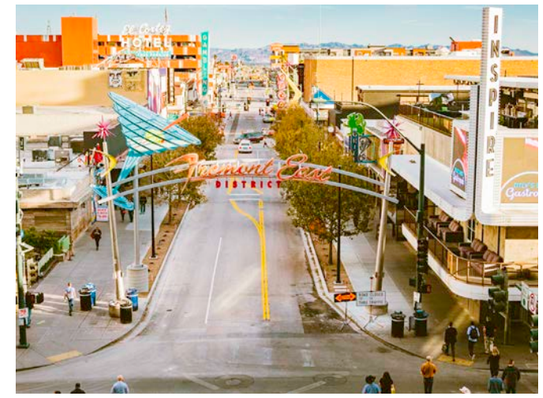
Among the considerations that must be made for auto-oriented transportation is mitigating the effects of vehicle storage and parking. The sheer amount of parking at many commercial locations distorts urban form; additionally the amount of pavement required for parking and the lack of adequate tree canopy has helped contribute to the urban heat island effect. The City Council is enabled to operate and regulate on-street and publically owned parking lots and parking areas throughout the City and establish the rates associated with it. Similarly, the Title 19 zoning code establishes minimum required parking standards for a wide range of use types. Over time, this has permitted the car to dominate the Las Vegas landscape.

Because of the overabundance of existing parking, there are prime opportunities to reutilize parking areas spaces as a part of this plan's broader strategy of infill and

FATALITIES - CLARK COUNTY



Source: Nevada Department of Public Safety



redevelopment. As a Regional Center, Downtown Las Vegas is currently the best environment to continue effectively enforcing parking standards and balancing parking supply (whether publicly or privately provided) with demand through pricing. As new high-density, transit-rich environments emerge, including at any of the recommended place types in the Land Use chapter, a parking management program must be carefully considered from the City or developers to ensure an adequate maximum supply of parking while encouraging the use of alternative modes for transport for others. The City, in turn, must study and re-examine its parking policies to determine additional means of solving parking issues and its impact on the built environment.

AS PART OF COMPLETE STREET BEST PRACTICES, THE RELATIONSHIP BETWEEN BUILDING AND STREET MUST CONTINUE TO BE EXPLORED

As applicants propose projects, it is important for the building or property owner have a clear understanding of the physical details of the structures they are proposing, the frontage to the street, and the components between building and street. The proper design of eye-level physical space is critical, and emphasis should be placed on urban design quality, including:

- Mental and Physical health: encourage walking and exploring neighborhoods by providing a comfortable and interesting place to walk through and carry on activities.
- Diversity of culture and places: there is no one size that fits all for neighborhoods and streets. These places are made out of our residents that live there, and Las Vegas aims towards maximizing living options that are diverse and need different types of infrastructure and development to be fulfilling and cater everyone's needs.
- Safety. Residents told us that crime in Las Vegas is their top concern. Although most times investment gets directed toward enforcement and institutionalized policing, many studies show that the proper design of our neighborhoods and streets can substantially reduce crime.
- Generation of value and revenue
- Cost-effectiveness
- Good design is design that can last and promotes the preservation of a good environment for our residents and the other species, plants or animals.
- Less pollution and less heat.

These attributes, discussed for each of the place types described in the Land Use Chapter, must ultimately be further addressed through changes and amendments in the Title 19: Unified Development Code.

IMPLEMENTATION STRATEGIES

- To reduce VMT and diversify the City's modal split, adopt the "LAYERED COMPELTE STREET NETWORK" as part of the 2050 Master Plan for Streets and Highways, and construct the recommended improvements essential for traffic management, safety, and regional economic development
  - Complete the major identified street and freeway improvements, especially the Downtown Access Project and the completion of Interstate 11, that are essential for safety and regional economic development.
  - Complete the major identified transit, bicycle, and pedestrian improvements to ensure active transportation and alternatives for all users.
  - Adopt a Vision Zero resolution, continue implementing safety design improvements, prioritize Vision Zero over vehicular traffic flow, and work to ensure motorists, motorcyclists, bicyclists, and pedestrians are aware of their rights and responsibilities on the road.
  - Ensure law enforcement enforces traffic law that apply to vulnerable users, especially as it applies to pedestrians, bicyclists, motorcyclists, and motorists, and continue to expand public education efforts to share the road To effectively manage parking and reduce parking oversupply:
  - Support carpooling and ridesharing efforts:
    - » Prioritize walking and biking improvements in areas with low auto ownership and lower incomes
    - » Revise access requirements for all developments to include all transportation modes
    - » Improve Title 19.04.40 connectivity standards to increase the overall connectedness of the layered complete street network
  - Resolve to support regional efforts to:
    - » Construct capacity improvements along Interstate 15 in Southern California
    - » Construct a reliever airport in the Ivanpah Valley as an air-freight and distribution hub when conditions warrant
    - » Complete high-speed rail connections to Southern Calfornia, provided construction of an intermodal station or connection in Downtown Las Vegas
  - Work with NDOT, RTC, LVGEA and other public entities to develop a regional freight plan that addresses:
    - » Reduction and elimination of congestion on the City's interstates and along major trucking routes that hinder the movement and distribution of goods.
    - » Electrification of freight infrastructure
    - » Create a northwestern transportation gateway in the Nu Wav Kaiv planning area
    - » Incentives for intermodal or multimodal freight,
    - » Development of urban freight distribution and consolidation centers
    - » Truck loading plans, multimodal infrastructure requirements, last-mile delivery solutions, and off-hour delivery programs.
- Infrastructure must be well maintained by properly allocating funding and resources
  - Dedicate adequate funding to ensure public streets, trails, and rights of way in good condition and well-maintained
  - As road and bridge structures age, assess their structural integrity and prioritize the reconstruction of any that fail to meet standards
  - Ensure all City-maintained roads, pavements, and bridges are in fair or good condition
  - Enable local governments to impose a limited fuel tax for local street and highway construction projects (NRS 373 - part of a larger Legislative package)

IMPLEMENTATION STRATEGIES

  - Resolve to support an increase in state motor fuel tax for transportation funding
- Ensure well designed, high quality urban design, street and parking standards and Incorporate street designs for street and bicycle facilities into Title 19.
  - As part of complete street best practices to ensure high quality urban design, prioritize walking and biking improvements in areas with low auto ownership and lower incomes
  - Improve Title 19.04.40 connectivity standards to increase the overall connectedness of the layered complete street network
  - Revise access requirements for all developments to include all transportation modes
  - Adopt parking maximum requirements and reduce and eliminate minimum parking standards
  - Include a bike parking requirements for specified uses
  - During future general plan amendments, identify underutilized parking lots to designate as TOD, TOC, NMXU land uses
  - Price public on-street and off-street parking at economical rates to help balance demand
  - Allow or permit paid parking as part of application proposals, traffic or parking management plans
  - Require bicycle parking or credits toward parking requirements based on proximity to transit lines
  - Return additional parking revenue to other services provided by the City of Las Vegas
  - Strengthen parking lot perimeter and interior landscaping requirements to reduce urban heat, improve stormwater quality, and improve aesthetics.
- Further reduce VMT, congestion, wasted time, and emissions by working with regional partners to embrace transit, TDM, TSM, carpooling, ridesharing, and other transportation solutions.
  - Implement or deploy TDM strategies, including partnering with RTC to provide additional funds and incentives through RTC's Club Ride program.
  - Provide and support HOV and bus-only facilities to ensure the movement of people
  - Pilot a car-sharing program within Regional Centers, TOD's, TOC's, or NMXU's
  - Require TNC's to share summary level transportation data to better assess mobility by ridersharing and impacts to the transportation network
  - Routinely assess curb-space and on-street and off-street parking for carshare vehicles, taxis, and TNC's.
  - Collaborate with bicycle and pedestrian non-profits, large employers (gaming/resort properties) in providing additional safe, accessible routes and facilities for the large population of service workers who often rely on a bike for their commute to work.
  - Expand RTC Bike Share to other planning areas along identified corridors in the On Board mobility plan to facilitate first-last mile trips and work with RTC to expand its fleet of bikes and electric bikes.

I.B TRANSPORTATION: TRANSIT

NRS 278.160.1(h)(2)

MAKE TRANSIT OPTIONS MORE CONVENIENT AND BETTER INTEGRATED WITH VIBRANT NEIGHBORHOODS AND EMPLOYMENT CENTERS, BETTER CONNECTING PEOPLE TO THEIR DESTINATIONS

Public transportation is essential to the overall transportation fabric. Not only does transit have the potential to move the largest number of people with the smallest physical footprint, but it also serves as the lifeblood for many Las Vegas residents as a reliable, accessible, and low-cost option to connect them to jobs and critical community resources. Furthermore, transit provides benefits to people who do not use it. For example, if ten people choose to ride a bus or train during rush hour, this results in an average of nine fewer cars on the road. This in turn leads to a more efficient transportation network, less traffic congestion, decreased emissions, and a safer community for all.

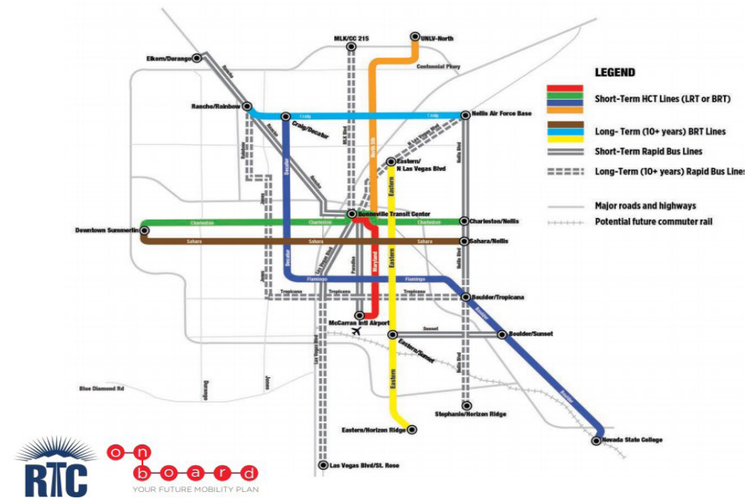
Nonetheless, only 4% of residents in Las Vegas use transit for their journey to work. While the list of proposed improvements to the transit system is substantial, there is also a social stigma and public perception that transit is only for those riders who have no other choice that must be overcome. In order to dispel this misconception, the City and its partners must incentivize "choice riders" or potential riders who have other means of transportation, to leave their vehicles at home in favor of making a commute using transit. Ideally in many cases, the user experience of a trip taken by a choice rider is one that is relatively comparable to using their own personal vehicle. It is convenient, accessible, and doesn't involve a transfer. Furthermore, it does not require additional time to find parking while positively impacting the City's carbon footprint. Unfortunately, while the supply bus-based transit in Southern Nevada is high, the demand of choice riders is relatively small.

For public transportation to be successful, it must be reliable, fast, accessible, and convenient to use. Transportation choice, and therefore multiple mode options, are critical and essential to reinforcing our urban neighborhoods and districts. Unlike some cities in the United States who have robust legacy transit infrastructure, Las Vegas has a more vehicle-centric foundation due to its development in the automobile era. With rapid construction of single-family detached housing during much of the 20th century, arterial streets and freeways served as the Valley's infrastructure backbone. As a result, Las Vegas' urban form and transportation infrastructure grew without much relationship to pedestrian or transit-oriented design and standards. In order to grow transit ridership, the City must coordinate with its partner, the Regional Transportation Commission of Southern Nevada (RTC) to implement existing recommendations to plan, fund, develop, incentivize, and implement community-friendly transit projects and programs.

Both RTC and the City work closely on the provision of public transportation and planning for transit service and facilities:

- RTC Transit is a fixed-route bus-based system comprised of more than 39 routes.
- RTC owns and operates a number of transit facilities including Bonneville Transit Center (BTC) which is RTC's central transit terminal and hub in Downtown Las Vegas. A number of other transit centers and park 'n' rides are located throughout the RTC service area.
- RTC also offers on-demand, door-to-door, reservation-based paratransit service to passengers who are functionally unable to independently use the RTC's fixed-route bus system.
- The City has also funded and provided its own transit services, and is currently coordinating with RTC on several circulator services:

Proposed Southern Nevada High Capacity Transit System



KEY ACTIONS

- Working with RTC, resolve to build and implement the key recommendations of the On Board Mobility Plan, including:
  - Building the high capacity transit system;
  - Expanding transit service to maximize access to jobs and housing;
  - Making all travel options safer and more secure;
  - Making short trips easier;
  - Expanding service for seniors, veterans, and people with disabilities;
  - Connecting major regional destinations including McCarran International Airport, the Strip, and Downtown Las Vegas;
  - Providing reliable transit for Downtown Las Vegas and resort corridor employees;
  - Leveraging new technology to improve mobility.
- Implement the place types recommended in the Land Use chapter to facilitate mixed-use TOD, infill, and redevelopment within proximity of quality public transportation.
- Work with RTC to ensure equitable transit funding.

OUTCOMES

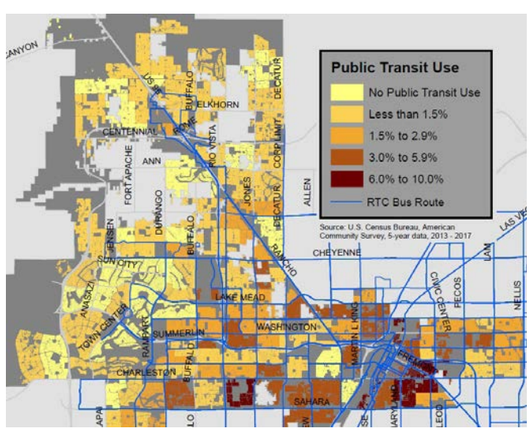
- By 2050, the mode split is 20% for transit.
- 75% of the region's residents are within a 1/2 mile of bus service, and 100% of the region will have access to some type of public transportation service by 2050.
- The number of dwelling units within ¼ mile of a public transit route increases over time.
- The number of dwelling units within ½ mile of a station of a high capacity transit route, transit center, park 'n' ride, or mobility hub increases over time.
- By 2050, x% of homes are within ½ mile of a public transit route or are served by a call 'n' ride or microtransit service areas.
- By 2050, the population density along high capacity transit routes is at least 30 dwelling units per acre for BRT routes and 40 dwelling units per acre for LRT routes.

SEE ALSO:
RTC On Board Future Mobility Plan

- Downtown Loop circulator provides free rides in Downtown Las Vegas.
- Autonomous circulator shuttles through the Fremont East district.
- GoMED autonomous circulator service between the Bonneville Transit Center and the Las Vegas Medical District.

- The Las Vegas Monorail does not enter the City, however previous plans called for its extension into Downtown Las Vegas from its current northern terminus at Sahara Avenue; future extensions of the privately funded system, including to Allegiant Stadium or McCarran Airport, and may present an opportunity to explore that northern extension in the future.
- The City is also authorized, through its charter, to construct, regulate, franchise, and license rail-based public transportation.

Currently, more than 400 transit vehicles and 300 paratransit vehicles convey passengers throughout the city and carry more than 64 million locals and tourists per year, with an average weekday ridership rate of more than 178,000. However, in order to meet our overall goals, the City and RTC must do more to grow ridership. The City's Mobility Master Plan detailed a transit vision reflecting interconnected high capacity transit service that links Regional Centers with mixed-use transit oriented development corridors. These corridors already have strong RTC Transit ridership, have transit-supportive densities, and have a variety of destinations.



This vision is thoroughly reflected in RTC's On Board Mobility Plan, a plan recommending a crucial investment in nearly 200 miles of high capacity transit which includes:

- Building a high capacity transit system;
- Expanding transit service to maximize access to jobs and housing;
- Making all travel options safer and more secure;
- Making short trips without a personal automobile easier;
- Expanding service for seniors, veterans, and people with disabilities;
- Connecting public transit options to major regional destinations including McCarran International Airport, the Strip, and Downtown Las Vegas;
- Providing reliable transit for Downtown Las Vegas and resort corridor employees;
- Leveraging new technology to improve mobility.

MULTIPLE MODAL OPTIONS AND TRANSPORTATION CHOICE ARE CRITICAL AND ESSENTIAL TO THE URBAN FABRIC

For public transportation to be successful, it must be accessible to passengers and convenient to use. Las Vegas, however, was one of the few major U.S. cities to have missed a critical developmental milestone: the creation of a public transit system because of its urban growth and development in the automobile era. With rapid construction of single-family detached housing during much of the 20th Century, arterial streets and freeways served as the Valley's infrastructure backbone. As a result, Las Vegas' urban form and transportation infrastructure grew without much relationship to pedestrian or transit oriented design and standards. Traditional single-family development over the next 30 years will continue to occur on the outskirts of the City as it did during the previous 30, particularly in large master planned communities in the Summerlin West and Kyle Canyon planning areas, as described in the Land Use Chapter. These developments will generate a substantial number of trips, such as work, shopping, and school, and will impact congestion levels within the Valley as a whole. But as described, these communities are relatively low density and auto-oriented. Because of these land use patterns:

- Transit-dependent riders and households with no vehicle ownership (23,766 within the City) are thus limited as to where they can live, typically around Downtown Las Vegas, West Las Vegas, Charleston, East Las Vegas, and Downtown South. These areas also tend to have lower household incomes and higher rates of rental housing;
- Residents of suburban communities have no public transportation option because it is not easily accessible. Currently, there are approximately 160,000 of the City's housing units within ¼ mile of an RTC Transit route – two-thirds of the City's total. 27,000 units (nearly all of which are single-family residential) are greater than a mile from service, making an easy walk to a bus stop relatively unlikely; and
- Lower densities make the likelihood of providing fixed-route transit service unlikely because of the high cost to serve those locations.

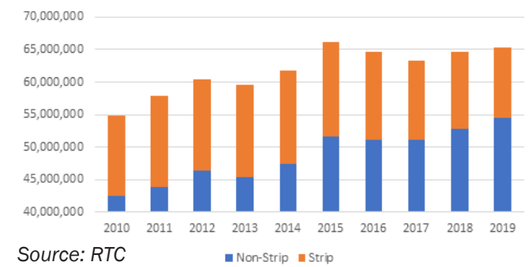
RTC TRANSIT IS A WELL-RUN, EFFICIENT BUS-BASED TRANSIT SYSTEM, BUT RIDERSHIP ON SOME ROUTES HAS BEEN DECLINING

Throughout public outreach to develop this master plan, City of Las Vegas residents have indicated broad support for more transportation options, provided that they are reliable, fast, accessible, and convenient. RTC Transit's system characteristics are typical of other bus-based transit systems around the country, with some exceptions related to the "24-7-365" nature of the city.

RTC Transit's service is provided on a grid system, with most major local routes traveling crosstown on major arterials. Among these are 9 "frequent service" routes that operate every 15 minutes (or better) during weekday daytime hours and 20 minutes or better during evenings and weekends. Service types provided include:

- Local routes, most of which provide service at 20 or 30 minute headways, with a few at hourly headways.
- Las Vegas Strip service:

TOTAL RIDERSHIP - RTC TRANSIT



Source: RTC

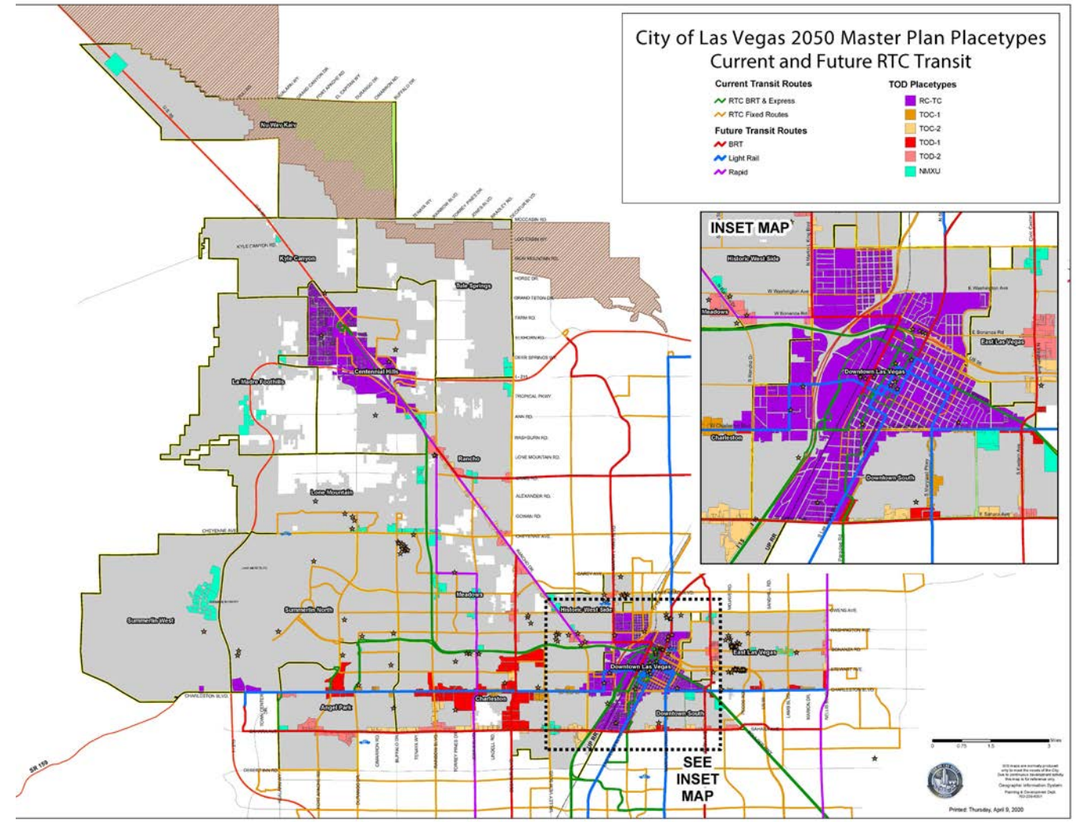
- The Deuce on the Strip: operates double decker vehicles with frequent service
- SDX: Strip-Downtown Express provides limited stop BRT service between the Las Vegas Premium Outlets North, Downtown Las Vegas, Las Vegas Convention Center, the Strip, and Las Vegas Premium Outlets South

- Bus Rapid Transit (BRT) – Including the SDX, four BRT routes offer frequent service, operate in dedicated lanes and have improved stops; many of these were originally built as a more robust type of service
- Express routes – RTC operates four freeway-based express routes on hourly headways that link suburban transit centers and park 'n' rides with Downtown Las Vegas and/or the Las Vegas Strip and McCarran Airport. These have higher amounts of choice riders, but also are the most-expensive to operate.

- RTC Transit functions efficiently because it provides service and frequency based on the availability of destinations, population, and employment density. For any transit system, coverage of the transit network (and the extent of the paratransit service), can only be done if cost effective to do so. As a result, much of the high density urban core is well-served with high frequency transit, but lower density suburban areas like Kyle Canyon, La Madre Foothills, Tule Springs, many parts of Lone Mountain, Summerlin North, and Summerlin West have lower frequency transit or no transit service at all.
- There are more than 3,300 bus stops in the RTC system, 1,700 of which have shelters. 97% of

RTC TRANSIT SYSTEM RIDERSHIP				
ROUTE / SERVICE	Type	FY2019 Ridership	Average weekday ridership	PRVH
Deuce - Las Vegas Strip	Premium	7,416,101	20,645	73.1
SDX - Strip-Downtown Express	BRT	3,843,874	10,994	62.6
109 - Maryland Pkwy	Local	3,451,297	10,329	55.8
113 - Las Vegas Blvd North	Local	2,660,143	7,628	51.7
202 - Flamingo Rd	Local	4,329,828	12,586	50.8
BHX - Boulder Highway Express	BRT	3,855,130	11,308	45.8
206 - Charleston Blvd	Local	3,995,506	12,192	42.9
SX - Sahara Express	BRT	3,730,462	11,255	41.5
201 - Tropicana Ave	Local	3,329,964	9,697	41.1
215 - Bonanza Rd	Local	700,079	2,087	39.8
110 - Eastern Ave	Local	2,377,523	7,258	39.3
115 - Nellis Blvd / Stephanie St	Local	2,153,793	6,390	38.5
103 - Decatur Blvd	Local	1,867,434	5,633	38.3
203 - Spring Mtn / Desert Inn / Lamb	Local	2,743,803	8,245	37.4
210 - Lake Mead Blvd	Local	2,079,801	6,268	37.2
108 - Paradise / University Ctr	Local	769,644	2,239	36.2
105 - Martin L King Blvd	Local	1,048,762	3,204	33.2
117 - LV Blvd South / Silverado Ranch	Local	692,924	1,980	32.6
101 - Rainbow Blvd	Local	1,166,567	3,517	32.0
219 - Craig Rd	Local	747,331	2,299	31.6
111 - Pecos Rd / Green Valley Pkwy	Local	1,218,537	3,806	31.6
106 - Rancho Dr / Centennial Hills	Local	1,071,438	3,152	30.8
104 - Valley View Blvd / Arville St	Local	1,046,071	3,223	30.5
218 - Cheyenne Ave	Local	839,142	2,711	30.4
102 - Jones Blvd	Local	670,223	2,081	28.5
208 - Washington Ave	Local	889,422	2,771	26.1
214 - H St / D St	Local	300,616	934	24.4
119 - Simmons St / Koval Ln	Local	726,387	2,299	24.2
212 - Sunset Rd	Local	973,980	3,035	22.9
209 - Vegas Dr / Owens Ave	Local	301,843	926	22.2
DVX - Downtown-Veterans Express	Express	320,177	1,034	21.4
217 - Warm Springs/Downtown Henderson	Local	664,613	2,125	20.2
121 - Durango Dr / Buffalo Rd	Local	437,980	1,414	20.2
207 - Alta Dr / Stewart Ave	Local	274,588	836	19.6
120 - Fort Apache Dr / Rampart Blvd	Local	440,776	1,352	19.5
WAX - Westcliff / Airport Express	Express	319,428	941	17.0
CX - Centennial Express	Express	317,227	966	16.2
HDX - Henderson-Downtown Express	Express	325,921	960	14.7
122 - South Maryland / Horizon Ridge	Local	247,917	806	13.6
TOTAL / AVERAGE		**64,346,242**	**4,901**	**33.22**

Source: RTC



transit trips begin and end by walking to and from an RTC Transit stop. In addition, RTC Transit vehicles are equipped with on-board bicycle racks; RTC transported more than 628,000 bikes in 2018. To improve the experience of all transit riders, it is critical to invest in making sidewalks and pathways that lead to a stop accessible to all people, safe, and comfortable to use.

Unlike some transit systems in other metro areas, RTC provides a fairly robust 24-7 span of service that accommodates employees of the tourism industry that may work overnight, graveyard, or swing shifts. 13 routes provide this service, often at hourly headways, which allows for direct connections to the Las Vegas Strip.

RTC also provides additional specialty services:

- Special event services, including dedicated express routes to T-Mobile Arena, Allegiant Stadium, and the Las Vegas Motor Speedway.
- Senior citizen services, including 12 “Silver Star” routes that provide loop circulator service to neighborhood destinations during certain days of the week, and flexible demand response (FDR), a call ‘n’ ride service for Sun City Summerlin and Centennial Hills.
- Transit services for senior and disabled veterans

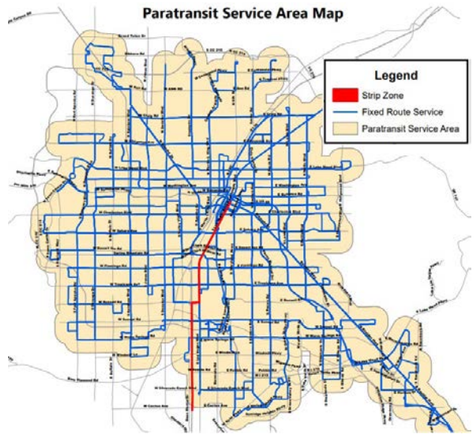
RTC operates a cost effectively, with a farebox recovery ratio higher than most other comparable transit systems. RTC Transit fares are nominal, beginning at $2 for a standard single ride in 2020, with options for daily, weekly, and monthly passes. Premium service routes that serve the Las Vegas Strip begin at $6 for two hours. Over the last twenty years, ridership has generally increased on most

routes, with periodic fluctuations across the entire system necessitating adjustments to route frequency, timing, and routing. One noted historic constant has been service on Strip routes being the most productive per passenger revenue vehicle hour (PRVH) at more than 60 passengers per vehicle per revenue-service hour – nearly twice the system-wide average of 33. These routes generate 17% of ridership within the system and are among the most profitable in the entire country for any mode. Other routes, including all of the commuter express routes offered to "choice riders," have much lower PRVH rates are expensive to operate and thus not as efficient to provide, but they are important with respect to the need to provide coverage and accessibility to other parts of the community. Notably, nearly all of the routes with low PRVH rates provide service to lower density suburban areas within the City of Las Vegas.

PARATRANSIT SERVICE IS AN IMPORTANT COMPONENT TO PROVIDING EQUITABLE TRANSPORTATION

RTC's paratransit service area covers a wide area and provides a necessary (and required) service for disabled and mobility impaired people:

- In 2019, 1.35 million paratransit trips were taken with a 95% on-time performance, serving 63,000 seniors.
- Despite its reservation based, door-to-door service, it has a much higher cost to serve and therefore a greater subsidy at more than $33 per trip. Furthermore, any expansion to the fixed route system that covers new areas must also expand the paratransit service area boundary.
- The reservation-based system could lead to long waits and delays for some passengers. While trips are programmed and coordinated, trips still must pick-up and drop-off other passengers, an inconvenience for those passengers making medical appointments or short trips. Trip optimization and a passenger notification system does attempt to mitigate these issues. As a result, RTC's functional rider assessments are necessary to show that a passenger is eligible for service, for which RTC has 20,600 certified wheelchair uses; otherwise, RTC works with passengers on mobility training to utilize the fixed-route bus service. RTC Transit has served 400,000 users with wheelchairs.



THE TRANSIT EXPERIENCE MUST BE IMPROVED TO ENHANCE ITS QUALITY AND ATTRACT NEW RIDERS

One of the greatest challenges to increasing the City's overall modal split is to improve the overall quality and experience of transit. Many City of Las Vegas residents that were surveyed during Master Plan outreach supported and valued RTC Transit services, but opinions were mixed on its reliability – only half felt public transportation could get them to their destination reliably and on time. Suburban residents were typically more likely to find transit service unreliable, whereas residents around Downtown Las Vegas found it to be both reliable and reasonably fast; those residents also valued access to public transportation from where they lived.

RTC's surveys on service also reveal important experiential oriented issues for existing passengers, choice riders, and tourists, including:

- Expanding coverage to more neighborhoods and more destinations. As such, service must ultimately be provided to every area throughout the City;
- Service during peak hours must be convenient and frequent; and
- Service must be safe; 75% of all passengers believe RTC Transit is safe; most surveyed believe lack of security, poor lighting or other people at bus stops were the most unsafe factors

TO ADDRESS A SHIFT IN MODES TO REDUCE CONGESTION, IMPROVE AIR QUALITY, AND EMISSIONS, THE CITY EMBRACES RTC'S ON BOARD MOBILITY PLAN FOR FUTURE HIGH CAPACITY TRANSIT AND WILL ADVOCATE FOR FUNDING IT

Anticipated to be adopted by the RTC Board of Commissioners in 2020, RTC's On Board Mobility Plan has been a two-year planning effort with considerable public stakeholder involvement. The On Board Mobility Plan includes eight "Big Mobility Moves" that would dramatically transform not only public transportation, but the region's entire transportation network as a whole by 2050. As described in the plan, these moves will have a dramatic impact on the City and will build the backbone for transit-oriented development by providing the "Transit" in TOD, which is why its ultimate build-out and construction will be critical to achieving many of the goals of this Master Plan:

Build the high capacity transit system - On Board describes high capacity transit as high quality, fast, and frequent transit services that operates in dedicated lanes and/or with high level of transit priority and includes the modes of LRT, BRT, and Rapid Bus. Each will help improve overall transit system performance and passenger experience.

Expand transit service to maximize access to jobs and housing - Not only would On Board provide high capacity transit, traditional transit service would increase to incorporate new coverage and expanded service to new areas, but also demand responsive service, such as call 'n' rides, microtransit or other similar service types. In 2019, RTC offered a pilot app-based ride-sharing service dubbed "Trip to Strip" that allowed passengers to hail and be picked up in a 12-passenger van, similar to transportation network company ridesharing apps. The City's development of loop and circulator service concepts such as the free Downtown Loop and the GoMED autonomous shuttle pilot in partnership with RTC has been an important step that demonstrates how the City and RTC can pilot, fund, and provide transit service when and where needs are identified. In addition to the RTC's and On Board recommendations, among the recommended areas for expanded transit service are below and are specifically stated under "Actions":

- Route extensions from existing service or new routes servicing NMXU within Summerlin West, Lone Mountain, Tule Springs, La Madre Foothills, Kyle Canyon, Centennial Hills, and Nu Wav Kaiv
- Microtransit serving identified planning areas:
  - Westcliff Transit Center, serving Summerlin North and Angel Park
  - Centennial Hills Transit Center and other identified transit centers in the northwestern planning areas, serving Centennial Hills, Nu Wa
  - Summerlin West

Make all travel options safer and more secure- As reflected in both City of Las Vegas and RTC passenger surveys, On Board recommends strengthening personal security and physical safety while riders walk to, wait for, and ride the bus. This includes more transit security and use of CPTED strategies at bus stops and transit centers. Safety has also been especially important due to the number of bus stops within the valley that have been struck by vehicles by careless or impaired drivers, killing and injuring those waiting. During the 2009 and 2011 Legislative sessions, RTC and local governments were directed to create a bus stop advisory committee and determine locations for stop relocations and bus turnouts, resulting in more than 400 stops being relocated. Since 2006, RTC no longer installs bus stops or shelters on a 5 foot sidewalk, but a 2009 study by RTC estimated nearly 1,000 stops did not meet this criteria. Of the bus stops that have been struck, many may have been placed in these locations because of the need for a stop near a busy transfer location or intersection but face right of way constraints. As such, the city must ensure that updates to Layered Complete Street Network cross sections in the Title 19 zoning code include transit stop design standards that ensure bus stops include bus turnouts or are protected from higher speed arterials and include designed space that will ultimately avoid injuries and fatalities of passengers by vehicles.

Make short trips easier- On Board shares the City's goals of making it easier and safer to walk and bike along the Layered Complete Street Network. Reflecting the 2050 general plan, On Board recommends the creation of regional and neighborhood mobility hubs at key TOD, TOC, and NMXU locations that have residential densities

exceeding 30 dwelling units per acre for BRT and more than 40 dwelling units per acre for LRT. Currently, few areas have dwelling units greater than 40 dwelling units per acre, but some emerge in close proximity to proposed near-term and long-term high capacity transit lines, especially within the Charleston, Downtown Las Vegas, and East Las Vegas planning areas. Each could also feature a range of transit and commercial amenities kiss 'n' ride drop off locations for transportation network companies and microtransit, provide convenient adjacent retail options, bike racks and infrastructure for first and last-mile connections, and secure, sheltered waiting areas featuring real-time transit information.

Expand service - Adding service for seniors, veterans, and people with disabilities, including the Flexible Demand Response, Silver Star routes, and Veterans services, as well as offering RTC's Paratransit service to new areas.

Improve regional connections - On Board will improve connections to major regional destinations including McCarran International Airport, the Strip, and Downtown Las Vegas.

Provide reliable transit for resort corridor employees - Because more than 30% of the region's jobs are in Downtown Las Vegas or along the Las Vegas Strip, many employees can only access employee only entrances leading to the "Back of House" located at the rear of most major properties. These areas are currently not well served by RTC Transit, but On Board recommends shuttles and pedestrian connections throughout the Las Vegas Strip corridor with direct links to Bonneville Transit Center in Downtown Las Vegas.

Leverage new technology to improve mobility - The On Board Mobility Plan recommends continued investment in technology to improve service. Simple programs, like providing smart-phone accessible apps and information to pay fares and get real-time schedule and wait times provide customer information and reinforce convenience and reliability. Furthermore, in an effort to reduce bus-based emissions and improve air quality, On Board would also invest in clean fuel technologies, transition existing buses to an all-electric fleet, and eventually incorporate autonomous technology into the fleet.

HIGH CAPACITY TRANSIT, PARTICULARLY LIGHT RAIL TRANSIT, DESCRIBED IN THE ON BOARD MOBILITY PLAN, MUST BE CLOSELY COORDINATED WITH RTC AS IT HAS THE BEST OPPORTUNITY TO MAKE MIXED-USE TRANSIT ORIENTED DEVELOPMENT (TOD) A REALITY

Of the place types described within the Land Use chapter and the 2050 general plan, Regional Centers (RC), Transit-oriented development (TOD), Transit-oriented corridors (TOC), and Neighborhood Mixed-Use Center (NMUC) each include a mixture of housing, office, retail, and/or other amenities integrated into a walkable neighborhood located near quality public transportation. TOD will result in:

- Increased transit ridership and fare revenue;
- Potential for added value created through increased and/or sustained property values where transit investments occur;
- Improved access to jobs, housing, and economic opportunity for people and working families of all ages and incomes; and
- Expanded mobility choices that reduce dependence on the automobile, reduce transportation costs, and free up household income for other purposes.

TOD opportunities are present along each identified On Board corridor based on the mode and ability to truly affect desirable change to land use. These corridors have the ability to foster new growth around transit because of the diverse and complementary high-activity uses along the corridor. Many of the parcels along these corridors are ideal for TOD, containing vacant, underutilized, or large contiguous lots.

TOD and redevelopment are also dependent on the underlying mode, transit service type, and ability to have an active pedestrian realm. While light rail transit (LRT) does represent a significant capital investment, it has produced hundreds of tangible results nationwide with economic value that can be captured in ways far greater than highway expansion and capacity investments can. It is therefore important to work closely with RTC's engineering and planning staff to carefully design transit utilizing Layered Complete Street Network principles.

In Southern Nevada, bus rapid transit (BRT) has thus far failed to generate any form of TOD. Many of the general features described for BRT that the On Board Mobility Plan recommends were simply not present in the operational characteristics of previous efforts; furthermore, perception issues of bus-based transit and a bus' lack of permanence don't typically translate to true TOD. It is imperative that with any bus-based high capacity transit lines that they be designed for permanence and with operational features that demonstrate a commitment to investments in the corridor including center-running dedicated lanes, larger stations, and branded rail-like vehicles. This will provide greater assurance that the route will remain in place.

To generate and produce TOD, access to fast, reliable transit service is critical to achieve its full potential. Light rail and more convenient transit options have regularly garnered widespread support during public outreach for the Master Plan process as well as a number of other studies, planning efforts, and projects:

- During Southern Nevada Strong outreach, 83% of residents surveyed wanted the region to pursue a high speed mass transit system such as light rail;
- The City of Las Vegas Mobility Master Plan's survey reported 94% of residents would use light rail or higher order mass transit if available;
- Maryland Parkway High Capacity Transit project surveys indicated more than 70% of respondents favoring light rail; and
- The RTC OnBoard 2018 Vision Survey indicated 83% of respondents having a positive impression of light rail and that 60% would be encouraged to try high capacity transit as a new mode of travel.

TRANSIT FUNDING MUST BE DRAMATICALLY INCREASED TO PROPORTIONATE AND MORE EQUITABLE LEVELS

Funding for RTC Transit comes from a combination of sources, the primary ones being:

- Federal Transit Administration funding
- Other Federal grants, including Congestion Mitigation Air Quality (CMAQ) and the Surface Transportation Program (STP)
- Voter approved sales tax measures (1/4 and 1/8 percent Q10 funds)
- Transit fares
- Advertising revenue on RTC Transit vehicles, bus stops, and facilities.

In addition to the need of funding reflected in the RTC On Board Mobility Plans, ridership trends in the existing system are placing an additional revenue burden on the day-to-day operations of the transit system. The farebox recovery ratio, the amount of money the RTC collects from riders that offsets the total subsidy for transit operations, is approximately 40%, which according to the American Public Transportation Association (APTA) is twice the national average. Historically, the RTC's Strip routes have had a recovery ratio in excess of 150%, which has allowed the RTC to subsidize local service provided to the remainder of the system. Unfortunately, both ridership and revenue from RTC's Strip routes have continued to decline with an approximate 30% decline in ridership since 2014. This decline coincides with the authorization of transportation network companies (ie - Uber, Lyft etc) within the State of Nevada. Strip farebox revenue has subsequently fallen over the last five years from $24 million to $17 million. Despite this, the trend seems isolated to the Strip as ridership on all other local routes in the system experienced a 1% increase in 2019.

Should these trends continue, with ridership falling, farebox revenue declining, and overall operating losses increasing, RTC has estimated the gap could lead to less funding for service, bus replacements, and other transit infrastructure needs. Furthermore, if forecasted transit operating costs surpass revenue within the next five years, service may need to be cut, eliminated, or altered, despite the demand

for transit, growth of the community, and the projected need for service. In the coming years, strategies must be developed to increase revenues by balancing the load on the system to be less reliant on tourism trends and provide the service necessary to grow and sustain ridership of residents. One such strategy, transit oriented development, would enact a funding mechanism to raise revenue and dedicate a portion of the proceeds back into the system for its costs and operations. This would be a critical method to finance the overall system.

EXISTING, FUTURE, AND RECOMMENDED MOBILITY HUBS

PLANNING AREA	Name / Location	Current RTC Routes Served	Future On Board High Capacity Transit Routes /notes
Downtown Las Vegas	Bonneville Transit Center	Deuce, SDX, WAX, CX, HDX, DVX, BHX, 105, 106, 108, 109, 113, 206, 207, 208, 214, 215	Bike Service Center & Parking, Paratransit, Future On Board HCT
Angel Park	Westcliff Transit Center	WAX, 121, 208	Park & Ride (137 + 9 ADA spaces), Bike Parking, Paratransit
Centennial Hills	Centennial Hills Transit Center	CX, 106A, 106B	Park & Ride (872 + 27 ADA spaces), Bike Parking, Paratransit, Future Rancho Rapid, microtransit
Summerlin North / Clark County	Summerlin Transit Center	SX, 206	Future Charleston HCT, Sahara HCT
Charleston	West Charleston	206, 103	Future Charleston, Decatur HCT
East Las Vegas	East Charleston	115, 206, SX-A	Future Charleston, Nellis Rapid
Downtown South	Sahara/Maryland	SX, 109	Future Maryland HCT
East Las Vegas	Eastern/Bonanza	110, 215	Future Eastern HCT
East Las Vegas	Eastern/Fremont	BHX, 110, 206	Future Eastern HCT
West Las Vegas	Martin L King/Lake Mead	105, 210, 214	Future Martin L King Rapid
Rancho	Santa Fe	101, 106, 219	Future Craig HCT/Rancho Rapid
Rancho	Craig/Decatur	103, 219	Future Craig / Decatur HCT, possible connections to 102
Charleston	Sahara/Decatur	103, SX	Sahara HCT, Future Decatur HCT, possible connections to Route 102
Twin Lakes	Rancho/Decatur	103, 106	Future Rancho Rapid
Tule Springs	215/Decatur	103	Future express service, microtransit
Summerlin West	215/Summerlin		Future express service, microtransit
La Madre Foothills	215/Ann		Future express service, microtransit
Lone Mountain	215/Cheyenne		Extension of Route 218, Future express service, microtransit
Lone Mountain	95/Cheyenne	101, 104, 218	Future express service, microtransit
Kyle Canyon	95/Kyle Canyon		Future express service, microtransit; Required park 'n' ride pursuant to Kyle Canyon Development Agreement
Nu Wav Kaiv	I-11/Niviganti		Future express service, microtransit

IMPLEMENTATION STRATEGIES

- Resolve to support, fund, and help RTC implement the eight "big moves" identified in RTC's On Board Mobility Plan:
  - Build the high capacity transit system
  - Expand transit service to maximize access to jobs and housing;
  - In conjunction with RTC, work to fund and develop new local and express routes that provide additional coverage and paratransit service to areas that currently lack service, including:
    - » Extension of crosstown Routes 103, 120, 121, 210, 218, and CX to existing or future mobility hubs
    - » A new Ann Road/Centennial Hills/Kyle Canyon crosstown route
    - » Provision of service within La Madre Foothills
    - » New express routes between the City's Regional Centers and mobility hubs to those outside city limits.
    - » As it has done previously with the Downtown Loop and GoMED transit circulator services, work with RTC to develop circulator, loop, and microtransit service from identified transit centers
  - Make all travel options safer and more secure
    - » Work with RTC on specific aspects that improve the transit-user experience for riders
    - » Standardize the Layered Complete Street Network standards within Title 19 and streets and highways specifications for transit
    - » Work with RTC to install transit supportive infrastructure that ensures fast, high quality service including major transit amenities, center running transit lanes, limited applications of mixed flow operations, bus turnouts, bus-only lanes, transit signal priority, and queue jump lanes to bypass traffic at major intersections
  - Make short trips easier by constructing mobility hubs and transit centers or park 'n' ride facilities within each planning area at locations identified as part of the On Board Mobility Plan
  - Provide reliable transit for resort corridor employees;
  - Expand service for seniors, veterans, and people with disabilities;
  - Leverage new technology to improve mobility;
  - Improve connections to major destinations.
- Work with the RTC to ensure that transit funding be increased to levels comparable to the amounts provided to street and highways and advocate for legislative changes that ensure value capture from TOD.
  - Dedicate in-kind money for City-specific transit service, routes, and infrastructure.
  - Support measures for funding alternative modes of transportation at the Nevada Legislature, as well as value capture mechanisms that can apply toward transit infrastructure or operations.
  - Partner with the RTC on FTA applications.

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
The provision of transportation for all, regardless of income or location, ensures residents the ability to access neighborhoods, employment, and the daily needs of life	Public transportation, especially electrified modes, can reduce overall costs, reduce emissions, and be more efficient.	Transit helps support active transportation modes that result in improved health outcomes.	A well invested multi-modal transportation system is essential for a livable community for residents and businesses.	Investment in high capacity transportation and innovative associated technology like autonomous transit can help improve the efficiency of movement throughout the city.

I.C TRANSPORTATION: SMART SYSTEMS

NRS 278.160.1(h)(1) and (3)

STRENGTHEN SMART TRANSPORTATION SYSTEMS AND INFRASTRUCTURE TO FOSTER ECONOMIC DEVELOPMENT EFFORTS

The City of Las Vegas has been a leading Smart City, partly because so much of its infrastructure and development has taken place rapidly and over the last thirty years, which has seen a massive technological revolution. Since the 2000s, new sets of tools and "smart" products have become mainstream and are in widespread use in our daily lives. These systems have made their way into infrastructure, and use a digital technology to communicate information and data for beneficial and practical uses. Smart technologies also have the capacity to solve to help citizens monitor their use and impact of resources.

As described in the Economic Development goal, the City has led this transition with the creation of an Innovation District within Downtown Las Vegas and creating a comprehensive "Smart Vegas" innovation initiative built around public safety, economic growth, mobility, education, social benefit, and health care – all under the guise of becoming a "Smart City." It has great potential to leverage further development of smart infrastructure, especially with knowledge and resources at UNLV. Ongoing efforts can be seen in two realms:

- Smart networks:
  - The City franchises telecommunications companies for use of the City's right of way and the provision of service to its residents and visitors. A number of franchises are granted for service in this space, including for Cox Communications and CenturyLink, two of the largest internet, television, and telephone communications providers.
  - The Public Utilities Commission of Nevada (PUCN) also regulates local telephone service but in a limited capacity. Wireless providers are permitted and regulated by the City with respect to infrastructure siting, design, and typical operations.
  - NV Energy developed one of the nation's first "smart grids." Through the use of smart metering, a wide range of data is collected for each customer and informs NV Energy's transmission and distribution networks.
- Smart mobility:
  - The Regional Transportation Commission of Southern Nevada (RTC), together with the Nevada Department of Transportation (NDOT), is responsible for the Freeway and Arterial System of Transportation (FAST), one of the first integrated transportation system management entities in the United States. FAST oversees both freeways and arterials and is responsible for regional intelligent transportation system (ITS) infrastructure.

Several City of Las Vegas departments oversee different aspects of smart infrastructure; the Department of Information Technology, led by the City's Chief Innovation Officer, and the Department of Public Works, which oversees capital project and infrastructure planning.

SEE ALSO:
Smarter Vegas Plan

KEY ACTIONS

- Construct a citywide fiber network to support the development of IoT, mobility, public safety, and other applications
- Fully leverage Downtown Las Vegas and Nu Wav Kaiv as innovation centers for future smart infrastructure where opportunities to leverage light manufacturing and aerospace, UAV, autonomous technologies, and supportive military or defense activities can exist.
- Further enable the electrification of transportation by continuing to develop vehicle charging infrastructure

OUTCOMES

- Implementation and support of identified "Smart Cities" demonstration projects occurring within the City's Innovation District pursuant to the framework identified in the Smart Plan
- Debut annual "Emerging Technology" pilots.
- Ongoing deployment of coordinated FAST smart mobility TSM/ITS and V2I technologies for use and application by connected and autonomous vehicles
- Citywide implementation of a fiber-optic network for IoT devices by 2050
- Number of public EV charging stations increases to 1.07 per 10,000 residents
- EV registrations increases over time
- Maintenance of "Smart City" analytic dashboard

The City 's IIC@V offers configurable modular working spaces with both private and open offices and meeting rooms. The facility includes high-speed secured Wi-Fi and network.

AS THE INTERNET OF THINGS CONTINUES ITS DEVELOPMENT, THE CITY OF LAS VEGAS HAS THE OPPORTUNITY TO BECOME THE LEADING SMART CITY; THE DEVELOPMENT OF A CITYWIDE FIBER NETWORK CAN SERVE AS THE BACKBONE FOR A RANGE OF APPLICATIONS

Access to high speed internet may be taken for granted within urban areas, especially those with advanced and well-developed telecommunications networks already in place. However, secure internet access is critical for improving quality of life and ensuring access to an equitable future; online education, health care, personal safety, and even training applications online all can help an individual improve their lives. However, digitialization can also be equally dangerous if the skills and understanding of these technologies are not rolled out in conjunction with their infrastructure. To truly ensure "smart cities" help a city to grow better, Las Vegas will need to take a thoughtful approach to transitioning the skill-set of its citizens to the digital age. Doing so will ensure that becoming a "smart city" can become the guiding means of development for future Las Vegas generations.

The City of Las Vegas current smart efforts are centered within a test bed in its existing Innovation District. The Innovation District acts as a test bed for introducing advanced technologies and new transportation infrastructure that can promote sustained economic development and an improved quality of life. Projects and solutions have been developed through collaborative efforts between the city and new technology partners. The City has leveraged its global location with international trade shows such as the Consumer Electronics Show to help companies showcase new and innovative technologies. The Innovation District Resolution also enables city staff to create partnerships to establish demonstration sites throughout the Innovation District. Once new technologies are tested and vetted, those with the greatest community impact, easiest citywide scalability, and potential for return on investment will be considered for deployment across the City and ultimately with other partner agencies. Within the District is the International Innovation Center @ Vegas (IIC@V), which began in 2019 as an incubator for the development of new and emerging technologies, including but not limited to IoT (Internet of Things), Artificial Intelligence (AI), virtual and augmented reality, cybersecurity, water science, and advanced mobile data. IIC@V houses both start-up and established companies.

At the heart of the Innovation District is robust connected vehicle infrastructure designed to support the operation of Connected Autonomous Vehicles (CAVS). The city's significant investment in a high-speed fiber optic network supports the safe operation and assessment of CAVs, making the area a hotbed of testing of technologies. To support the development of connected and autonomous vehicle technologies and building on the success of the International Innovation Center @ Vegas, the city of Las Vegas has allocated additional space for mobility technology startups as a new Advanced Mobility Center.

Since its inception, the District has already resulted in a multitude of projects including the automated vehicle technology companies Navya and Aptiv. Both have tested and deployed their Vehicle-to-Infrastructure (V2I) technology, with the former deploying an autonomous shuttle within the Fremont East District of Downtown Las Vegas. This template may be a model for other pilot microtransit projects, including GoMed between the City's Downtown core and the Las Vegas Medical District and others described in the Transit goal.

The ultimate vision from the Smart Vegas plan is to continue testing and piloting new innovations that connect citizens and technology for an enhanced quality of life, improved economy, and future-focused environment. Future innovative Smart City projects and programs, in addition to mobility and connected or autonomous vehicles may include:

- Public Safety: Innovative technology that better informs first responders and decrease response times.
- Economic Growth: New technologies and infrastructure from increased private sector investment that promotes new business models, encourage operational efficiencies, and lead to new job opportunities
- Health Care: New technology advancements that connected and intelligent medical devices will encourage a broader view of health and well-being

AS A LEADING EARLY ADOPTER IN INTELLIGENT TRANSPORTATION SYSTEMS AND TRANSPORTATION SYSTEM MANAGEMENT, THE CITY MUST FURTHER CONNECT SMART CITY EFFORTS WITH MOBILITY PLANNING

FAST was one of the early TSM/ITS systems that rapidly deployed smart infrastructure along Southern Nevada's roads. Traffic is monitored and managed through through each city's intelligent transportation system (ITS) devices including radar detection flow meters, closed circuit television cameras (CCTV), dynamic message signs (DMS), ramp meters, lane use control signals, and traffic signals. Its newest feature includes Active Traffic Management (ATM) and is employed throughout the I-15 corridor. All ITS devices report to a central system through software and communications systems including the fiber optic and microwave network. Transportation operations and management strategies .

The next frontier of TSM and ITS innovation will likely be closely tied to FAST. As the City develops connected corridors and prepares for the advent of connected autonomous transportation, more applications for Vehicle to Vehicle and Vehicle to Infrastructure may require investment. Other systems within the universe of the Internet of Thing (IoT) may also require technology development; because of the unknown costs, rapid advancement, and evolution of these and other TSM/ITS systems, a short-term wait-and-see approach may initially be required until stakeholders, including NDOT, RTC/FAST, and other jurisdictions determine the correct measures necessary on a regional basis.

TO FURTHER MITIGATE AIR QUALITY AND GREENHOUSE GAS EMISSIONS, TRANSPORTATION ELECTRIFICATION MUST BECOME EMBEDDED INTO DEVELOPMENT

Over the past decade, transportation electrification has seen tremendous advancements for personal electric vehicles, freight, and vehicle fleets. Direct benefits of electric vehicles for consumers include reductions of emissions and reduced cost and demand for fuel. However, a critical link to the development of the electric vehicle and plug-in hybrid electric vehicle market is the development of the infrastructure necessary to sustain these vehicles. While market share is still slowly growing, industry estimates the electric and plug-in hybrid electric vehicle adoption rate to increase to approximately 33% market share by 2035.

The City has been at the forefront for electric vehicles and infrastructure. In 2009, it was awarded funding through a Congressional appropriation for a Plug-in Hybrid Electric Vehicle Demonstration Program, allowing the City to be the first Nevada municipality to purchase and test electric and plug-in hybrid electric fleet vehicles and make an initial deployment of associated electric vehicle charging infrastructure.

While the City required its own charging station infrastructure for its vehicles, widespread electric vehicle adoption has necessitated the rollout of new infrastructure for charging access in the community as well. As a result, the City chose to make its procured charging station infrastructure publically available. Due to the installation of more than 2 megawatts of solar covered parking, additional conduit was made available to add electric vehicle infrastructure. Community centers were selected as they had the most public traffic and had the greatest chance for use.

Since the completion of the Demonstration Program, Nevada's electric vehicle market has continued to flourish. There is now a network of more than 200 publically accessible electric vehicle charging station locations throughout Southern Nevada, of all types, including Levels I, II, and DC-fast charge. There has also been continued support by both the public and private sector:

- Nearly all resorts within Downtown Las Vegas and on the Las Vegas Strip have EV charging infrastructure at their properties.
- Deployment of charging as a part of the State's Nevada Electric Highway (I-11) linking Las Vegas to Reno with EV charging stations; and the I-15 Alternative Fuel Corridors between the California stateline at Primm and the Arizona stateline at Mesquite;
- NV Energy, the state's investor owned utility, proactively deployed a time of use electric vehicle retail rate allowing customers to pay a discounted rate if they charge the vehicle during the utility's off-peak hours.

Further development of electric vehicle charging infrastructure and network refinement will provide a critical link supporting broader adoption of electric vehicles that improves recognition and support for these vehicles, reduces mobile emissions, and enables and fosters additional car-sharing programs. Additional public investment for electric vehicle infrastructure must be a future focus for both new residents and visitors.

QUICKLY CHANGING AND NEWLY EMERGING TECHNOLOGIES WILL REQUIRE THE MONITORING AND GOVERNANCE OF SOCIETAL, CYBER, AND NETWORK SECURITY

Rolling out new technologies are only useful if citizens are prepared to interact with them, and the city of Las Vegas is prepared to govern these technologies. The City of Las Vegas will need to ensure that its digitalization efforts are deployed in line with training initiatives, information campaigns, and the governance of new technologies, especially as electrification efforts transition to autonomous and robotics-based operations. The City will need to ensure that coordination is maintained between its Technology Office, NV Energy, and the City's Department of Transportation; considering the depth of coordination needed, the city should consider implementing a Department of Innovation or a Department of Mobility to ensure its economic development is coordinated inline with smart city development.

Cities are already seeing an eruption of technologies coming online, and with various impacts on their economic development. Electric vehicles, for instance, have been noted for their potential to decrease transportation emissions, but also have been noted as potentially having a negative impact on the grid if the utility grid below charging stations are not prepared for their roll-out. The coordination between NV Energy, UNLV, and the City of Las Vegas it its initial Innovation District pilot points to the importance of coordination between digital aims, particularly as autonomous vehicles and drones come online. Both of these technologies have equally been noted for their potential in reducing traffic congestion, but in increasing free-time individuals. Imagine a future where one does not need to drive to get to work, but instead, can simply use a car that is able to drive itself to work; similarly to trains, autonomous vehicles can be used to transport groups of individuals, especially in areas where access to buses and/or trains is difficult. Drones have also been noted as equally exciting for the potential to deliver goods and services in difficult to access areas. Both types of technologies may have the opportunity to really disrupt Las Vegas residents in a positive way.

However, these technologies may be equally devastating as beneficial if deep attention to skill-set and understanding of the function of these systems are not coordinated neatly. Both types of technologies require a deep understanding of technical systems, and need to be directly developed in line with security measures that ensure they function appropriately. As exciting it is to imagine a future where one does not need to drive themselves to work, it is equally frightening to image a future when the car you are traveling in becomes operated by a malicious individual.

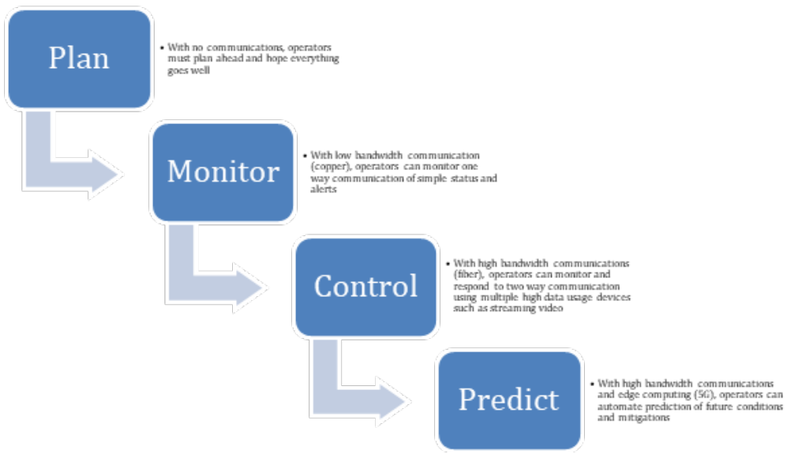
Technical training, security monitoring, and grid coordination are core to making sure that these systems result in positive lifestyle changes for Las Vegas residents.

MAJOR PROJECT

WHY DO WE NEED A CITYWIDE FIBER NETWORK?

Smart Cities believe in supporting its residents and improving quality of life by using data and connectivity. It is estimated that the number of connected devices in the world has grown by over five times in just over 10 years. This trend is expected to continue to grow exponentially over the next 30 years. There is value in the intentional collection of data to better understand trends and behaviors that promote adaptation. However, to implement these smart systems, real-world infrastructure is needed to collect and transmit this data.

The ability to monitor, control and predict operations of IoT, mobility and public safety devices in realtime is directly connected to the data infrastructure, such as fiber and 5G, which is available at the location of the device.



EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Develop training programs and continue partnering with UNLV to ensure Las Vegas residents have the access to the skills and resources needed for digitalized jobs.	The advancement of smart networks will share data and information to increase efficient use of resources.	Smart infrastructure roll-out can be used with smart platforms and information systems to inform healthy lifestyle choices for Las Vegas residents.	Investment in smart infrastructure will enable the development of practical applications that can be used to improve life for residents.	New, rapidly evolving innovations have the potential to transform land uses, means of transportation, and enhance economic development efforts.

IMPLEMENTATION STRATEGIES

- Construct a citywide fiber-optic network and infrastructure network
- Offer franchise agreements for franchisees to utilize City infrastructure for the purposes of "Smart City"
- Continue to invest in smart infrastructure abd specific IoT projects that improve City operations and service delivery, including:
  - Arterial and intersection-based ITS, including traffic signals, fiber optics, and Dedicated Short Range Communications (DSRC)
  - WiFi and broadband applications at all municipal buildings and facilities
  - Building controls and management systems
  - Smart metering for wastewater treatment and sewer operations
  - V2x (Vehicle to anything) infrastructure
- Complete and formally launch the Advanced Mobility Center and other innovation areas, including in the Nu Wav Kaiv planning area along the I-11, where opportunities to leverage light manufacturing and aerospace, UAV, autonomous technologies, and supportive military or defense activities can exist.
- Support the deployment of Connected and Autonomous Vehicles.
  - Conduct a study or specific plan on the opportunities, challenges, benefits, and threats of Connected and Autonomous Vehicles.
- To further enable the development of electric vehicle charging infrastructure:
  - Invest in publicly accessible EV-charging infrastructure, including DC-fast charge, as part of the Nevada Electric Highway (including within in the northwestern Nu Wav Kaiv district along the I-11) and as part of the Interstate 15 Alternative Fueled Vehicles corridor.
  - Adopt amendments to the LVMC Title 19, Unified Development Code, to create an incentive program for electric vehicle parking and charging stations where off-street parking is required that reduces required parking
  - Explicitly permit charging stations as an allowable accessory use.
  - Incorporate electric vehicle charging capability (station ready) for a determined capacity of total vehicle parking capacity at all newly constructed City buildings and facilities.
  - Work with NV Energy to assess the expansion of existing electric vehicle infrastructure to ensure facilities have capability to handle charging load, be able to meet the demand for increased accessibility of electric vehicles.
  - Adopt Design Standards and Minimum Requirements for municipal and private installations:
    - » Approve general design standards for electric vehicle charging
    - » Instructions, regulations, and warnings
    - » Signage and striping
    - » Additional requirements and standards shall be developed for handicapped/ADA accessible EV charging station spaces and loading.
    - » Charging station specifications and procurement standards for City charging units should consider products that are capable of charging users for power or other pay-per-use features, national network connections and RFID cards.

II RESOURCE CONSERVATION

GOALS

A. Support efficient water management, reduce water consumption, and enact stronger water conservation strategies to minimize consumptive use

B. Prioritize the use of renewable energy sources and improve energy efficiency.

C. Reduce waste consumption and target net-zero municipal solid waste produced in the community.

D. Mitigate and reduce municipal and community greenhouse gas emissions.

II.A CONSERVATION: WATER

NRS 278.160.1(a)(1)

SEE ALSO:
SNWA Water Resources Plan
SNWA Conservation Plan

SUPPORT EFFICIENT WATER MANAGEMENT, REDUCE WATER CONSUMPTION, AND ENACT STRONGER WATER CONSERVATION STRATEGIES TO MINIMIZE CONSUMPTIVE WATER USE

Water is by far one the most crucial considerations this plan makes with respect to the City's ability to grow, serve new residents, and for economic development opportunities through 2050. Nevada's historical management of water resources is applaudable and involves deep connections to many actors and existing regulations across state-borders. Although Southern Nevada has been successful in water conservation efforts it is important for Las Vegas' future to move towards more proactive planning of water.

Given current gallons per person, per day (GPCD), housing composition, and population, the average per housing water consumption is approximately 307 gallons per unit per day. It is clear that over the long term, existing residential uses combined with the projected population of increase of approximately 308,000 new residents will not be able to meet SNWA's goals, even if water conservation efforts and residential water efficiency programs are broadly employed. If additional housing were added as new subdivisions, citywide water consumption would increase to 120 GPCD by 2050. On an aggregate basis, single-family residential consumes more water per acre; however, as single-family density increases, similar water consumption values emerge, especially at levels greater than 10 dwelling-units per acre Consumptive water use would be better suited in building types and uses that ultimately return water to Lake Mead after being treated at the City's wastewater treatment plants.

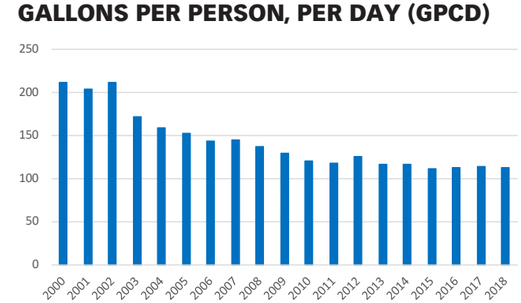
- Southern Nevada Water Authority (SNWA) is the region's water purveyor. Since 1991, SNWA has been responsible for developing and managing regional water resources through the Water Resource Plan and Joint Water Conservation Plan, protecting Lake Mead's water quality, regional water treatment, and infrastructure and conservation programs for Las Vegas residents and businesses. Water is drawn from Lake Mead through three existing intake structures and pumped to one of two water treatment facilities before distribution throughout the community. The system is able to pump, treat and distribute approximately 900 million gallons per day, ensuring uninterrupted sustainable service to the growing community.
- The City of Las Vegas is largely served by the Las Vegas Valley Water District (LVVWD), a member agency of SNWA. LVVWD treats and delivers water to city residents and businesses through the Southern Nevada Water System.
- The U.S. Bureau of Reclamation manages water resources and facilities in the Western United States, including Lake Mead, Hoover Dam, and other reservoirs and infrastructure on the Colorado River.
  - The Colorado River Commission (CRC) is the State of Nevada agency responsible for acquiring and managing Nevada's share of water resources from the Colorado River.
  - Nevada Division of Water Resources (DWR) and the State Engineer help appropriate, conserve, protect, and manage surface and groundwater resources, water rights, and monitor well use.
  - The Nevada Department of Environmental Protection (NDEP) oversees water quality for drinking water, discharges into the sanitary sewer system, and water pollution prevention and control through state-level permitting, enforcement and compliance with the National Pollutant Discharge Elimination System (NPDES) permit for the Municipal Separate Storm Sewer System (known as MS4).

The City of Las Vegas leads Southern Nevada in water conservation efforts by supporting regional management efforts by the SNWA, adopting policies, drought restrictions, and development standards, and reducing annual municipal water consumption 2.25 billion gallons over the past decade. The City also regulates public utilities and water, wastewater collection and treatment, stormwater management, and the regionally adopted drought management and conservation plan.

Water consumed at homes and businesses reenter the City's 1,800 mile-long sanitary sewer system, which gets treated at the City's wastewater treatment plants, for which the Public Works Department's Environmental Division is responsible. On average, 44 million gallons of water per day are treated by the plant and used at golf courses around the valley or returned to Lake Mead, with a maximum daily treatment capacity of nearly 100 million gallons per day. Both wastewater and stormwater leave the Las Vegas Valley through the Las Vegas Wash. Through both direct and indirect reuse, Southern Nevada recycles 99 percent of its wastewater and receives "Return-Flow Credits" that account for roughly 40 percent of the water used in Southern Nevada, making it the second largest resource of the water resource portfolio.

As a part of its previous efforts, the City must continue to lead by example and continue implementing drought conservation and water efficiency measures that reduce water consumption, lower costs, and ensure a safe and clean water supply for the future.

GALLONS PER PERSON, PER DAY (GPCD)



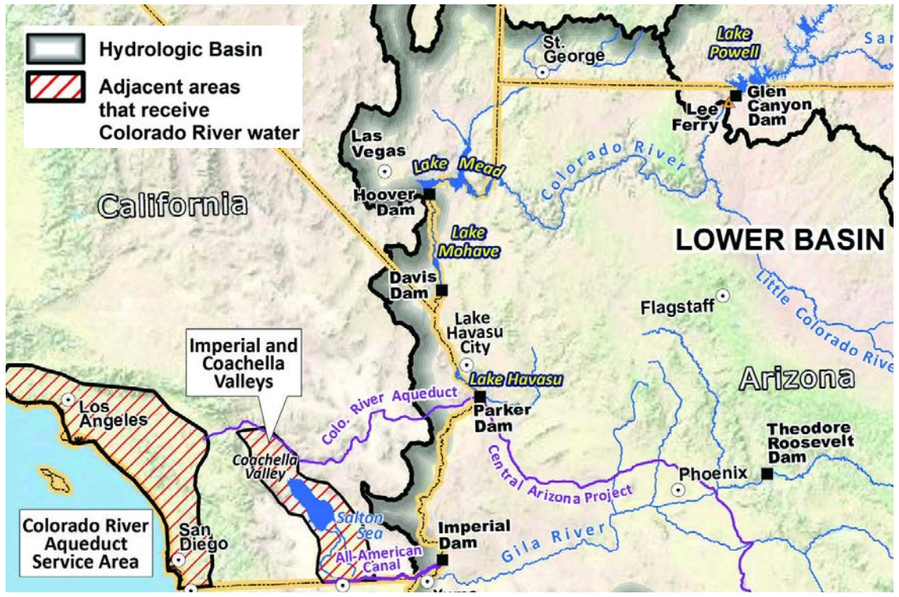
Source: SNWA

OUTCOMES

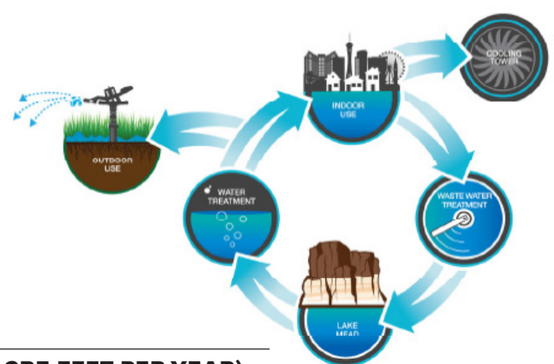
- Community water consumption will be reduced to 105 GPCD by 2035 and 90 GPCD by 2050, consistent with SNWA's Water Resources Plan
- CLV municipal operations shall reduce total water consumption x% annually, covering the sectors of buildings and facilities, park and landscaping, and wastewater treatment
- LVVWD incurs no violation of Safe Drinking Water Act/EPA drinking water rules for chemical and microbial contaminants and turbidity
- The City remains in compliance with its NPDES permit with no violations of Clean Water Act effluent and reporting guidelines for all treated wastewater
- The City incurs no major NPDES violations on its MS4 permit for stormwater quality

KEY ACTIONS

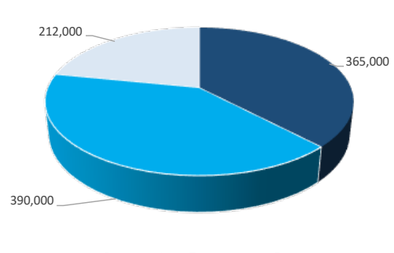
- Adhere to the Drought Contingency Plan and directly collaborate with SNWA on their Water Resources and Drought Conservation Plans
- Partner with SNWA or LVVWD to determine the feasibility and/or implement City water conservation programs
- Make applicable corresponding water conservation code changes to LVMC Title 14 and LVMC Title 19 Unified Development Code that go beyond those currently adopted and provide additional requirements and scrutiny during the approval process,
- Ensure a continued commitment to water efficiency and water reduction for municipal operations
- Collaborate to clean up sensitive areas that flow to Lake Mead to prevent stormwater pollution, and comply with the NPDES MS4 permit.
- Manage, maintain, and upgrade water and wastewater treatment infrastructure to reduce leaks in the system and eliminate contamination, ensuring clean water returns to Lake Mead for return-flow credit.



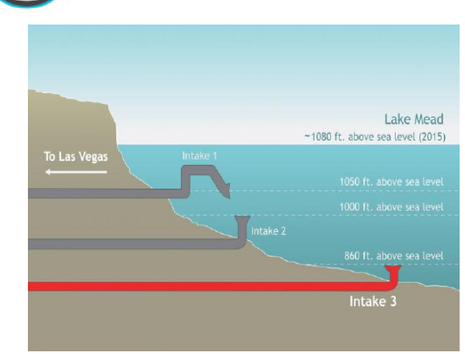
Southern Nevada Water System



WATER PORTFOLIO (ACRE-FEET PER YEAR)



Source: SNWA



SOUTHERN NEVADA'S WATER PORTFLIO CONSISTS OF 300,000 ACRE-FEET APPORTIONED FROM THE COLORADO RIVER, WHICH IS 90% OF THE REGION'S SUPPLY

The "Law of the River" – the Colorado River Compact -- adopted nearly a century ago between the seven Colorado River Basin states and Mexico, governs the allocation of water rights. Nevada is allocated 300,000 acre feet per year (AFY) – only 2% of the total 15 million acre-feet. Despite being adopted at a time when Southern Nevada was sparsely populated and when water flows were not representative of drought conditions, Southern Nevada has been innovative and has coped in utilizing its water resources by returning treated water to the river for credit. Through negotiations with other Basin States, other rules, laws, and interim guidelines have been adopted that address water allocations during periods of shortage. As a region, Southern Nevada used 244,000 AFY in 2018. SNWA's Water Resource Plans ensure water demand throughout the region are met by managing supplies and accounting for changing climatic conditions within the Colorado River Basin.

- Permanent: approximately 365,000 AFY
  - Colorado River – 300,000 AFY: Nevada's allocation of Colorado River water flows representing 90 percent of Southern Nevada's water supply used almost entirely for municipal and industrial purposes.
  - Groundwater – 46,961 AFY: LVVWD has more than 40,000 acre feet of senior rights, stored as a "banked" future reserve through artificially injected recharge.
- Temporary: Approximately 1.97 million acre-feet / 390,000 AFY: These resources, including water banking and intentionally created surpluses, are flexible arrangements with other states that can be used to meet potential short-term gaps in supply or demand, including as a bridge resource as other future resources are developed.
- Future: Approximately 212,000 AFY: Includes desalination, transfers and exchanges, and the Eastern Nevada Groundwater Development project. Each of these resources would only be utilized in the event water demand and climatic conditions warrant their development. Each have their own economic costs and legal constraints

SNWA AND THE LAS VEGAS VALLEY WATER DISTRICT PROVIDE CUSTOMERS WITH HIGH QUALITY WATER IN COMPLIANCE WITH SAFE DRINKING WATER STANDARDS

Water drawn from Lake Mead is treated at SNWA's water treatment facilities primarily through ozonation. Each year, SNWA scientists collect more than 50,000 water samples and conduct more than 300,000 analyses to ensure that Southern Nevada's drinking water meets or surpasses Safe Drinking Water Act standards. Southern Nevada's drinking water is at the highest standards. Drinking water quality may decline as the levels of Lake Mead decline due to drought. This could impose additional costs to comply with safe drinking water standards; furthermore, the City must be proactive in its stormwater pollution prevention and wastewater treatment efforts by enforcing the MS4 permit.

THE COLORADO RIVER BASIN IS SUSCEPTIBLE TO DROUGHT, AMONG THE TOP ENVIRONMENTAL THREATS LAS VEGAS MUST CONFRONT AND ADAPT TO

Since 2002, the Colorado River Basin has experienced severe drought conditions, which have reduced the average flows of the Colorado River to well below averages. This is a result of changing climatic conditions that result in higher temperatures, changing continental weather patterns, and more variable precipitation. As a result, drought has impacted water elevations at lakes Powell and Mead, the river system's two largest storage reservoirs.

Potential impacts of climate change create uncertainty about the future flows of the Colorado River, and it is clear that Southern Nevada must continue to proactively plan for drought conditions. SNWA and other stakeholders actively collaborate to pursue options and strategies to avoid future supply and demand imbalances. The SNWA Water Resource Plan anticipate continued and worsening drought conditions, but demonstrates sufficient water supplies to meet projected demands through 2050, even if drought conditions continue to persist in the Colorado River.

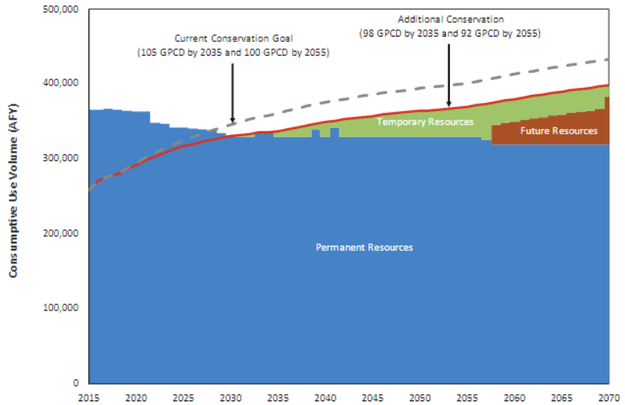
According to climate models from SNWA contained within the Water Resources Plan, variable supply and demand scenarios are projected based on population factors and provided assumptions on reducing demand to 100 GPCD, water use and conservation, economic development, and climate.

While SNWA has assumed for average (14.7 million AFY inflow to Make Mead), dry, extremely dry, and climate change hydrologic conditions for water supplies, the latter must be the scenario considered, for which it is assumed that conditions within the Colorado River Basin are 70% more dry, resulting in reduced inflows to Lake Mead (12.9 million AFY inflow), and thus, lower lake levels. Given these, the probability of shortage declarations, even for average hydrologic conditions, is high for Southern Nevada's largest permanent resource.

Given the supply and demand considerations, this plan assumes SNWA's Water Resources Plan's climate change hydrology, in which additional aggressive conservation strategies are required and timed with the and need for temporary resources beginning in 2030, with preparations for future resources beginning in 2040. This scenario assumes future water use at about 100 GPCD by 2035 and about 90 GPCD by 2050.

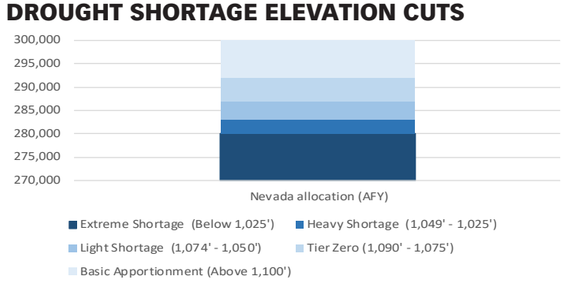
FURTHER DROPS IN LAKE MEAD'S ELEVATION WILL TRIGGER ADDITIONAL CUTS IN ALLOCATION FOR ALL BASIN STATES AND MAY TRIGGER DEVELOPMENT OF FUTURE RESOURCES

Lake Mead is the nation's largest reservoir, covering nearly 160,000 acres, having a total capacity of 29.69 million acre-feet, and having a maximum designed water surface elevation at Hoover Dam of 1,220 feet. As elevations fall, water levels will be below SNWA's three intakes. At elevation 895, Lake Mead would reach deadpool, with Colorado River Water no longer being able to pass Hoover Dam.



Climate Change Hydrology, with additional conservation

DROUGHT SHORTAGE ELEVATION CUTS



Source: SNWA

Interim guidelines agreed to and adopted by the Basin states and valid through 2026, the elevation of Lake Mead at Hoover Dam can trigger a shortage declaration from the Secretary of the Interior, resulting in automatic cutbacks to each state's allocation.

As of 2020, Lake Mead's elevation was filling and stood at elevation 1,090 at Hoover Dam, representing a decline of 130 feet and standing at 40% of total capacity. While water left in Lake Mead by the Tier Zero cutbacks, which were initiated in 2019, can only be recovered once the lake's elevation increases to 1,100 feet. Due to reservoir balancing and deliveries, the lake's elevation is projected by the Bureau of Reclamation to decline further over the next two years and is estimated to reach 1,075 feet by July 2021.

In addition to the mandatory reductions, the SNWA signed with other basin states entered into the Lower Basin Drought Contingency Plan, an agreement requiring the Lower Basin states to make additional efforts to reduce Lake Mead's projected decline and further risks of allocation cuts.

SOUTHERN NEVADA'S WATER USE STRATEGIES OF RESTRICTIONS AND REGULATIONS, PRICING, CONSERVATION, AND EDUCATION HAVE MADE IT A RECOGNIZED LEADER

Of all metered water consumption, the residential sector accounts for approximately 60% of all consumptive use. Single-family residential accounts for the vast majority of this consumption; at a typical home, 80% of use is for outdoor irrigation. Because of this, the majority of conservation efforts have been directed at this sector. Since 1991, SNWA has managed one of the most progressive and comprehensive water programs and is detailed in its 2019 Conservation Plan:

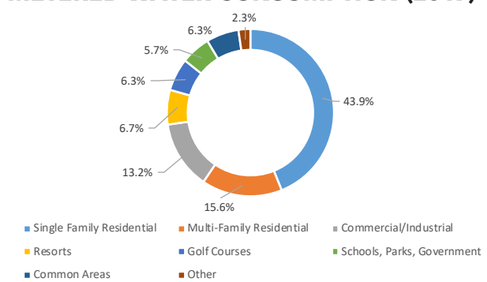
- **Regulation:** As adopted and incorporated into Titles of Las Vegas Municipal Code, regulations to eliminate and reduce excess water use, as well as establish landscaping standards. They also establish standards for irrigating times of day, days of week, and seasons of the year
- **Water Pricing:** SNWA's member agencies utilize tiered rate structures that charge higher rates as consumption increases and encourages residents to reduce water use or face increasing costs.
- **Incentive Programs** for residential and commercial customers: these effective programs have allowed the community to participate in conservation efforts.
- **Education**: SNWA has a variety of public-education programs, to engage the community and help residents understand efficient use of water in the desert.

Participation in the SNWA's conservation programs has realized impressive results; the Water Smart Landscape Rebate Program: 189 million square feet of grass removed and 130 billion gallons of water saved since 1999.

TO MEET SNWA'S PROJECTED CLIMATE AND DEMAND SCENARIOS, THIS PLAN'S LAND USE STRATEGY CAN LEAD TO GREATER WATER EFFICIENCY

Under this plan's new TOD place types, a wider range of housing, especially multi-family type units would be created. The key feature with these units are that they are within buildings and structures that are not so tall to require evaporative cooling or a cooling tower and do not require individual outdoor landscaping. Based on data from SNWA, multi-family units in buildings no taller than four stories utilize less than 100 GPCD. New TOD housing totals alone would instead average approximately 284 gallons per unit, roughly equivalent to 110 GPCD. Applied citywide with existing housing stock, SNWA's overall water conservation objectives and targets are attainable, especially if employed within other jurisdictions. Additionally, the City must also similarly strengthen and reform LVMC Title 14 and Title 19 Unified Development Code to ensure overall regional conservation goals are met and water is reduced.

METERED WATER CONSUMPTION (2019)



Source: SNWA

CURRENT WATER CONSUMPTION (gallons per day by total acreage)					
PLANNING AREA	Attached Residential	Commercial	Industrial	Multi-Family Residential	Single-Family Residential
Angel Park	271,172	808,374	0	1,674,142	4,285,457
Centennial Hills	120,999	891,591	5,538	744,755	4,936,060
Charleston	416,836	2,008,287	203,083	1,964,821	5,693,627
Downtown	404,024	901	251,923	859,842	724,415
Downtown South	180,648	370,256	331	104,020	1,296,883
East Las Vegas	521,319	559,555	101,912	1,319,032	3,343,097
West Las Vegas	169,060	109,591	30,644	408,857	1,145,916
Kyle Canyon	0	5,023	17,914	66,633	1,221,080
La Madre Foothills	0	76,326	238,235	192,722	1,992,873
Lone Mountain	227,430	389,381	7,036	795,321	3,632,092
Twin Lakes	691,437	1,528,394	25,909	2,659,558	5,494,486
Nu Wav Kaiv	0	0	0	0	0
Rancho	94,868	757,117	25,005	379,770	4,962,440
Summerlin North	691,884	866,073	4,547	1,267,266	7,024,876
Summerlin West	691,884	19,150	0	99,173	2,228,950
Tule Springs	0	123,678	0	0	3,634,503
Total consumption:	**4,481,562**	**8,513,697**	**912,077**	**12,535,913**	**51,616,755**

RESIDENTIAL BUILDING TYPE	HOUSING UNITS	LAND ACRES	YEARLY USE (1,000 GALLONS)	GPCD
Multi-Family, 1-floor	5,599	326	441,710	93.0
Multi-Family, 2-floor	76,594	3,214	6,015,886	88.1
Multi-Family, 3-floor	11,472	387	763,516	86.0
Multi-Family, 4-floor	2,743	53	165,243	76.6
Multi-Family, 5+ floor	5,531	79	422,825	175.4
SFR (aggregate)	294,413	43,808	40,488,848	143.4
SFR Units/Acre: 0.5	125	492	120,287	1,152.3
SFR Units/Acre: 2	12,006	5,786	4,317,771	372.7
SFR Units/Acre: 5	18,571	3,764	3,322,578	191.1
SFR Units/Acre: 8	31,149	3,893	3,706,575	122.8
SFR Units/Acre: 10	27,905	2,791	2,778,274	102.4
SFR Units/Acre: 12	19,702	1,576	1,768,082	92.5
SFR Units/Acre: 14+	28,217	1,378	2,195,610	82.7

Source: Placebuild tool, SNWA

IMPLEMENTATION STRATEGIES

- Adhere to the Drought Contingency Plan in future years and directly collaborate with SNWA on updates on both their Water Resources and Drought Conservation Plans, specifically as it relates to development trends and projections, land use, and conservation best-practices.
- Partner with SNWA or LVVWD to determine the feasibility and/or implement City water conservation programs:
  - Offer comprehensive programs for low-income or multifamily households.
  - Partner to design, advertise, and/or implement a low-income program that goes beyond direct-install indoor or outdoor drip systems
  - A tree and landscaping incentive program to replace sick, dying, non-native, or non-adaptive trees with xeriscaping, water efficient, drought tolerant species
  - Required community benchmarking, rating, and water use, either for all buildings.
  - Required water actions to improve building efficiency, including:
    - » Point of sale water audit requirement
    - » Energy efficiency provisions in rental properties
- Make applicable corresponding water conservation code changes to LVMC Title 14 and LVMC Title 19 Unified Development Code that go beyond those currently adopted and provide additional requirements and scrutiny during the approval process, which may consider:
  - Include LVVWD staff on development application to assess water use
  - Reduction or elimination of variances, waivers, or exceptions governing landscaping, use of turf,
  - Non-functional turf at City parks or private parks, or schools
  - Adoption of specific low-impact development standards
  - Additional scrutiny on water features
  - Mandatory prohibitions and stricter standards for approval for any turf
  - Low-impact development infrastructure
  - Approvals for limited use and application of rainwater harvesting and cisterns, to be used to supplement water needs for personal gardens or existing landscaping
  - Enable the City's Code Enforcement division to provide additional fines for water waste
- Ensure a continued commitment to water efficiency and water reduction for municipal operations:
  - Installing and maintaining artificial turf for the majority of new athletic and sports fields
  - Revising design standards for public buildings and facilities to ensure xeriscaping and proper use of species
  - Further eliminating or reducing non-functional turf
  - conducting water audits and leak detection to determine any system losses
- Work with public agencies, non-profits, and members of the public to clean up sensitive areas that flow to Lake Mead, including the Las Vegas Wash and its tributaries, to prevent stormwater pollution, and comply with the NPDES MS4 permit.
- Manage, maintain, and upgrade water and wastewater treatment infrastructure to reduce leaks in the system and eliminate contamination, ensuring clean water returns to Lake Mead for return-flow credit.

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Shifting towards denser housing will ensure residents can use water more efficiently without paying additionally for it	Regional water pricing should be evaluated to ensure Nevada continues to receives its allocated fair share of Lake Mead supplies in the future	Decentralized water supplies should be develop to further reduce stress on Las Vegas's current water resources and ensure all residents have reliable water supplies.	Focusing on enhancing parks rather than individual "yards" will prevent excessive water consumption, and increase quality of life.	Smart metering and information campaigns should be rolled out to incentive smarter individual water usage

II.B CONSERVATION: ENERGY

NRS 278.160.1(a)(1)

PRIORITIZE THE USE OF RENEWABLE ENERGY SOURCES AND IMPROVE ENERGY EFFICIENCY

The City of Las Vegas is a leader in clean energy, investing more than $70 million in renewable energy and energy efficiency upgrades over the past decade. The City has also been equally invested in constructing, LEED certified green buildings as well as sustainable transportation by committing to utilizing clean fuels and electrifying its vehicle fleet. As technology changes quickly, it is important for Las Vegas to continuously monitor and update its infrastructure coordination plans directly alongside the utility to ensure a reliable grid.

Both the public and private sector entities play important roles in ensuring the reliable and sustainable delivery of energy, such as:

- The City of Las Vegas (and the Southern Nevada region as a whole) are largely served by the state's two primary investor owned utilities: NV Energy for electricity and Southwest Gas for natural gas. Both generate, procure, transmit, and safely distribute energy for the City's consumers; The City Council is empowered to provide utilities by franchise and has done so for both
- The City regulates the placement of power plants, energy systems, substations, and utility infrastructure across the City through zoning regulations.
- Both gas and electric utilities are subject to oversight and regulation by the Public Utilities Commission of Nevada (PUCN) to ensure compliance with state laws, analyses of utility rates, safety checks of utility operations, and resolution of consumer complaints;
- The Nevada Governor's Office of Energy (NGOE) oversees statewide energy policy and energy programs.

The transition to cleaner energy sources will yield numerous benefits, including potential for economic development, cleaner air, reduced costs, and reduced greenhouse gas emissions, yet the transition to a low-carbon future requires coordination in utility planning.

OUTCOMES

- 80% of region's energy consumption at residential and commercial buildings is reduced through energy efficiency measures by 2050
- 50% of both municipal and community energy supply is from renewable sources by 2030, consistent with the Nevada RPS; and 100% by 2050
- Municipal operations shall reduce total energy consumption 2% annually, covering the sectors of buildings and facilities, streetlighting, and wastewater treatment

KEY ACTIONS

- Continue leading municipal clean energy efforts
- Expand community renewable energy, energy conservation, storage, and green building efforts
- Study, determine the feasibility, and/or implement City energy programs in partnership with the region's utilities
- Electrify transportation by developing a robust EV charging network

The City has constructed more than 6 megawatts of solar covered parking at forty City facilities, parks, fire stations, and community centers. The Water Pollution Control Facility's solar plant provides clean power for energy intensive wastewater treatment operations, in addition to methane from anaerobic digestion and a 4 megawatt allocation of hydropower from Hoover Dam. Since 2017, 100 percent of municipal operations have been powered by clean energy through Renewable Energy Agreements with NV Energy.

NEVADA'S ENERGY PORTFOLIO MUST CONTINUE TO DIVERSIFY AND TRANSITION TO CLEANER ENERGY SOURCES

In order for buildings and homes to become more sustainable, Nevada's energy portfolio must continue to diversify and transition to cleaner energy sources at an increased pace. The state's Renewable Portfolio Standard currently require 50% of NV Energy's retail sales to come from renewables by 2030, yet there are currently just 12 gigawatts of installed energy sources in Nevada's portfolio. The majority of electricity supplies (4,600 megawatts) come from coal or natural gas fired power plants. In order for buildings and homes to decarbonize, the City of Las Vegas and NV Energy must incentivize residents, commercial buildings, and industry members to utilize solar where possible; power-purchase agreements and public-private partnerships will be made to ensure equitable roll-out of resources.

Conventional hydropower is one of Nevada's largest renewable resources, stemming from the Hoover Dam. More than half of the power produced there goes to the state of California and Southern California cities; about a quarter goes to Arizona; the remainder goes to Nevada, (237 MW) for customers in Las Vegas. While hydropower is a clean source of energy and is mostly reliable, hydropower generation is susceptible to changing climatic conditions; lower lake elevations can have a dramatic effect on power production which is likely to cause a problem in the future.

With the shutdown of both Reid Gardner in Moapa and Navajo Generating Station near Page, AZ, coal-fired electricity has been completely phased out of NV Energy's portfolio in accordance with Senate Bill 123 (2013) Legislative Session, which required the reduction of 800 MW of coal-generated electricity in Nevada. Natural gas is primary resource for Nevada used for power generation and heating, with more than 4,300 MW of capacity in Southern Nevada for generation, including for "peak" cooling load conditions during the summer.

Southern Nevada has some of the highest solar potential in the country that can be taken advantage of by solar photovoltaic (PV) panels, solar thermal power plants, solar cooling, or solar thermal collectors, yet the renewable portfolio of the area is still below the levels it needs to be for Las Vegas to achieve its goals.

Large-scale solar PV and concentrated solar thermal projects are among the largest in the world in terms of capacity and footprints; further installations by NV energy are required to ensure buildings are able to decarbonize.

NV Energy's SolarGenerations rebate program and net-energy metering policies have resulted in more than 46,300 rooftop systems being installed in Southern Nevada, with more than 110 megawatts installed in Las Vegas. The falling cost of solar makes it an attractive electricity supply over business as usual; utility-scale plants and rooftop solar businesses and homeowners must be built to ensure a sustainable transition.

The vast majority of the State's RPS requirements being fulfilled from geothermal power plants located in Northern and Central Nevada. An estimated sixty percent of Nevada's geothermal potential remains untapped. With proper maintenance, geothermal power plants may have operating capacities of up to fifty years. New geothermal energy exploration, however, contains higher risks due to drilling production wells in optimal locations.

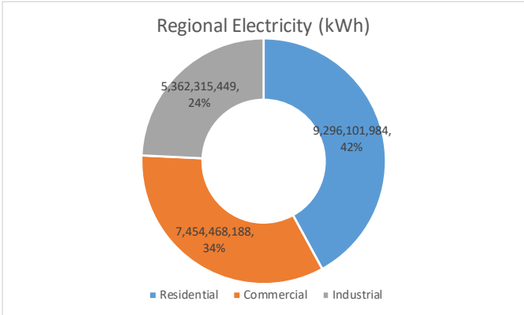
Wind power can supply renewable energy in areas considered to have "Outstanding" resource potential, where sustained annual average wind speeds are approximately 18 miles per hour at a height of about 160 feet. While wind is somewhat predictable in these areas, like solar, it suffers from intermittency issues. While City zoning does permit small wind systems, there are few areas where turbines are viable and cost effective.

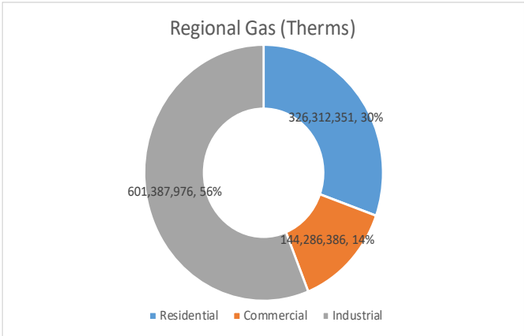
Biomass, consisting of food, plant and wood waste, and organic material are the most common feedstocks for energy. Similarly, iit produced biogas that can be captured and burned for electricity production. Nevada has four biomass/landfill gas projects, one of which is located at Apex Regional Landfill.

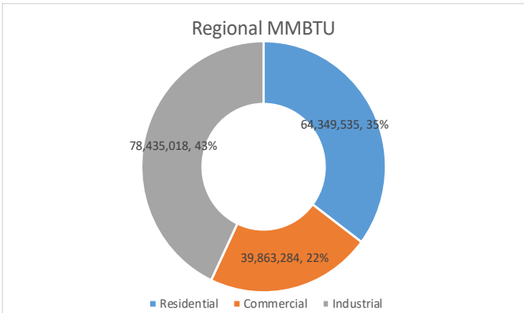
Based on current and future energy demand noted in triennial resource plans submitted to the PUCN, NV Energy estimates approximately 5,850-6,800 MW of peak demand by 2038. Furthermore, with an anticipated addition of 308,000 new City residents in 119,000 new dwelling units, it remains imperative to address overall consumption, even if the sources continue to become cleaner.

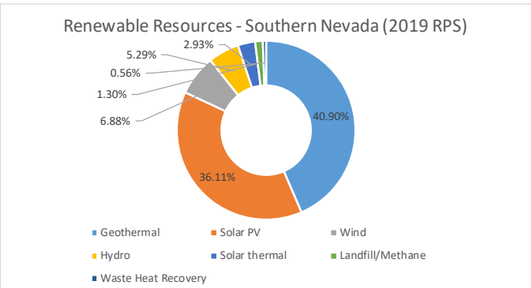
COMMIT TO GREEN BUILDING AND ENERGY EFFICIENCY IMRPOVEMENTS

The cheapest kilowatt is the one that is not produced. This will require the improvement in operational efficiencies, code development, provision of programs and incentives, and monitoring the consumption of energy for each of the region's major sectors.









Source: NV Energy, Southwest Gas, PUCN

Almost two in three Nevada homes use natural gas as their primary heating fuel. Southwest Gas relies on out of state supply piped from resource areas in Wyoming. When heat is available as a by-product of other processes, waste heat energy recovery can be utilized to collect waste heat that would typically be wasted and use it to generate power.

Overall, in-home energy usage has increased dramatically over time. In 2019, the Southern Nevada residential sector consumed 8.9 billion kWh of electricity and 231 million therms of natural gas. The Residential Energy Consumption Survey conducted by the U.S. EIA shows that space heating is no longer the majority of energy used at home. In 1993, appliances, electronics, and lighting consumed twenty-four percent of a home's energy. By 2009, that number increased to almost thirty-five percent due to the increase rechargeable personal electronics and in-home entertainment systems. Personal electronics may have boosted the share of energy consumed within the home, but overall average home energy consumption is actually decreasing and has been over the past thirty years. Newer homes, although typically larger, have energy efficient air conditioning, space heating, and appliances. New Federal, state, and local energy codes have addressed energy consumption through conservation.

Over the past decade, Southern Nevada's building officials adopted more efficient energy codes to ensure that new buildings are built as efficiently as possible, and currently require buildings to be constructed to 2018 International Energy Conservation Code (IECC) standards.

Southern Nevada's commercial sector, consisting of hotels, casinos, retail stores, offices (business and government), restaurants, schools and other similar buildings, consumed 11.3 billion kWh of electricity and 108 million therms of natural gas in 2019. The industrial sector consumed 8.9 billion kWh of electricity and 540 million therms of natural gas during the same period. While total energy use in these sectors has increased in the last decade, the share of energy use in the industrial sector has substantially decreased due in part to efforts to increase building efficiency.

Green certified commercial and industrial building stock surged in Nevada after the 2005 Legislature authorized a 50% abatement of property taxes for green LEED certified buildings for ten years; while the standard has since been modified, LEED certified buildings in Nevada continue to receive property tax abatements through this program. Considerable resource savings can be achieved under LEED, which also contributes to reduced operating costs over the life of the building.

However, not all market segments, income levels, or building types may be addressed, especially for some low-income and multi-family building types. Existing buildings programs can be utilized to improve lighting insulation, weatherization, and air sealing. Both utilities offer demand side management, energy efficiency, and renewable energy assessment, rebates, and demand side management programs for some homeowners and businesses. The City has offered Commercial Property Assessed Clean Energy (C-PACE) as a strategy to help finance energy efficiency and renewable energy improvements, but is not enabled for residential property.

As energy storage technology improves, new opportunities will develop to pair solar generation with energy demand management, allowing buildings to generate and store solar throughout the day and use stored energy during peak cooling periods and at night. Where possible, the City must address building energy efficiency as technologies and building types continue to evolve, either through direct programs or through partnerships with the utilities.

Although these upgrades have resulted in efficiency gains, true decarbonization will require a more aggressive approach to the energy supplies of these buildings and commit to conservation.

ENSURE ACCESS TO SAFE, SECURE, RELIABLE AND RESILIENT POWER THAT'S EQUITABLY PRICED

Both utility companies have maintained good records of safety and monitoring. The electrical grid is particularly notable due to the deployment use of smart meters, which allows the utilities continuous monitoring and to record interruptions within the grid. If and when disruptions do occur, the "smart grid" allows for a faster response to address the outage and restore service. The diversification of the portfolio has also made the electricity much more resilient, and the advent of energy storage, building load management, and other energy innovations when paired with renewables will only further help grid reliability. As the

respective gas and electrical grids age, both the City and PUCN must continue to regulate the utilities to ensure they are resilient and reliable.

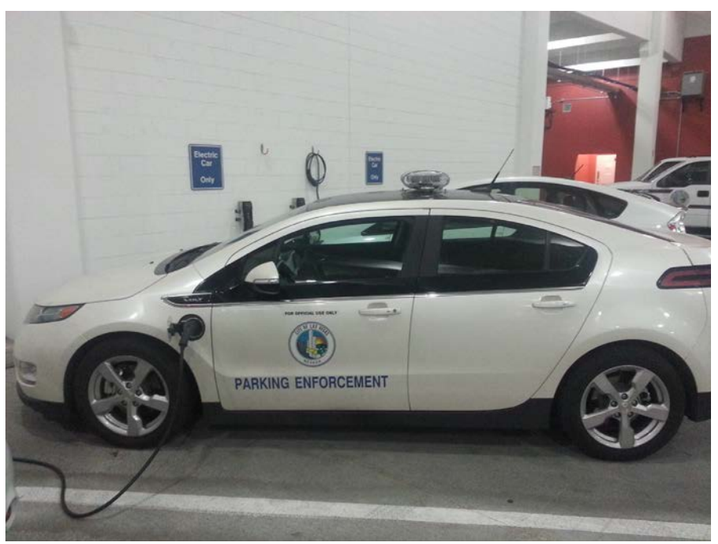
Energy providers must balance supply with demand. While this happens on a daily basis throughout the year, the summer "peak" months pose the most challenging balancing times of the year because of high energy consumption when air conditioning use is at its maximum. During these times of peak demand, energy prices are typically higher. Power plant operators can increase or decrease production to accommodate different load types and profiles. "Peaking" power plants can be started quickly and can respond to fluctuations in demand to meet this power need.

Equally important is the cost of energy, as they can impact residents of all income levels; low-income, minority, and senior households may be particularly susceptible to cost fluctuations. The average rate in Southern Nevada has remained low at 10.68 cents/kWh, lower than the national average of 12.52 cents/kWh; average monthly electric bills statewide are $116, $2 more than the national average. consumers are faced with whatever rates are proposed by the utilities, subject to the review and approval of the PUCN. The CIty must monitor rate cases for City residents and businesses to ensure the cost of living and cost of doing business is not adversely impacted by utility costs. It must also work with the utilities or offer programs that can be taken advantage of by the full spectrum of customer and building types.

ELECTRIFY TRANSPORTATION TO REDUCE FUEL CONSUMPTION AND EMISSIONS

Finally, transportation energy consumption and the resultant mobile source emissions has been steadily climbing for the past decade. Because the number of trips taken are by cars and annual vehicle miles (AVMT) traveled, have continued to rise, transportation energy consumption must be balanced and electrified. The City was the first public entity in the state to purchase electric (EV) and plug-in hybrid electric (PHEV) fleet vehicles and has invested in EV charging infrastructure at its facilities and garages.

As technology evolves, it is imporant for Las Vegas to coninuously monitor and update it infrastructure alongside the utility to ensure a reliable grid. Parking, freight management, TOD, complete streets, the use of alternative modes and active transportation, carsharing and carpooling, demand side management and transportation electrification will all be important complimentary implementation strategies that have a range of other added benefits.



IMPLEMENTATION STRATEGIES

- Continue leading municipal clean energy efforts:
  - Construct new facilities to a minimum LEED Silver standards with solar
  - Integrate interior and exterior energy conservation measures and efficient lighting into Operations and Maintenance management strategies
  - Upgrade City facilities energy efficiency retrofit strategies
  - Benchmark energy and water consumption
  - Install EV charging infrastructure for fleet and/or public use
  - Establish a fuel efficiency requirement for non-electric fleet vehicles and adopt a fleet electrification policy
  - Assess and improve energy efficiency for wastewater treatment operations
- Expand community renewable energy, energy conservation, storage, and green building efforts
  - Monitor gas and electric rates for all customers
  - Amend Title 19 to permit district energy or microgrids
  - Adoption of the latest IECC and ensure Building and Safety staff is dedicated to energy code compliance and enforcement
  - Up-front support for developers and builders for energy code compliance, which may include education prior to permit issuance or application review.
- Study, determine the feasibility, and/or implement City energy conservation programs in partnership with the utilities:
  - Monitor gas and electric rates for all customers
  - Amend Title 19 to permit district energy or microgrids
  - Community solar programs
  - Voluntary PACE program for residential properties
  - Solar, energy storage, and EV ready requirements for residential and/or commercial buildings
  - Required community benchmarking, rating, and energy use, either for all buildings or buildings of certain sizes
  - Required energy actions to improve building performance, including:
    - » Point of sale energy audit requirement
    - » Energy efficiency provisions in rental properties
    - » Retrocomissioning requirements
  - Comprehensive energy savings programs for low-income or multifamily households.
  - Offer comprehensive energy efficiency programs for multifamily customers.
  - Incentivize increased distributed renewable sources and access to clean transportation and EV charging infrastructure among their customers.

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Ensure utility prices are a fair portion of income.	Diversify the energy portfolio to mitigate and adapt to climate change by installing localized microgrids and other distributed energy resources	Increased renewable integration in the grid and reduced transportation emissions will lead to healthier air.	Low utility costs help keep Las Vegas competitive; improving housing stock can help keep energy affordable	Transportation electrification, energy storage, and green building will help decouple energy from growth.

II.C CONSERVATION: WASTE

NRS 278.160.1(a)(2)

REDUCE WASTE CONSUMPTION AND TARGET NET-ZERO MUNICIPAL SOLID WASTE PRODUCED IN THE COMMUNITY

Safe, long-term storage and management of municipal solid waste (MSW) is a critical component of a resilient city. Las Vegas has the opportunity to emerge as a net-zero waste city given its current recycling infrastructure and small, but active market, to address specialty recycling and other special waste streams. Given the projected population increases and number of new households, current waste disposal efforts and trends will only yield an increase in the total diversion rate to 30% by 2050 with current recycling trends and practices. Southern Nevadans must not only dispose of less waste per person per day, it must recycle a greater share of what is disposed of, yielding total average daily disposal rates less than 7.5 lbs.

Apex Regional Landfill, is the largest Class I municipal solid waste landfill by volume in the United States and has an expected lifespan of 200 years, with 300 of 2,200 available acres developed. Apex Landfill currently holds 60 million tons of waste and accepts an average of 6,900 tons of waste per day.

Republic Services of Southern Nevada serves the City of Las Vegas (and much of the region as a whole) under a franchise granted by City Council to provide solid waste and recycling service to City residents, businesses, and for government operations. Waste and recycling is further regulated several important ways:

- The Nevada Division of Environmental Protection (NDEP) oversees solid waste programs throughout Nevada.
- The Southern Nevada Health District (SNHD) serves as the region's Solid Waste Management Authority
- The City regulates Public Health and Safety pursuant to Title 9 of Las Vegas Municipal Code, including nuisances, solid waste, litter, and hazardous materials.

Aside from the City's authority to regulate solid waste and recycling, it has made waste reduction and recycling a priority in its municipal operations through its Sustainability initiative and through the City Council's (R-32-2017). 30,000 cubic yards (yd^3) from 68,000 yd^3, and increased its diversion rate to 55%.

KEY ACTIONS

- Educate the public on proper recycling, determine additional opportunities to increase waste diversion rates, and address special waste streams while ensuring waste costs are kept low.
- Require the provision of single-stream recycling service at multi-family and commercial properties
- Conduct neighborhood clean-ups, ensure public spaces and right-of-way are clean and graffiti free, and sensitive areas of the Mojave Desert are trash-free.
- Continue waste reduction and recycling efforts for municipal operations.

OUTCOMES

- 80% of the region's waste disposed of by landfill is reduced by 2050 and a recycling rate of at least 40% is achieved
- Eliminate landfill-based emissions by 2050
- CLV municipal operations shall reduce waste stream 2% annually

SOUTHERN NEVADA HAS HISTORICALLY HAD LOW RATES OF RECYCLING AND WASTE DIVERSION. A NEED FOR STRONGER PROGRAMMING TO REACH ZERO WASTE BY 2050 IS NEEDED

Southern Nevadans (including City of Las Vegas residents) currently dispose of approximately 6 lbs of waste per person per day (1.19 tons per capita), and recycle 1.5 lbs of waste for a total disposal rate of 7.5 lbs. On average, 2.3 million tons of MSW and 1.4 million tons of industrial and special waste are disposed of; 586,000 tons of MSW and 915,000 tons of construction and demolition debris are recycled.

Single-family residences are required to have one pickup per week for trash pickup and single-stream recycling, with bulk items collected every other week. For the City of Las Vegas, it is estimated that approximately 170,000 tons of MSW is collected annually, with a 2019 recycling rate of 19.5%, on par with the regional recycling rate of 19.3%.

THE CITY AND ITS FRANCHISEE CURRENTLY PROVIDES EFFECTIVE AND EFFICIENT WASTE SERVICES FOR MUNICIPAL WASTE STREAMS AT REASONABLE RATES

Waste disposal rates are nominal – forsingle family residences, waste collection costs approximately $16 per month. Tipping fees at Apex are approximately $32 per ton (2019), well below the national average of $45 per ton.

PREVENTING LITTER AND ILLEGAL DUMPING ARE ALSO CRITICAL TO PROTECTING THE NATURAL ENVIRONMENT AROUND LAS VEGAS AND THE CITY'S TOURISM INDUSTRY.

The physical appearance of a community plays an important role on the perception and image of it being livable. Not only are clean streets important for neighborhoods and the residents that live in them, it is important for commercial areas to do business and important for current and future visitors to have a positive impression of public places that are well-kept, clean and safe. Stormwater pollution prevention is also important to prevent waste from entering Lake Mead.

SEE ALSO:
Nevada Solid Waste Management Plan

RECYCLABLES MUST BE COLLECTED FROM MULTI-FAMILY AND COMMERCIAL PROPERTIES.

Many multi-family apartment and condominium complexes in Southern Nevada do not have recycling and those that do have low recycling rates; similarly, the provision of commercial recycling is available, but varies based on the types of businesses, tenants, and operations.

ORGANIC WASTES AND COMPOSTING HAVE POTENTIAL TO INCREASE WASTE DIVERSION RATES.

The lack of regional agriculture limits local market demand for composting. Southern Nevada Water Authority's efforts to limit and reduce turf and other water-intensive landscaping over the past decade have also limited the amount of available yard waste for composting. While the lack of regional agriculture limits local market demand for compost, organics nevertheless represents a sizable share of the total waste stream, which may create a new market for composting and waste byproducts, and various waste-to-energy efforts.

The effects of food waste go beyond reducing pressure on global food supplies and food security issues; uneaten food goes to landfills where it decomposes and produces methane gas. Resorts have been active participants in food waste recovery and diversion and have been nationally recognized for efforts in reducing food waste. Locally, resort diversion efforts have made their way to the local food bank, which has a combined effort of food diversion, rescue, and preparation to food-insecure populations within the region. Additionally, at many resorts, inedible food waste and scraps are diverted for compost and used as animal feed.

Other positive innovative trends in the waste system include the installation of landfill gas capture and energy production at the Apex Landfill and landfill gas flaring at the closed Sunrise Landfill.

SMALLER SPECIAL WASTE STREAMS SUCH AS MEDICAL AND ELECTRONIC WASTE POSE SPECIFIC CHALLENGES TO ACHIEVING ZERO WASTE AND MUST BE MANAGED.

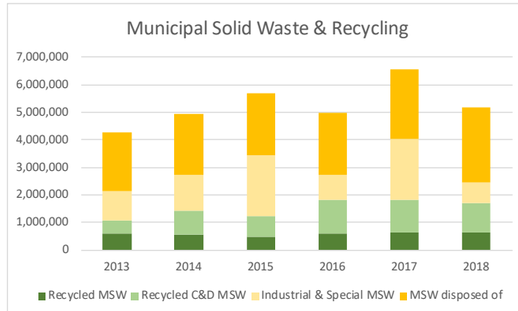
The City, in conjunction with the franchisee and Southern Nevada Health District, must continue to provide special waste stream services, ensure dissemination of information to the general public on the proper disposal of these special waste streams, and work with stakeholders through the development of a regional waste management plan that addresses ways to recycle, repurpose or reduce them. These waste streams may require additional recommendations and further treatment in future updates to the franchise agreement

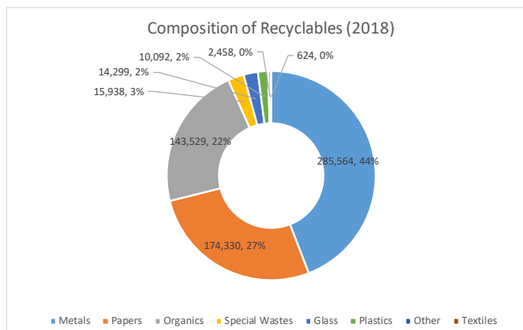
GLOBAL COMMODITY AND RECYCLING MARKET CHALLENGES COMPOUND DIFFICULTIES IN DIVERTING WASTE, AND MUST BE MONITORED AND MANAGED.

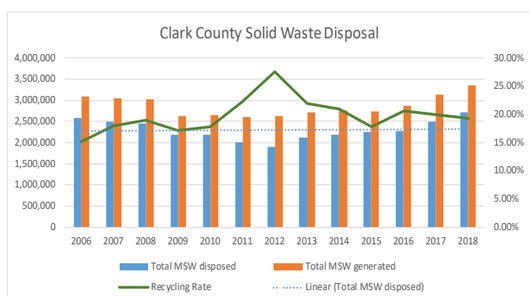
Among the greatest is the current challenges of the global and national recycling and commodities market, in which most American recyclables are exported to China and other Pacific Rim countries. These countries have recently stopped accepting recyclables due to high rates of contamination – simply put, cleaner recyclable materials have greater value. It is important to note that market trends and structural changes will continue to occur by 2050 and these trends, as well as both demand and supply-side strategies, must be monitored.

PUBLIC EDUCATION EFFORTS ARE NEEDED TO ENSURE PROPER WASTE DIVERSION

According to a report from International City Manager Association, most Americans do not know what to dispose of and what to recycle. Many often dispose of recyclables in large plastic bags that cannot be processed by recycling facilities and do not keep recyclables empty, clean and dry. To help increase rates of recycling and emerge as a net-zero waste city, the City and franchisee must keep the provision of single-stream recycling services for all residents and businesses, and conduct a strong public education campaign on what to recycle and how to recycle.







Source: NDEP, SNHD

IMPLEMENTATION STRATEGIES

- Educate the public on proper recycling, determine additional opportunities to increase waste diversion rates, and address special waste streams while ensuring waste costs are kept low.
  - Reconstitute Keep Las Vegas Beautiful program as a part of Keep America Beautiful
  - Establish public education campaigns or focused otreach efforts to inform residents and businesses in achieving waste reduction targets
  - Create incentive programs to reduce waste
  - Establish a targeted waste management program
  - Assess the Republic Services Franchise Agreement for waste collection and provisions of recycling and determine additional opportunities
  - Adopt a specific regional waste management plan to address waste reduction targets that conducts an economic analysis of waste management operations and overall waste streams that ensure tipping fees, rates, and other charges reflect current costs
  - In conjunction with the waste franchisee, develop, implement, and advertise additional special and critical waste stream programs based on market conditions including a compositing program, and additional programs for special waste streams
- Require the provision of single-stream recycling service at multi-family and commercial properties
  - Make applicable corresponding code changes to LVMC TItle 9.08- Collection of Solid Waste and Recyclables and LVMC Title 19.12- Litter, considering reduction of specific material types, product bans, enforcement mechamisms, and fines that address litter, illegal dumping, gradditi, and harm to the natural and built environment
- Conduct neighborhood clean-ups, ensure public spaces and right-of-way are clean and graffiti free, and sensitive areas of the Mojave Desert are trash-free.
  - Conduct neighborhood and park clean-ups to keep them clean
  - Ensure public spaces and right-of-way are clean, free of graffiti
  - Clean up sensitive areas, such as the Las Vegas Wash and desert areas
- Continue waste reduction and recycling efforts for municipal operations.
  - Provide recycling at all City facilities, parks, and targeted public places for use by City employees and members of the general public
  - Conduct waste stream audits to determine the rate and composition of recyclables
  - Collect and divert special waste streams that arise from unique City operations, including general operations and maintenance, street sweeping, wastewater treatment, public safety and detention
  - Provide general information to all city departments and employees on proper waste and recycling disposal

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Make recycling programs available to all while keeping rates low for residents and businesses.	Increase diversion rate from landfill through recycling and waste reduction efforts.	Reduced litter and pollution to private property, the desert and to the Las Vegas Wash keeps both natural and built environment healthy.	Ensuring the City is physically clean provides for a more inviting and livable for residents.	Invest in landfill / biogas renewable energy production to reduce methane gas emissions

GREENHOUSE GAS EMISSIONS

NRS 278.160.2

SEE ALSO:
CLV 2019 GHG Emissions Inventory

MITIGATE AND REDUCE MUNICIPAL AND COMMUNITY GREENHOUSE GAS EMISSIONS

Recognizing the global impact of climate change caused by greenhous gas emissions, the Kyoto Protocol established a target of 80% greenhouse gas emissions reductions of all industrialized countries by 2050. Although the United States was not a participant in the Protocol, over 1,000 mayors, including former City of Las Vegas Mayor Oscar Goodman, were signatory to the U.S. Conference of Mayors' Climate Protection Agreement in 2006, committing to meet or exceed the Kyoto targets. Similarly, world leaders formed an agreement at the 2015 Paris Climate Conference to limit the rise in average global temperature to below 2°C. At the time, the U.S. committed to reducing its greenhouse gas emissions by 28% below 2005 levels by 2025.

Carbon dioxide (CO2), sulfur hexafluoride (SF6), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs) are the six gases contributing to climate change. These gases are measured in carbon dioxide equivalent (CO2e), the equivalent impact of each different gas in terms of the amount of carbon dioxide that would create the same amount of warming. for different sources:

- Scope 1: Stationary and mobile emissions from direct combustion, including vehicles, utility power generation, and wastewater treatment operations
- Scope 2: Emissions resulting from the purchase of generated electricity or heating
- Scope 3: Indirect emissions from sources related to associated activities, such as air travel, employee commuting, and contracted solid waste.

The City has been a leader in reducing and mitigating its environmental impact and annually discloses its municipal and community greenhouse gas emissions. With substantial investment in clean energy, energy efficiency, and recycling over the past fifteen years, the City's emissions plummeted. Additionally, the City has fulfilled its electrical load requirements through Renewable Energy Agreements with NV Energy beginning in 2017, dramatically reducing emissions from municipal operations. The City is not alone in greenhouse gas emissions inventory and mitigation efforts for each major sector. The Nevada Division of Environmental Protection (NDEP) has conducted statewide inventories and future projections, including one in 2019, while Clark County has initiated new efforts to mitigate regional emissions. The major emitters and sources within the City and Southern Nevada include:

- Energy generation: Scope 1 and Scope 2 emissions from the generation of electricity from NV Energy power plants, with energy measured in million BTU's (MMBTU) and emissions using regional grid coefficients
- Residential, commercial, and industrial sectors: Scope 2 emissions resulting from the purchase of NV Energy's electricity and natural gas purchased from Southwest Gas for each sector. At a regional scale, municipal and civic energy consumption and emissions is also captured in these totals
- Transportation and mobile emissions: these are a function of vehicle miles traveled (VMT) as reported from NDOT and RTC; also included are total estimated enplanements from McCarran International Airport and daily trains running along Union Pacific tracks
- Waste: landfill based emissions, primarily methane, generated from the decomposition of municipal solid waste at Apex Regional Landfill and the closed Sunrise Landfill

Southern Nevada has negligible emissions from agriculture and land use; because these and other fugitive and Scope 3 sources cannot be easily be tracked, these were excluded.However, through this plan, the City will strive to meet targets through municipal, community, and regional mitigation and reduction actions.

OUTCOMES

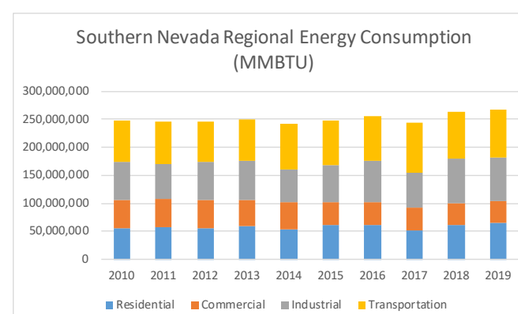
- Achieve carbon neutrality for City of Las Vegas municipal operations by 2050
- 28% of community greenhouse gas emissions are reduced by 2025 and 80% of community greenhouse gas emissions are reduced by 2050 from all major sectors

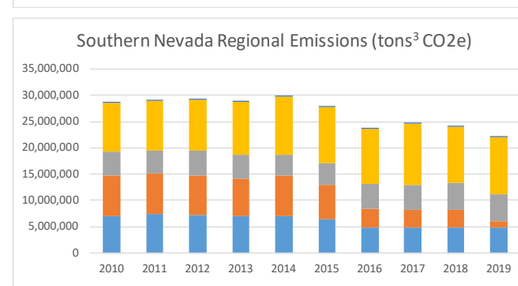
NV Energy has closed, demolished and divested ifrom coal-fired electricity generation, including Fort Mohave in Laughlin (2005), the Reid-Gardner in Moapa (2019), and the Navajo Generation Station in Page, AZ (2019). Through legislatively apporoved emissions reduction and capacity replacement programs, combined with an increasingly stringent renewable portfolio standard, emissions from power generation have been reduced dramatically.

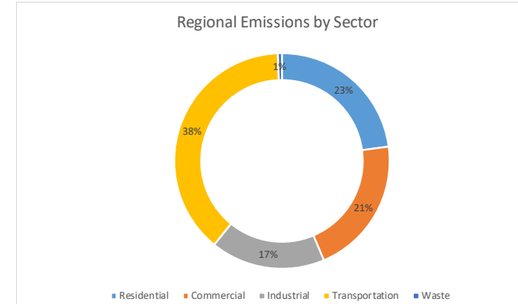
2006 Municipal Emissions: *309,000 tons CO2e*
2019 Municipal Emissions: *20,760 tons CO2e*

2019 City of Las Vegas Emissions: *6.1 million tons CO2e*
2019 City Emissions per capita: *9.21 lbs. per capita*

2005 Regional Emissions: *28.0 million tons CO2e*
2019 Regional Emissions: *22.3 million tons CO2e*



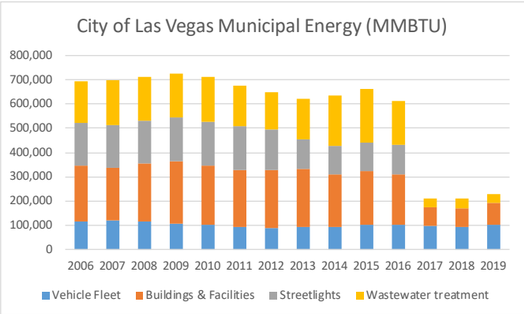


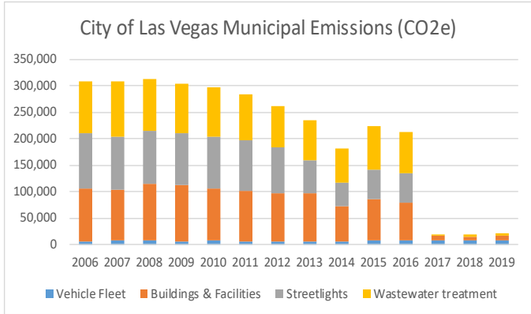


Source: City of Las Vegas 2019 GHG Emissions Inventory

KEY ACTIONS

- Emerge as a carbon neutral municipality
- Continue implementing community-wide energy efficiency and renewable energy programs for power generation and residential, commercial, and industrial sectors, while increasing waste diversion rates
- Focus efforts to improve transportation-based emissions through vehicle miles traveled (VMT) reduction and modal shifts, transit-oriented develoment (TOD), infill, and redevelopment, and transportation electrification





Emissions from CIty operations decreased due to the implementation of Renewable Energy Agreements with NV Energy, replacing the City's retail load with renewable energy from Boulder Solar (Source: CLV 2019-2020 Inventory, CIRIS v2.3, GPC protocol using 4AR GWP factors of IPCC guidelines, BASIC boundary, disclosed to Carbon Disclosure Project).

THE CITY HAS BEEN SUCCESSFUL AT MITIGATING ITS MUNICIPAL EMISSIONS

The primary sources of municipal operational emissions are from building and facility energy consumption, streetlighting, and wastewater treatment operations. Because renewable energy has been so heavily invested and because the City has entered into Renewable Energy Agreements with NV Energy to power the entire City's electric load, the City's only major source of stationary emissions are from natural gas consumption for building heating and wastewater treatment. Mobile emissions from the City's vehicle fleet are small, but could be further reduced.

CLEAN ENERGY EFFORTS HAVE ALREADY RESULTED IN DRAMATIC EMISSIONS REDUCTIONS IN MANY SECTORS

Over time, the residential, commercial, and industrial buildings sectors have seen dramatically reduced emissions as a result of cleaner power supplied by NV Energy. This is largely attributable to the state's renewable portfolio standard (RPS) and expanded renewable energy use at both the utility scale and for small distributed generation systems. As the RPS increases in stringency, a corresponding reduction in emissions will continue to occur. Concurrently, the retirement of coal fired power plants in Southern Nevada have dramatically altered the energy portfolio, leading to fewer emissions. Overall, future emissions are projected to remain stable, as will emissions from decomposing waste from both landfills, provided this plan's waste diversion and recycling strategies are also employed.

TRANSPORTATION BASED EMISSIONS CAN BE REDUCED THROUGH TRANSPORTATION ELECTRIFICATION, PUBLIC TRANSIT INVESTMENT, AND LOCATION EFFICIENCY

Because transportation is the next largest share of emissions, mobile emission mitigation efforts must be the primary focus in the future. Overall, future emissions are projected to remain stable, but making progressive reductions are dependent upon several factors:

- Federal fuel economy standards for passenger vehicles and trucks may change over time. Provided these standards are not relaxed, fuel-economy will likely continue to improve over time.
- Efforts to electrify personal transportation is a function of more electric vehicles being sold and on the market as well as the provision and availability of electric vehicle charging infrastructure. Equally important is the need to electrify public transportation, either through electric buses or light rail transit.
- By implementing this plan's strategies for redevelopment, infill, and transit-oriented development and aligning with the RTC's On Board Mobility Plan that includes high capacity transit recommendations, the potential for reducing VMT, traffic congestion, and overall emissions increases. In addition, opportunities for balancing jobs and housing will also increase as more mixed-use place types are located and developed.

IMPLEMENTATION STRATEGIES

Many of the following implementation strategies overlap those discussed in other chapters and goals within this plan. Each will yield different levels of emissions reductions from stationary or mobile sources. As new infrastructure is constructed or programs are instituted, the City must collaborate with internal departments, investor-owned utilities, and regional agencies to track and measure reductions resulting from each respective strategy.

- Emerge as a carbon neutral municipality:
  - Conduct annual municipal greenhouse gas emission inventories and address other emission types
  - Continue energy efficiency and solar investments at City buildings and facilities
  - Require public infrastructure consider energy and emissions factors for new or upgraded infrastructure
  - Upgrade remaining streetlights to LED
  - Improve vehicle fleet fuel economy
  - Address additional sustainable purchasing and supply chain opportunities
- Continue implementing community-wide energy efficiency and renewable energy programs for power generation and residential, commercial, and industrial sectors, while increasing waste diversion rates
  - Conduct annual regional and communitywide greenhouse gas emissions inventories
  - Make additional investments in the urban tree canopy
  - Make progressive improvements to building energy codes and standards
  - Institute building performance rating an reporting programs
  - Incentivize and install energy efficiency and renewable energy measures in partnership with investor owned utilities
  - Improve the efficiency of waste collection
  - Increase the community recycling and waste diversion rates
  - Landfill waste to energy initiatives
- Focus efforts to improve transportation-based emissions through vehicle miles traveled (VMT) reduction and modal shifts, transit-oriented develoment (TOD), infill, and redevelopment, and transportation electrification
  - Implement the 2050 Place types Map as described in the General Plan
  - Identify and institute brownfield and greyfield redevelopment projects
  - Increase funding and construct the layered complete street network as part of the City's Master Plan for Streets and Highways
  - Fund the high capacity transit program identified within RTC's On Board Mobility Plan
  - Invest in transportation electrification initiatives including electric vehicle charging infrastructure
  - Fund transportation demand management programs

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Ensure specific groups are not overburdened by the effects of stationary or mobile emissions.	Coupled with adaptation strategies, current climate mitigation efforts prove the City's resilience to climate challenges	Improvements to increase location efficiency will result in more active transportation choices	Ensuring the City is leader in mitigating emissions through a variety of community strategies improves the image and perception of the City's sustainability.	New methods and technologies to mitigate mobile and stationary emissions must be explored and pursued

III PUBLIC FACILITIES + SERVICES

GOALS

A. Provide equitable access to facilities and services that help meet residents' social needs, maximize their potential for development and enhance community wellbeing.

B. Ensure healthy outcomes for all members of the community.

III.A PUBLIC FACILITIES

NRS 278.160.1(e) and NRS 278.165

PROVIDE EQUITABLE ACCESS TO FACILITIES AND SERVICES THAT HELP MEET RESIDENTS' SOCIAL NEEDS, MAXIMIZE THEIR POTENTIAL FOR DEVELOPMENT, AND ENHANCE COMMUNITY WELL-BEING.

It is critically important that the expenditure of public funds on local infrastructure improvements and public buildings and facilities be closely coordinated to meet the continuing demands of anticipated growth and development throughout the City. Providing high quality municipal services in one of the country's most rapidly growing cities is challenging, especially with limited revenue and unpredictable funding sources. As new communities emerge on the edges of the City, while older mature neighborhoods redevelop and revitalize, balance is needed to plan for public buildings and public infrastructure that provide a broad range of services throughout the City.

One of the primary implementation tools for the 2050 Master Plan is the Capital Improvement Plan (CIP). The CIP is a fiscal and management tool the City uses to prioritize capital projects and allocate resources to fund public buildings and facilities projects to permit the City to govern, transact and conduct official business or operate essential services. NRS 278.0226 requires that the CIP decision making process be linked to the policies outlined within this plan. Each department in the City must coordinate capital improvements and operating and maintenance forecasts and expenditures within their individual budgets with the overall long range planning policies as contained in the 2050 Master Plan.

KEY ACTIONS

- While additional facility space isn't immediately required, during future CIP planning, strategically identify priority service needs and resources, whether provided by City, County, regional, state, or Federal providers, including the needs of priority populations and priority planning areas for evaluation to ensure adequate and equitable access to public resources.
- Implement the City's Sewer Facilities Plan to ensure wastewater treatment needs are met, especially in areas anticipated for infill and redevelopment.
- Continue proactive coordination with above ground and underground wet and dry utilities to ensure infrastructure is in place, the development process is smooth, and disturbances to pedestrian, bicycle, and vehicular rights of way are minimized.
- Collaborate with the Las Vegas-Clark County Library District to site and locate additional facilities in underserved and future growth areas.
- Dedicate more places and spaces for the arts.

OUTCOMES

- To provide equitable access to all public buildings, facilities, and services, ensure that by 2050, 75% of residents live within 2 miles of a recreation or community center, library, or cultural center.
- Maintain a facility service standard of 3.6 City employees (non-public safety) per 1,000 residents and 321 square feet per employee

The City of Las Vegas is a limited services government; while some functions are the responsibility of the City of Las Vegas, a number of other regionally-based functions are delegated by other public agencies.

- Many Federal, state, county, and regional services are located within the core planning areas of Las Vegas, most of which are in or around Downtown Las Vegas
  - Federal government: Federal facilities are located in Downtown's Civic and Business District, however, post offices, Social Security, and Veteran's Affairs offices are scattered throughout Southern Nevada.
  - State of Nevada: includes a wide range of state agencies. Many are located within the Grant Sawyer State Building; other satellite offices, including the DMV, job training, and social welfare offices are located throughout the community.
  - The Regional Justice Center and other Federal and State courthouses: a number of courts are located within Downtown Las Vegas' Civic and Business district Las Vegas Municipal Court will relocate after its new building is completed adjacent to City Hall in 2021.
  - Las Vegas Metropolitan Police Department has a number of areas commands and community police substations located throughout the City.
  - The Southern Nevada Health District maintains offices at its headquarters in the Charleston planning area, as well as community clinics
  - Many of Clark County's services are provided and accessible at the Clark County Government Center.
  - The Las Vegas-Clark County Library District is a consolidated library district overseen by a ten-member Board of Trustees, including five appointed by the Las Vegas City Council. Funded by property tax levies and governed pursuant to NRS 379, the District serves 25 countywide libraries, including nine within the City.

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Access to all types of public services and facilities brings residents closer to their government.	Green public buildings and facilities show a commitment to sustainability and reduce the City's energy and operational costs.	The provision of recreational facilities promote community access to mind and body wellness.	Ensuring the adequate provision of utilities, infrastructure, and services are essential to daily life	Co-locate city services within municipal centers in each planning area

- The City of Las Vegas provides services, operating 21 departments, providing internal services, public safety, provision of infrastructure, and cultural and recreational amenities.
  - The City's Public Works and the Operations and Maintenance departments are directly responsible for constructing and maintaining the City's public buildings and facilities. They also set standards for the space needs of employees. The City's existing building stock is currently maintained by the Operations and Maintenance Department. Operations and Maintenance is responsible for upkeep of public buildings. In addition, Operations and Maintenance handles custodial services, remodeling, and real estate. The construction of new public buildings within the City is overseen by the Department of Public Works Capital Project Management division, which manages the design and construction of public buildings from pre-planning conceptual design, to project management and construction support.
  - The Public Work's Department's Environmental Division operates and maintains the City's sanitary sewer, wastewater collection and treatment operation.
- Public and Private utility providers, including:
  - The City of Las Vegas is served by two primary investor owned utilities: NV Energy for electricity and Southwest Gas for natural gas, described further in Goal TI-3.
  - The City of Las Vegas is served by the Las Vegas Valley Water District (LVVWD), which treats and delivers water to city residents and businesses.
  - Stormwater and the region's storm drain and flood control network is planned, funded, and managed by the Clark County Regional Flood Control District (RFCD).
  - Republic Services of Southern Nevada serves the City of Las Vegas (and much of the region as a whole) under a franchise granted by City Council to provide solid waste and recycling service to City residents, businesses, and for government operations.
  - The City franchises telecommunications companies for use of the City's right of way and the provision of service to its residents and visitors. A number of franchises are granted for service in this space, including for Cox Communications and CenturyLink, two of the largest internet, television, and telephone communications providers. Wireless providers are permitted and regulated by the City with respect to infrastructure siting, design, and typical operations.

THE CITY OF LAS VEGAS IS MEETING ITS CURRENT DEMAND FOR BUILDINGS AND FACILITIES, BUT OTHER SPACE TYPES MAY BE REQUIRED AS THE CITY'S POPULATION GROWS

The City currently operates more than 100 public buildings, and facilities. These include administrative buildings, cultural facilities, community centers and recreational facilities, public safety, wastewater treatment, warehouses, and other types of buildings. Some of the largest include:

- Las Vegas City Hall, the administrative flagship building and headquarters of the City, housing internal service, development services, and administrative functions, as well as meeting space and offices for the Las Vegas City Council and city management.
- The City is currently building a new 138,000 square-foot Municipal Court anticipated to open in 2021 next to City Hall, vacating current space at the Regional Justice Center.
- One of the hallmarks of a world-class city is the extent of its opportunities for cultural expression. Cultural buildings and facilities, such as art centers, museums, community centers, performing arts spaces, and libraries, play an important role in community life. While the City has made great strides in recent years regarding cultural facilities, the City must continue to expand its cultural role. Each must be available to all citizens of Las Vegas, are designed to bring cultural awareness and pride to the City, and serve as assets so they can be effectively programmed and marketed.
- Nearly 30 different community centers, pools, and recreational facilities are distributed throughout the City.

CITY FACILITIES	NUMBER OF FACILITIES	SQUARE FOOTAGE
Administrative	18	611,340
Cultural	9	164,643
Public Safety	28	458,040
Recreational	29	596,587
Warehouses	17	151,419
WPCF	1	679,938
Other	11	163,769
TOTAL	**113**	**2,825,736**

- Two service yards (East and West) house many of the City's vehicles, equipment, and repair facilities and contain maintenance, warehousing, and storage facilities.
- The City's wastewater treatment plant.

In order to predict the future needs of administrative and warehousing facilities, it is important to identify the current conditions regarding space needs within the City. To maintain a service standard of 3.6 non-public safety city workers per every 1,000 residents to maintain the level of customer service that the City currently provides, an increase of staff and building space of 321 square feet per employee will be required. As of 2019, there are 1,526 full-time non-public safety employees, and 866 part-time employees located at various facilities throughout the City within 1,372,570 square feet of administrative, cultural, and recreational building space. (Public Safety employees accounted for under that respective goal). Based on future population projections, design metrics, and public service standards, the City will need nearly 3,550 full and

CITY EMPLOYEES	2019	2050	DIFFERENCE
Population	675,971	984,738	
# Non P/S Employees (Actual)	2,392		
# Non P/S Employees (Required)	2,433	3,545	1,112
Actual square feet	1,372,570		
Required square feet	781,152	1,137,963	234,607

part time non-public safety employees. However, with the recent construction of multiple new public facilities over the past decade, the City should be able to provide enough facility space for its core city services functions, based on employee space needs alone. Public access to city services may warrant construction of additional or future facilities, based on specific need requirements.

When considering the design of new public buildings, the City must demonstrate equitable site selection and environmentally conscientious design. Site selection for new facilities should prioritize access to underserved and vulnerable populations, while also incorporating innovative design and sustainability principals. The City will ensure that any new public buildings built by and for the City are built to a minimum of the United States Green Building Council's (USGBC) LEED-Silver level. Public facilities should have direct access to alternative modes of transportation.

Based on geographic proximities and the lack of facilities in general, the Nu Wav Kaiv, Tule Springs, Lone Mountain, La Madre Foothills and Kyle Canyon, and are the most underserved locations due to lack of facilities. The Southern Nevada Public Lands Management Act, however, can be used to reserve land for future public facility construction in those areas. However, other areas near the urban core may be underserved due to the proximity of a public facility or service.

ENSURE THAT THE SANITARY SEWER SYSTEM HAS THE CAPACITY TO ACCOMMODATE THE PROJECTED DENSITIES AND POPULATIONS FORECASTED THOUGH 2050

The City constructs, operates, and maintains the sewer collection system, as well as treating and discharging water back into the Las Vegas Wash for return flow credit. The City's existing service area is approximately 154 square miles. Based on a 2002 interlocal agreement between the City and County, the City provides wastewater collection service to northwestern areas around Lone Mountain outside of existing city limits. With inclusion of future growth areas, service could expand to approximately 173 square miles.

The existing City wastewater collection system is comprised of approximately 1,827 miles of pipeline ranging in diameter from 6-inches to 10 feet. Collected wastewater is directed to the Water Pollution Control Facility located in the east valley. The 140-acre treatment facility has a capacity to treat up to 91 million gallons per day (MGD) and provides for the collection, treatment, and disinfection of wastewater for discharge into the Las Vegas Wash, as well as the collection and disposal of residual solid material. The WPCF utilizes both solar and digester gas from its anaerobic digestion process to power two large combustion engines that power aeration air blowers.

Sewer capacity can be easily calculated for development of vacant land in the suburbs; however, because this plan anticipates higher density infill development within more mature areas of the City, it is difficult to estimate the potential impact on capacity. Redevelopment can overwhelm the sewer system due to aging infrastructure or pipe diameters that were never intended to handle high intensity uses. Higher density and mixed-use infill development often requires upgrades of the existing sewer system at significant cost to the developer or the City. Should a developer be required to upgrade sewer lines, the additional cost could serve as a disincentive. In order to attract viable development into the City's designated TOD place types, it is imperative that the wastewater plan be closely coordinated. The Department of Public Works maintains an up-to-date Wastewater Collection System Master Plan to anticipate future changes in capacity requirements and is proactive in meeting those needs based on metrics such as population forecasts and future land use.

THE AVAILABILITY OF LIBRARIES ENSURES PUBLIC ACCESS TO INFORMATION AND RESOURCES

The Las Vegas-Clark County Library District ensures access to reading and information at each of its libraries. They are also an educational and cultural resource for many of the City's children and residents, some of which include theaters, lecture, and concert halls. The District's Library Facilities Master Plan Decision Framework Document was approved in 2019 to assist with capital decision making for the next 20 years. The document is a tool to assess and execute capital investment strategies during a rapidly evolving environment for public libraries. It allows the District to stay abreast of changes in the economy, demographics, consumer behavior, information distribution, technology, physical buildings, and other factors though 2040. The framework found that individual library branches will see population shifts, but their facilities are well distributed in the near and mid-term. Based on these trends and an analysis of the District's footprint, the District has identified several potential future site locations to serve residents.

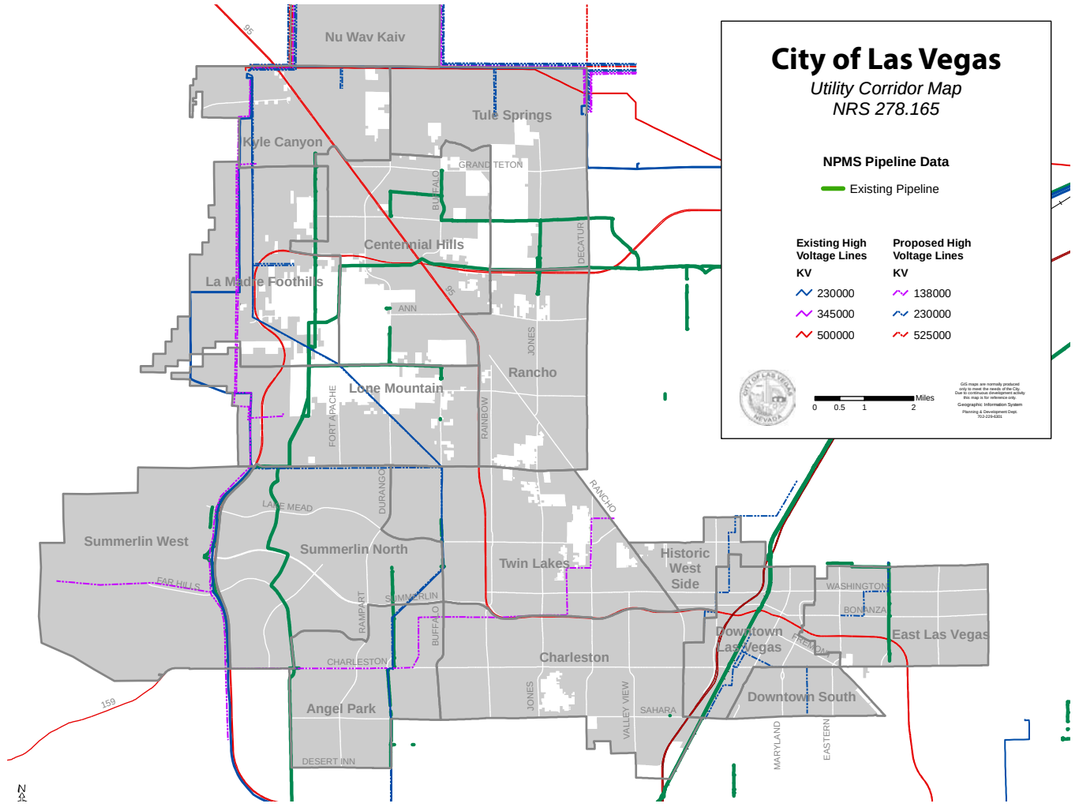
- Kyle Canyon: within the Skye Canyon master planned community on a City of Las Vegas BLM site (NV-157 Kyle Canyon Road near Nah Gah Kiev Pkwy)
- La Madre Foothills
- Lone Mountain: along the I-215 Beltway.
- East Las Vegas: while a new library opened in 2019 within this area, the District's eastern area still has potential service gaps

EFFORTS TO COORDINATE WITH A RANGE OF "WET" AND "DRY" UTILITIES HAVE BEEN IMPROVING TO ENSURE ADEQUATE PROVISION OF SERVICE TO RESIDENTS AND BUSINESSES

The City coordinates with private utility companies to ensure the adequate provision of electricity, natural gas, water, and telecommunication infrastructure to existing and new development. Through franchise agreements for use of city rights-of way, utilities are typically located underground, in sidewalk or curbside utility boxes, or overhead transmission lines. With the exception of utility transmission line requests of 15,000 volts (15 kV) or larger outside of an established overhead utility corridor, utilities are not required to have a public hearing for approval.

Development coordination is one of the biggest challenges the City faces, as each utility company has specific requirements for the installation of required appurtenances. While many types of utility installations can be located underground, some, such as electric transformers or water backflow preventers, are required by to be located above ground. Aesthetically, these appurtenances are large, unsightly, and conflict with the zoning code provisions that are intended to minimize their impacts. Required equipment clearances often make it impractical to house them within the footprint of a building, which typically results in encroachments into the pedestrian realm. Overhead utilities, especially in core planning areas, pose another challenge. Since the early 2000's, Title 19 has required undergrounding overhead utility lines for safety and aesthetics, but it has proven challenging to implement due to cost and the ability of the requirement to be waived at a public hearing.

While efforts to coordinate utility installations have improved, moving forward, the City must continue to engage in discussions with "wet" and "dry" utility companies to minimize the impacts of their installations. The feasibility of utility consolidation or banking multiple properties from a designated location equipment reduces the current installation clearances must be examined. Discussions should also be had with the development community to emphasize the importance of a site design that takes above ground utilities into consideration prior to the submittal of off-site improvement plans. The zoning code must also be revised to include development standards that take into account the locational provisions of above ground utilities to minimize their impacts.

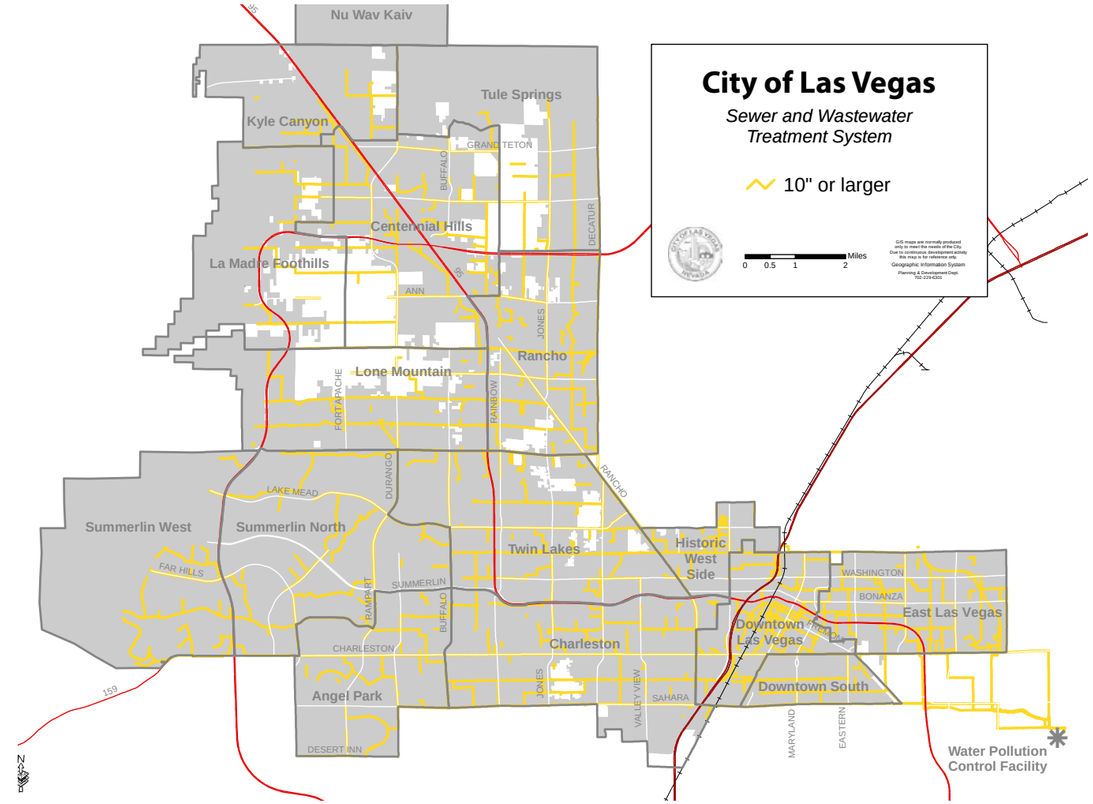


UTILITY CORRIDORS AND TRANSMISSION PLAN

Most electric, gas, sewer, and telecommunications infrastructure are located underground within the public right-of-way as buried pipelines and conduit, or are overhead transmission lines. The City has limited oversight on the location of utility transmission lines. It is directed to approve lines located within an established utility corridor administratively, and all others through the approval of a Special Use Permit by the Planning Commission. A utility applicant may appeal the Planning Commission's decision to the Public Utilities Commission of Nevada if the applicant believes that the Commission did not act in a timely manner, or if they feel aggrieved by conditions imposed with the special use permit.

In addition to this statutory requirement, this Master Plan includes the following additional provisions:

- *The City will continue to work with investor-owned utilities to eliminate aerial lines by relocating them underground within the city of Las Vegas, especially within Downtown Las Vegas.*
- *Utility installations within the public right-of-way shall be coordinated during new or street rehabilitation projects.*
- *Sidewalks, alleys, building entrances, and other public spaces shall be kept clear of electrical, water, and natural gas boxes and infrastructure. Utility boxes and infrastructure shall be located in appropriate areas as depicted in LVMC Title 19 and shall not be placed in a manner that interferes with pedestrian or bicyclist movement.*



WASTEWATER COLLECTION SYSTEM MASTER PLAN

The Wastewater Collection System Master Plan is separate plan document that identifies capital improvement projects for capacity in the existing sewer system and expansion of sewerage facilities to serve new development. The plan uses an updated model and includes specific projects, estimated costs, and a schedule for implementation. Most programmed CIP projects are upgrades to the Water Pollution Control Facility and for major sewer interceptor lines to accommodate future growth. All costs associated with the sanitation operation, including debt service on bonds, are paid for through service fees and a portion of a sales tax.

This subplan is consistent with this Master Plan, which also support the following additional provisions:

- *Abandon septic tanks (Individual Sewage Disposal Systems) and connect property owners to the sewer network.*
- *Coordinate and time improvements in conjunction with new large-scale infill and redevelopment projects that are supportive of the land use placetypes contained in Chapter 2.*
- *Implement improvements to the sanitary sewer system as identified in the Wastewater Collection System Master Plan Update which will increase the capacity to deliver more wastewater for reclamation for greywater irrigation uses or to returned it to Lake Mead for return flow credits.*

CULTURAL FACILITIES HELP IMPROVE COMMUNITY WELL-BEING

Arts and culture are vital for every city. Abroad range of arts and cultural resources and activities develop community cohesion, civic participation, self-expression and creativity and revitalization

Southern Nevada has a wealth of cultural opportunities and is home to world class entertainment and performing arts. As the City has grown, cultural offerings have evolved from casino lounge acts to full-scale entertainment productions, fine-art productions to dedicated programs and schools for the arts. The City's cultural scene has blossomed with many new cultural additions within the heart of Las Vegas, including

- The Smith Center for the Performing Arts
- The DISCOVERY Children's Museum
- National Museum of Organized Crime and Law Enforcement
- The Neon Museum
- The Nevada State Museum and Origen Experience at the Las Vegas Springs Preserve
- Community city art and cultural centers offering community galleries, cultural facilities, and theater space.

The City's Office of Cultural Affairs coordinates performances and events, a youth theater, classes and workshops, and dedicates "a Percent for the Arts," a dedicated funding formula from its capital budget for artistic works on public works projects at city facilities and within City rights-of-way. Through these efforts, the City also approves the creation of both permanent and temporary art installations throughout the City. Assisting the office is the Las Vegas Arts Commission, an appointed volunteer advisory board that helps determine projects and overall awareness of the arts.

After the Arts District was formed in Downtown Las Vegas, the City found a new home for artists to collaborate in live-work environments. Intended as an evolving cultural center, the Arts District is an example of a Downtown district that is successfully redeveloping and reinventing the built environment through public investment and entrepreneurship as envisioned by the Vision 2045 Downtown Las Vegas Masterplan. Further urban design efforts and targeted incentives to develop artistic and cultural endeavors will cement the Arts District as the City's live-work-play destination for creative industry.

To sustain momentum and to secure Las Vegas reputation as a unique hub for cultural activity, the City must continue to invest in its cultural facilities and places. As part of its annual efforts, the City must invest in a robust Municipal Arts Plan that makes further examination into the needs of new cultural facilities and use of right of way space to improve their aesthetics. Ultimately, this sub-plan can help protect, enhance, and further develop Las Vegas' cultural resources and serve to strengthen the region's creative industries.

Among the identified needs and new cultural facilities are:

- The development of a new vision for the City's "Cultural Corridor" within the Cashman District of Downtown Las Vegas. Because this area has a range of existing cultural resources, including the Neon Museum, Natural History Museum, and Las Vegas Mormon Fort state park, it has been historically situated for such uses. However, it also competes with other surrounding uses including state government, economic development efforts at both the former Las Vegas Library and Cashman Center, and contends with high levels of poverty and homelessness. A specific community planning effort must take place to reimagine this district to yield tangible results
- Construction of dedicated fine arts museums, including at least one as part of the Nevada Museum of Art
- Construction of a dedicated natural science museum
- Relocation of the National Atomic History Museum to Downtown Las Vegas
- Relocation and expansion of the Natural History Museum
- Commission and dedicate public art, monuments, and statues
- New dedicated galleries and community facilities for community-scale performing arts
- An open-air or partially enclosed outdoor amphitheater venue for year-round large-scale ticketed performing arts events

Finally, the Office of Cultural Affairs must continue to track participation and attendance at community art fairs, cultural events, festivals, performances and programs to demonstrate community need and communicate financial or logistical support for local arts. Collaboration with programs at UNLV and CCSD, especially the Las Vegas Academy for the Performing Arts in Downtown Las Vegas will further help develop community pride and the next generation of artists.

A DAY IN THE LIFE

FINDING AN ANSWER TO TRANSIENCE

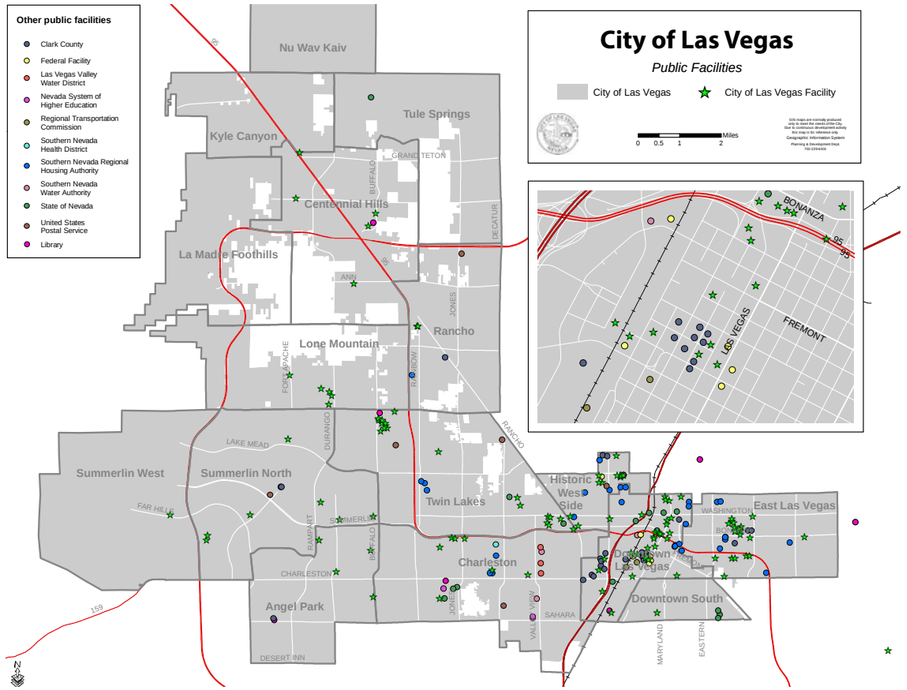
Aubrey McCall, YMCA Director

Calling herself "the moving type", Aubrey and her husband had already lived in several other cities by the time they decided to settle and raise their young family in Las Vegas. From the very beginning, they loved the city's "24-hour-town" activities and choices. Today, Aubrey, who runs a Y in one of the city's north-central communities, also appreciates the ready availability of free and low-cost services the city provides. For she and her husband Tom, Las Vegas has always been a city of opportunity. "Here there are a million different directions you can go," she says.

Even so, she adds, Las Vegas struggles with being a transient town. She knows many transplants but comes across few people who were born and raised here. She also knows many who have decided to sell their homes and move on. She sees the city as filled with "pockets of really nice" and "pockets of not nice anymore" and wonders what can be done to keep neighborhoods from going downhill.

When it comes to the public education system, she notes that transiency contributes to a low high school graduation rate, an unwelcome statistic for a system—the state's largest—that must already content with complex challenges such as continued rapid growth.

Aubrey notes that her own two children have done well in the city's public schools—in part thanks to her own deep involvement. It's in the area of early childhood education that she sees the greatest unmet need. She'd like to see more funding, from the state as well as the city (since kinder care, after all, is a statewide issue) so the city's earliest residences can have the resources they need to make the best possible start.



PLANNING AREA	FACILITY NEEDS BASED ON 2050 POPULATION
Angel Park	Moderate need, due to proximity
Centennial Hills	Adequately served
Charleston	High need, due to lack of proximity, area demographics
Downtown	Adequately served
Downtown South	Low need due to existing service provision, but warranted based on area demographics
East Las Vegas	Moderate need due to existing service provision, but warranted based on area demographics and proximity
Kyle Canyon	Moderate need, due to long term development build-out and master planned community service provision
La Madre Foothills	Moderate need, due to proximity, long term development build-out, and master planned community service provision
Lone Mountain	Moderate need, due to proximity
Meadows	High need, due to lack of proximity, area demographics
Nu Wav Kaiv	Low need, due to long term development build-out
Rancho	Moderate need, due to proximity
Summerlin North	Adequately served
Summerlin West	Low need, due to long term development build-out and master planned community service provision
Tule Springs	Moderate need, due to proximity
West Las Vegas	Low need due to existing service provision, but warranted based on area demographics

IMPLEMENTATION STRATEGIES

- All future public buildings and facilities capital improvements identified in the annual CIP will be assessed for its conformance with the pursuant to NRS 278.0226.
- For each planning area, conduct a community needs assessment to identify priority service needs and resources, whether for City, County, regional, State, or Federal resources, including the needs of priority populations and priority planning areas for evaluation.
  - Plan for future public building needs, including renovation and expansion of existing facilities, land acquisition, and new construction.
  - Evaluate administrative and warehousing space needs to help establish priorities in the annual capital improvement budgeting process.
  - Consider development of satellite administrative offices in areas that provide accessibility to underserved populations.
  - Construct all new City buildings and facilities to meet LEED Silver standards
  - Justify expansion and renovation of public buildings using the City's Office of Architectural Services standards
  - Research and consider land acquisition opportunities, including those through SNPLMA, in advance of programming capital improvements to take advantage of potential opportunities to expand future service delivery.
- Ensure that both newly developed and mature areas of the City contain appropriate public arts and cultural facilities, museums, libraries and other supportive uses:
  - Expand the number and quality of cultural opportunities within the community though capital funding, grants and private-public partnerships.
  - Locate and develop family-oriented arts, cultural, and entertainment facilities and venues in each planning area at locations accessible to all citizens.
  - Actively work with public, non-profit organizations and private interests to develop art galleries, museums, performing arts centers, sports and entertainment arenas, and other cultural facilities.
- Cooperate with the Las Vegas-Clark County Library District and assist with the future construction of libraries within the 2019 Library Facilities Master Plan Decision Framework document.
- Adopt coordinated strategies addressing key issues and concerns pertaining to water reclamation, treatment facilities, sanitary and storm drain systems by implementing the City's Wastewater Collection System Master Plan.
  - Rebuild and replace old and outdated sewer and wastewater treatment infrastructure through capital improvement programs
  - Ensure sewer infrastructure is right-sized in redevelopment areas
  - Develop a program to mitigate sewer construction and connection fees in infill areas
- Continue coordinating with above ground and underground wet and dry utilities:
  - Ensure development standards utilize minimize the visual impacts of required above ground appurtenances.
  - Ensure utility installations within the public right-of-way are made during pavement and utility rehabilitation projects and when new rights-of-way are developed to minimize the impact to motorists, bicyclists, and pedestrians.
  - Develop methods in coordination with utilities to screen or locate utility appurtenances outside of the pedestrian realm, including utility rooms, utilization of alleys, or undergrounding.
  - Codify development standards that take required utility company clearances into account and that require the consideration of above ground utilities prior to entitlement approval
- Dedicate more places and spaces for the arts
  - Construction of partially enclosed or open-air amphitheater for large-scale performing arts
  - Adopt a public arts and cultural facilities plan
  - Incentivize and fund development of new cultural facilities
  - Commission statues, artwork, murals, at City facilities and within public rights of way

III.B PUBLIC HEALTH + SOCIAL SERVICES

NRS 278.160.1(e)

ENSURE HEALTHY OUTCOMES FOR ALL MEMBERS OF THE COMMUNITY

Health is a foundational guiding principle of this plan. Throughout public outreach, health care and access to medical services were among the most important priorities and concerns for residents; city residents ranked health care as the second highest priority issue that the City should address over the next 30 years.

These issues may have scored as high as they did because of alarmingly poor public health indicators at the City, community-wide, and state levels, contributing to the designations of Health Profession Shortage Area, a Medically Underserved Area, and Medically Underserved Populations by the US Department of Health and Human Services. A 2019 regional Community Health Needs Assessment commissioned for the Southern Nevada Health District identified a number of indicators and areas recommended for improvement, including:

- **Poor personal care indicators:** These indicators, which include behavioral, environmental, and genetic factors, are determinants of personal health. Las Vegas residents typically exhibit concerning conditions, especially for children, women, and seniors.
- **Environmental conditions:** Some environmental conditions contribute to the region's chronic health concerns, especially with respect to pollution, geography, and socio-economics.
- **Motor vehicle and pedestrian safety:** Preventable deaths and injuries resulting from distracted and impaired driving are far greater than national averages.
- **Violence:** Public safety efforts have led to incremental drops in the violent crime rate. Unfortunately, many residents continue to have had to cope with dangerous situations that may lead to child abuse and different forms of domestic violence.
- **Mental health:** Mental health care is a necessary, but lacking necessity for a region that has ranked near last for both prevalence of mental illness and access to mental health services.
- **Substance abuse:** Las Vegas ranks high for certain types of drug and substance abuse.

OUTCOMES

- By 2030, the City increases the number of hospital beds to 25 beds per 10,000 residents and maintains the number of ICU beds above 4 per 10,000 residents
- By 2030, the region increases the number of physicians to above 400 per 100,000 residents
- Personal health indicator trends improve over time
- The number of adults and children with insurance increase to above 95%
- Designated Health Professional Shortage Area designations are removed within the City

KEY ACTIONS

- Adopt a Health-in-all-Policies statement and commit to increased partnerships with the Southern Nevada Health District and health care providers to improve key personal health care indicators
- Complete the build-out of the UNLV School of Medicine and leverage the Las Vegas Medical District to ensure training, recruitment, and retention of doctors and nurses to overcome shortages
- Develop a City-specific Community Health Needs and Public Health System Assessment addressing personal health Indicators and health care facilities citywide and their accessibility.

- **Overall Access to Care:** Regionally, Southern Nevada has struggled with a low resident-to-doctor ratio as well as wide gaps in health care accessibility, especially for low-income and minority neighborhoods. Health care costs and insurance also inhibits health care access.

Protecting public health and safety are among the City Council's most important enumerated authorities. While the City hasn't traditionally been involved in the direct provision of health care, it plays an important role in preventative measures that could cause environmental harm. Specifically, provisions within the City Charter and several titles of LVMC contain preventative public health measures, including:

- The provision to enforce health regulations and the establishment of quarantines
- The ability to treat people suffering alcohol or substance abuse
- The regulation of land use to protect public health safety and welfare
- Nuisance abatement
- Noise and odor control
- Health card requirements for certain business operations
- Animal, pest, and rodent control

As discussed in the Parks goal, the City offers direct activities and amenities for public health and wellness through its Parks and Recreation Department, including community centers with gyms, classes, swimming pools. Park facilities located throughout the City provide open recreational space for activities, sports, and play. The Planning and Public Works Departments have also dedicated hundreds of miles of trails and bicycle facilities to enable active transportation.

Social services are primarily handled as a regional function. The Clark County Social Services Department provides assistance to individuals not otherwise covered by other Federal or State programs, often for seniors and adults without children. The County's Family Services Department handles foster care and adoptions, and child abuse and protective services.

Titles 38, 39, and 40 of Nevada Revised Statutes contain specific chapters and provisions relating to public welfare, mental health, and public health, respectively. State public health laws govern and mandate actions by individual state departments and agencies, as well as agencies like SNHD, and local government service provision. The State also typically handles service provision that's passed down from the Federal Government. Programs and services include:

- State boards of licensure and examination for a wide range of medical professions
- The Nevada Department of Health and Human Services, which provides:
  - » Aging and disability services
  - » Child and family services
  - » Health care finances, particularly for Medicare and Medicaid
  - » Public and Behavioral Health
  - » Welfare and support services
  - » Minority health
- The Silver State Health Insurance Exchange, which provides Nevada residents access to Nevada Health Link, the online insurance marketplace in compliance with the Affordable Care Act. Because Nevada elected to expand Medicaid under Governor Brian Sandoval, more Nevadans qualify and have access to coverage.

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Improving health care access for low income and minority neighborhoods, regardless of location, is a vital need for members of the city who need access most.	As conditions change and the City continues to grow, adapting to new trends and population changes will keep the City at the forefront for health outcomes.	The City will work to improve physical and mental health outcomes, improve safety, and encourage healthy choices to sustain individuals and families.	Improved health measures, physical conditions, and access to care are essential for the City and region's quality of life.	Investments in public health systems and the UNLV School of Medicine align with economic development efforts.

PERSONAL HEALTH INDICATORS

- Children – Obese: 13.7% (Regional - trending up)
- Children – Physical activity / Inactivity: 42.8% / 15.1% (Regional – trending up)
- Children – Tobacco 5.4% (trending down, but smokeless tobacco use increasing)
- Teen Birth Rate – 21.9 / 1,000 (Regional – Moderate, Above 20.5% US); highest in CLV
- Adults – Obese: 28.2% (CLV - Improved, but trending up – below 30.1% US)
- Adults – Sedentary: 29.9% (CLV - Poor, trending up – above 26.6% US)
- Adults – Diabetes: 11.2% (CLV – Poor, above 10.8% US)
- Adults – High Cholesterol: 32.2% (CLV – Moderate, below 34.1% US)
- Adults – High blood pressure: 31.8% (CLV – Moderate, below 32.4% US)
- Adults – Experienced heart disease: 6.1% (CLV - Moderate, below 6.4% US)
- Adults – Smoking: 20.5% (CLV – poor, trending up – above 16.4% US)
- Adults – Asthma – 10.1% (CLV – poor, trending up – above 9.0% US)
- Adults – Cancer: 6.0% (CLV Moderate, Below 6.8% US)
- Adults – With Disability: 12.2% (Regional – Below 12.6% US)
- Suicide – 19.4 / 100,000 (Regional – Moderate, trending up – Above 13.9% US)
- Adults - Binge drink: 17.9% (CLV - Moderate, trending up - Above 17.0% US)
- Seniors – Hearing difficulty: 14.9% (CLV - above 14.6% US)
- Seniors – disabilities: 36.9% (CLV - above 35.0% US)
- Seniors – Alzheimer's / Dementia: 10.2% (Regional – Moderate, trending up - Below 10.9% US)
- Life expectancy: 78.8 (Regional – below 79.1 US)
- Leading causes of death:
  - 26.0% other causes
  - 23.0% heart disease
  - 21.3% cancer
  - 5.7% lung

Source: SNHD

THE CITY'S OVERALL HEALTH METRICS AND INDICATORS NEED CONSIDERABLE IMPROVEMENT THROUGH INVESTMENTS IN THE HEALTH CARE SYSTEM, A HEALTH IN ALL POLICIES COLLABORATIVE APPROACH, AND THROUGH PROACTIVE PREVENTATIVE EFFORTS TO ADDRESS CURRENT AND FUTURE ACUTE AND CHRONIC CONDITIONS

Based on recent personal health indicators from the Southern Nevada Health District, residents within the City, and Southern Nevada as a whole, lag behind many state and national averages as determined by the most recent Community Health Needs Assessment. For some groups, overall trends and health metrics indicate the need for renewed action, city leadership, and a "Health in all Policies" collaborative approach. This concept is intended to incorporate health considerations into the decision making process, whether through this plan's implementation by the City's departments, or through policy making by the City Council. Public health will ultimately be influenced by individual behaviors, but for areas in which the City has direct control, such as how the physical environment and health care access can be shaped by the City and community stakeholders.

For some of the health indicators that are especially troubling, but controllable or preventable, the City can play a greater role in addressing concerns. Throughout this Master Plan, the chapters and goals covering transportation, contain implementation strategies that affect the built environment and can significantly impact public health. Despite opportunities for active recreation and transportation, or the availability and accessibility of parks, community centers, pools and gyms, obesity, and sedentary lifestyles are prevalent for both adults and children, as are those that report higher incidences of diabetes and asthma. Similarly, as described under the Food goal, the City continues to work to address food deserts and food swamps, fast food outlets are more accessible than healthy food options and full-service grocery stores. The Nevada Clean Indoor Air Act has prohibited smoking and vaping indoors, but committing to strengthen and enforcement of smoking policies that reduce or eliminate secondhand smoke exposure, including at standalone bars, multi-family housing or other common public areas, coupled other smoking prevention and cessation efforts, will help reduce incidences of respiratory disease and cancer. Ultimately, many of these indicators may come down to individual behavior change, sometimes at the direction of or treatment from medical professionals. If given the tools, resources, or messaging that promote healthy behaviors and residents are linked to existing programs and resources, incidences of increased physical activity levels, improved nutrition, and decreased empty calorie and fat intake will yield an overall Improvement in health outcomes and self-management for people with acute or chronic conditions.

Some environmental conditions contribute to the region's chronic health concerns, especially asthma and respiratory illnesses. These are borne out of mitigatable issues such as air pollution, land use, and neighborhood characteristics. The City must ultimately reduce the community's exposure to identified environmental hazards through the protection of environmental quality. To address environmental conditions that contribute to the region's chronic health concerns, mobile source air pollution must be minimized through the prioritization of higher occupancy vehicles, transit usage, and transportation electrification. Land use itself – where and how housing and transportation systems are located - also play roles in health indicators. A renewed focus on environmental justice is therefore an important approach to mitigate health concerns in planning areas with higher minority populations and rates of poverty. While preserving natural conditions from urbanization will help ensure access to open spaces, the adequate provision of different types of parks and recreational centers will ensure all areas of the city have green space, which is good for both body and mind. A renewed focus on environmental justice is therefore an important approach to mitigate health concerns in planning areas with higher minority populations and rates of poverty.

As discussed in the Transportation Goals, deaths and injuries of motorists and vulnerable road users are far greater than national averages. Bicyclist and pedestrian safety continues to be an ongoing concern, requiring more attention to transportation facility design. Through the construction of the City's layered complete street network, street design that reduces speeds, eliminates dangerous conditions and roadway movements, and increases visibility, will help improve safety for all road users. Coupled with enforcement of traffic laws and increased penalties for actions that pose a threat to lives, an opportunity exists to improve overall safety and reach the City's "Vision Zero" goal

Public safety efforts have led to incremental drops in the violent crime rate. Unfortunately, many residents continue to have to cope with dangerous situations that may lead to child abuse and different forms of domestic violence. Though deterrence efforts may be necessary in certain high crime areas, community-oriented policing and public safety efforts, as well as changes to built environment conditions are just as important to reduce violence. Additional work must be made to address mental health and substance abuse, two issues that often establish conditions for physical violence. Because Las Vegas has structured its economy on tourism and entertainment, there are intrinsically higher risks for smoking, alcohol abuse, and drug use abuse. Alcohol use, maternal substance use, and most recently, the epidemic of opioid abuse have each had higher rates among Las Vegas residents.

Unfortunately, funding and availability for mental health services and substance abuse treatment programs is low across Nevada; the state ranks last in the country for a range of mental health metrics, including youth and adult mental health conditions, mental health workforce availability, funding for treatment, and facility availability. To address these difficult challenges, there must be recognition of how each issue and system interacts with each other. Within its powers, the City Council can provide for appropriate policing, whether enforced by the LVMPD or City Marshals, treatment for alcohol and substance abuse, or franchise public health services. The City must also work with the County and other community resources to ensure stronger social service safety nets must to ensure people, especially women and children, do not become victims of violence. Further careful examination of facilities, such as group homes and treatment centers

To guide areas in which the City plays roles in public health, the City must consider adoption of a health in all policies

A DAY IN THE LIFE

SMALL CHANGES, BIG OPPORTUNITIES

Jenny Hazlitt, Employee of a Non-Profit Providing Resources to Low Income Individuals

Jenny Hazlitt can tell you stories. Stories about unemployed residents who can't afford the bus fare across town to get to job interviews. Stories about parents who can't apply for–or hold onto– much-needed jobs because they can't find or afford childcare, or because after an extremely time consuming trip across town they get home too late to pick up their child by closing time.

But Jenny is optimistic. She believes the city can make small changes that would open up big opportunities. To receive assistance services in this city, she says, one often must first pay for them–and many simply can't. "How can you end up getting city assistance when you don't even have the money to pay for a birth certificate for your child, or a social security card?"

She'd love to see licensed childcare in at least some low-income apartment complexes. Add to that a 30-day bus pass, say, and an opportunity to receive a voucher for a birth certificate for those for those receiving Medicaid or food stamps.

Jenny envisions a city that makes a bigger effort to reach out to its underserved residents. She points out that Las Vegas has many non-profit resources that most people don't even know about.

Simple marketing and advertising campaigns could make people aware of them—and of town halls where they could have a greater voice in their own quality of life as well as that of Las Vegas as a whole.

statement for key decisions and commit to conducting Health Impact Assessments on proposed CIP projects to increase positive health outcomes and minimize adverse impacts. To accomplish this approach, the City must continue working with SNHD and the medical community to monitor health indicators and develop recommendations to strengthen the delivery of health services to improve respective outcomes, especially for strategies that improve physical activity, smoking cessation, and reducing obesity. Development and ongoing update of a Community Health and Public Health System Assessment, specific to the City of Las Vegas that identifies health care competencies, and capacities of essential service providers. Southern Nevada Strong's collaborative approach at a regional level can help the City monitor and improve health services and programs that improve positive health outcomes and expand access to health care.

LAS VEGANS LACK SUFFICIENT ACCESS TO HEALTH CARE, AND THE NUMBER OF DOCTORS AND NURSES AVAILABLE IS LOW FOR THE CITY AND STATE. UNLV AND THE NEW SCHOOL OF MEDICINE IS ANTICIPATED TO HELP ALLEVIATE SHORTAGES OF HEALTH CARE PROVIDERS

Regular access to health care, including checkups, screenings, and exams can help find problems before they start or find problems early when treatment is often most effective. With fewer doctors, access is delayed or is done through the emergency room, instead of through a primary care physician, adding to costs not only for the patient, but for those that may truly need emergency care. For a variety of reasons, including the City's rapid population growth, Las Vegas has struggled with low resident-to-doctor and low resident-to-registered nurse ratios, which are well below national averages. Important specialty care populations, including those with physical or cognitive disabilities, maternity, pediatrics, and senior care have also had growing demands on the local health care system. The University of Nevada's 2018 Physician Workforce Report indicates that in Southern Nevada, the greatest need is for general practice doctors, especially for family medicine, internal medicine, pediatrics, and psychiatry. Similarly, the number of RN's and advanced practice registerd nurses, while increasing overall, still are desperately needed. To address these issues and reduce the gaps in access to health care due to the lack of health care jobs, three important steps must be taken by the City, which must assert a leadership role, in partnership with SNHD, UNLV, and the health care community:

Train and Retain Primary Care Doctors and Nurses - Until only recently, Las Vegas was the largest metropolitan area without a complete and dedicated medical school and academic program. The University of Nevada School of Medicine previously fulfilled the need for medical education and provided for residency programs, but the new University of Nevada, Las Vegas (UNLV) program has made tremendous strides since its first students graduated with MD degrees in 2017. Initial reports indicated that the new school would yield $1.2 billion annual economic impact and add 8,000 new jobs to the region by 2030. The addition of the UNLV School of Medicine complements UNLV's Schools of Dental Medicine, Nursing, Public Health, and Health Sciences. Anchored within the Las Vegas Medical District in Downtown Las Vegas, the School of Medicine will be instrumental to helping fulfilling many acute and chronic public health outcomes, as well as increasing overall health care capacity. While UNLV's School of Medicine has only just begun, the school itself needs additional funding, faculty, and resources for a complete build-out of the school within the Medical District. New facilities, classrooms, labs, and resources must be committed to ensure early success and future results.

The primary objective of UNLV's programs is to educate, train, and ultimately retain new health care workers – especially an increase in the overall number of new graduating doctors from the UNLV School of Medicine and nurses from the School of Nursing. As the school has started, 60 students will graduate a year, later increasing to between 120-180 per year. The city and UNLV can supplement these results with graduates from other programs, including Tuoro University Nevada, the College of Southern Nevada, Nevada State College, and other private and non-profit training programs and schools. In addition, as discussed in the Economy and Workforce Chapter, dedication of a new state college campus tailored to residents within the City will further buoy UNLV's work, especially if targeted and specialized two and four year degrees enhance nursing and medical workforce development capacity.

Continue Recruitment of Health Care Employees - Even though the public sector oversight of health care is essential, much of the health care system's backbone is through the private sector, which employs thousands of the City's health service providers, including hospitals and medical offices, technicians, and administrative professionals. Overall, health care accounts for more than 12% of the region's total jobs. As a targeted economic sector, health care occupations, including registered nurses, general practitioners, and pharmacists are the among the occupations in highest demand. While the health care sector has been a focus for the City, LVGEA, and GOED, a renewed recruitment and attraction effort must take place to not only fill created jobs, but to supplement the existing industry. The City must forge new partnerships with the private sectors to attract these health care workers, as well as attract graduating doctors and nurses from elsewhere. Because of the previously established relationship with the University of Nevada, this should be an important first step as efforts are made to attract people from other states and across the country.

Dedicate efforts on medical tourism and research– Leveraging the City's hospitality industry may be a key effort to attract new health care providers and be a stepping stone to attracting medical research. The City made great advances with the opening of the Cleveland Clinic and establishment of the Lou Ruvo Center for Brain Health in Downtown Las Vegas. As advances are made and the UNLV School of Medicine matures, opportunities for patients to travel, be treated, and recover in Las Vegas may make the City more attractive, especially with institutions like the Cleveland Clinic. As new

MEDICAL PROFESSIONALS

- Estimated active doctors (MD/DO): 3,845 (Region)
- Estimated active physician assistants: 618 (Region)
- Primary care physicians per 100,000: 108 (NV)
- Primary care physicians per 100,000: 150 (US)
- Doctors per 100,000: 228 (NV)
- Doctors per 100,000: 373 (US)
- Registered Nurses per 100,000: 674 (NV)
- Registered Nurses per 100,000: 854.3 (US)

Department of Health and Human Services; University of Nevada; Nevada Board of Medical Examiners; Nevada State Board of Nursing; Southern Nevada Health District

region's share of doctors and nurses stabilize, the City must focus on recruiting dedicated medical research to Southern Nevada. While Las Vegas must make great advances in other areas just to be competitive, this long-term effort may ultimately yield dividends by attracting more high-paying jobs, increasing the quality of medical care, and improving other livability metrics enumerated throughout this master plan.

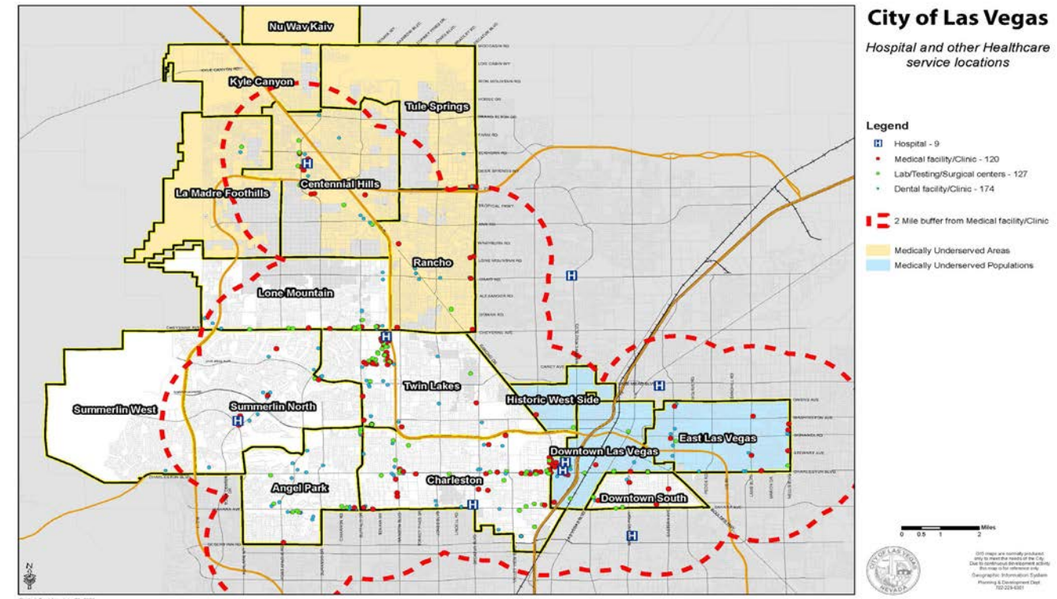
THE LAS VEGAS MEDICAL DISTRICT AND UNIVERSITY MEDICAL CENTER ARE IMPORTANT HEALTH CARE FACILITIES TO THE CITY AND REGION, BUT MORE HEALTH CARE CAPACITY IS NEEDED

Since 1931, University Medical Center (UMC) has served as the County Hospital and has served Las Vegas as its oldest care facility. Through expansive growth and several name changes, UMC has also changed roles, becoming a teaching institution of the University of Nevada in 1986 and providing dedicated burn care, pediatric emergency care, and trauma; it has Nevada's only Level I Trauma Center. In 2009, pediatric services were combined to form the Children's Hospital of Nevada. UMC has grown in importance with the addition of the UNLV School of Medicine and serves as a key partner to train academic medicine.

As the City has grown, so too have its health care facilities and providers, most of which are for-profit entities. Valley Health Systems and Sunrise Health, operate four hospitals within the City, and have constructed and expanded many of the newest hospitals and medical centers over the last two decades. Dignity Health, who runs Southern Nevada's St Rose Dominican faith-based hospitals and clinics, has also branched out to other parts of the valley. Because of Las Vegas' notably unique status of also serving a large non-resident population, the community does have above-average intensive care unit beds available, especially at centrally located hospitals near Downtown Las Vegas and the Strip; however, the region is below average for the total number of hospital beds available. Geographically, hospital location varies; a greater need for both hospital facilities and ICU capacity exists in the underserved northwestern planning areas. Overall, expansions to existing hospitals or the addition of smaller hospital facilities may help increase overall hospital capacity, but may not with access and proximity. The City should therefore ensure at least one major hospital within 4 miles for immediate urgent care, or a 10 minute drive, of every City resident. Additionally, the Joint Commission, a national independent, non-profit accredits and certifies health care organizations and programs based on accountability measures. The Joint Commission accredits and recognizes high-performing hospitals as "Top Performers." As a benchmark for hospital quality, the City must work with each health system and SNHD to ensure each can attain such status.

Geography, demographics, and socio-economics also play a major role in access to care within the City, especially for clinical care. Wide gaps in health care accessibility and laboratories continues to be a challenge, especially for low-income and minority neighborhoods. This has lead the US Department of Health and Human Services to formally designate Health Professional Shortage Areas (HPSA) as well as large portions of the county and North Las Vegas. Most of the planning areas surrounding Downtown Las Vegas are designated as an HPSA for primary care and dental health facilities, while western and northwestern planning areas, which tend to have higher household incomes and access to facilities, are not. West Las Vegas, Twin Lakes, Charleston, Downtown Las Vegas, and East Las Vegas have among the highest concentrations of medically underserved populations. This is especially important from an equity standpoint. Finally, northwestern planning areas are medically underserved due to an overall lack of facilities. Centennial Hills Hospital is the only major medical center for one of the fastest growing areas of the valley.

Not only is geographic access a challenge, but service navigation itself can be daunting, especially for populations in which cultural and linguistic sensitivities may exist. The disparity contributes to lower rates of visits to physicians and dentists. With recent advances in telemedicine, health care access may be somewhat mitigated for some populations, especially for those with good high-speed internet access and smart devices. This innovation does make it easy for doctors to treat and prescribe for the majority of minor conditions or injuries and may have potential for future job growth. Some health care concerns, however, cannot be otherwise treated this way, nor is telemedicine an option for low-income communities; therefore, the continued provision of essential medical, dental, and mental health services at physical locations is necessary, especially within HPSAs.



LOCAL HEALTH INFRASTRUCTURE

- Nevada – 2.1 hospital beds / 1,000 population
- National average: 23.5 beds and 2.7 ICU beds / 10,000 population
- Las Vegas Metro Area: 20.8 beds / 4.1 ICU beds

Source: SNHD

REGIONAL PROJECTIONS

	2019	2050	DIFFERENCE
Population	675,971	984,738	
# Doctors	2,392	3,939	1,547
# Hospital beds	1,983	2,461	478

HEALTHCARE FACILITIES

FACILITY	HOSPITAL BEDS	ICU BEDS
University Medical Center	541	81
Valley Hospital	242	63
Sunrise Hospital (Clark County)	668	84
North Vista Hospital (North Las Vegas)	177	20
Summerlin Hospital	485	74
Mountain View Hospital	408	47
Centennial Hills Hospital	262	20
Dignity Health – St Rose Sahara Campus	0	0
TOTAL	**1,938 CLV/ 2,783 shared**	**389**

HEALTH CARE COSTS MAY CONTINUE TO BE A BARRIER TO HEALTH OUTCOMES AND SERVICE DELIVERY

Health care accessibility is made much more difficult if additional factors are involved, including poverty and if a household is led by a single parent. Socio-economically, health care costs and access to affordable insurance, which has been an ongoing policy debate since the passage of the Affordable Care Act in 2010, can be a limiting factor to health care access. Within the City, adults with insurance fall below the overall national average. Health care costs are also driven higher by those experiencing poorer health. Those reporting good health and regular exercise report between eight to ten fewer visits to the doctor each year.

The City may have less control over national or state health care policy issues, such as Medicare or Medicaid, health care coverage and insurance, or state markets. However, because health care costs have a direct impact on livability, the City can become an advocate for reducing these expenses to its residents. The City does make some efforts to communicate medical and health events and works with SNHD and health care providers, an ongoing, concerted partnership approach must be made to make to address equity in service delivery, especially for vulnerable populations, women, children, and seniors. The provision of interpretation services, simplified public information about eligibility and enrollment for obtaining health insurance or reducing health care costs are all such methods.

INSURANCE COVERAGE

- Population uninsured: 12.5% (Region)
- Adults with insurance: 82.8% (Below 84.9% NV, Below 87.5% US)
- Children with insurance: 93.2% (Above 92.0% NV, Below 94.8% US)
- Private vs Public insurance: 48.8% vs 29.0%
- Medicaid recipients: 17.3% (Above 17.0% NV, Below 19.6% US)

The UNLV School of Medicine's graduates will help to alleviate the community's shortage of doctors. With each new incoming class, the knowledge base established will continue to grow, as well as the overall capacity of the school and the benefiting surrounding health care institutions. Continued development of residencies and fellowships at area hospitals and medical facilities is necessary for the retention of doctors and physicians within the City and Southern Nevada.

IMPLEMENTATION STRATEGIES

- Adopt a Health-in-all-Policies statement and commit to increased partnerships with the Southern Nevada Health District and health care providers to improve key personal health care indicators
  - Utilize Health Impact Assessments for key policies and CIP decisions
  - Implement the recommended strategies throughout the plan with respect to food and urban agriculture, parks, park connectivity, active transportation, transportation safety, violence prevention and reduction, environmental justice as preventative health measures
  - Eliminate nuisances and public health concerns found in the built or natural environment through mitigation and code enforcement
  - As part of larger legislative package, amend the Las Vegas City Charter to enable City Council powers to treat and care for individuals with mental health
  - Sponsor and hold community health fairs
  - Engage the public, local businesses, and health care providers in developing strategies that improve health behaviors related to smoking and obesity
  - Partner to provide interpretation services and simplified public information about health care costs and insurance
- Complete the build-out of the UNLV School of Medicine and leverage the Las Vegas Medical District to ensure training, recruitment, and retention of doctors and nurses to overcome shortages
  - Recruit medical professionals to the community and to identified HPSA's
  - Work with NSHE to dedicate a new state college campus tailored to residents within the City targeted granting two and four year degrees to enhance nursing and medical workforce development capacity.
  - Provide incentives for medical tourism and public, private, or non-profit research organizations
- Develop a City-specific Community Health Needs and Public Health System Assessment addressing personal health Indicators and health care facilities citywide and their accessibility.
  - Construct new full service hospitals and medical centers within the northwestern planning areas
  - Work with health care providers and incentivize private companies to construct clinics, medical offices, and, more hospital bed capacity as needed

IV SAFETY

GOALS

A. Provide high quality emergency services, reduce crime and create safe, friendly communities that elevate social equity.

B. Strengthen resilience to climate change risks, natural and man-made hazards, and extreme events.

C. Minimize flooding risks to prevent damage to property and infrastructure

IV.A SAFETY: PUBLIC SAFETY

NRS 278.160.1(g)

PROVIDE HIGH QUALITY EMERGENCY SERVICES, REDUCE CRIME, AND CREATE SAFE, FRIENDLY COMMUNITIES THAT ELEVATE SOCIAL EQUITY

In multiple surveys and public engagement efforts, public safety, with respect to crime and fire protection, was understandably a major concern for residents and was rated as the highest priority issue confronting Las Vegas for the future.

- Throughout the City, the vast majority of residents believed safety and crime was the top issue – so much so, that it would be a reason not to recommend the City as a place to reside
- Despite the concern, the majority of residents felt very or moderately safe in the City. Most residents felt safe within their neighborhoods, but less so in the City in general. The Charleston, Twin Lakes, Downtown Las Vegas and West Las Vegas planning areas received higher response rates of feeling unsafe and that those areas had relatively high rates of crime.
- A third of residents believed the witnessed crime within their neighborhood, with property crime or vandalism being the most-witnessed type
- The majority of residents felt confident in the police to respond quickly to an emergency or non-emergency call, but those levels of confidence dwindled in the same core planning areas surrounding Downtown Las Vegas. 70% of residents believe LVMPD does a good job of controlling crime in their neighborhood with more than half reporting seeing a police patrol at least once per week
- Respondents confidently believed in the fire department or EMS service being able to quickly respond to an emergency call. From a single-family home to Stratosphere Tower, LVFR must be able to answer any type of call, whether a person in need of aid or a complex structural fire; fortunately, as a top rated fire department, it has the tools it needs to handle all types of emergency response.

These responses are largely based on perceptions of emergency services, crime, and response within respondents point of. When contrasted with actual crime and public safety rates within the City itself, both violent crime and property crime rates have decreased substantially over the past decade, from. Remarkably, major fires and fire prevention efforts have yielded positive results despite receiving more than 100,000 annual calls for service.

As the City has grown, so too has the need for adequate police service and fire protection coverage, through efforts to fund more sworn police officer and marshal positions to adding new capital improvements. Over the past decade, the Nevada Legislature has authorized, with Clark County Commission approval, sales tax increases to fund more police officers in the midst of economic recovery from the Great Recession and record visitation. Another boost in police funding was authorized during a special legislative session that funded expansions of the Las Vegas Convention Center and construction of Allegiant Stadium. New additions to fire and police capacity will continue to be needed, not only within existing areas that will see population growth due to infill and redevelopment but growth in northwestern planning areas.

OUTCOMES

- Maintain Fire and Rescue Department's ISO Class 1 rating and CFAI accreditations.
- 90% of response times are in compliance with NFPA standards from dispatch to first response.
- LVMPD maintains a ratio of 2 officers per 1,000 residents or better.
- LVMPD and Las Vegas City Marshals achieve maintain CALEA accreditation.
- Overall violent crime rates improve to a minimum of 5.5 homicides, 400 aggrevated assaults, 70 forcible rapes, and 2,500 property crimes per 100,000 residents annually

The City Council has also consistently made public safety as its leading strategic priority. Protecting public safety is one of the leading enumerated authorities for which the City Charter and LVMC empower the Council to:

- Adopt police ordinances
- Organize the fire department
- Regulate or prohibit the storage and transportation of hazardous materials
- Adopt a fire code

The Planning Department's Code Enforcement division also assists with neighborhood issues and code compliance. Indirectly, code enforcement helps improve the upkeep and physical appearance of commercial properties and neighborhoods that improve overall conditions. To enforce its ordinances and zoning provisions, the City Council can authorize civil penalties and liens for failure to maintain properties.

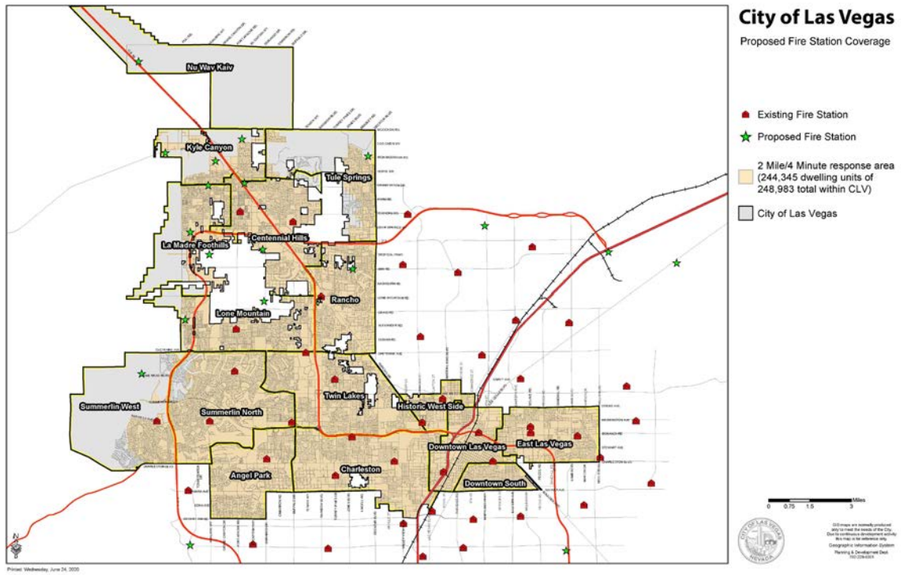
Two key departments provide for the City's public safety services:

- The Department of Public Safety includes Las Vegas City Marshals that patrol city buildings, parks, and facilities, and operates the City's Detention Center. Public Safety also provides Animal Control.

KEY ACTIONS

- Continue to adequately train, equip, and fund public safety staff and officers to remain a trusted resource that will quickly respond to a call for service
- Construct the recommended public safety capital projects to provide adequate police and fire protection coverage when need is warranted
- Improve built environment safety and adopt a safe communities strategic plan with an approach that balances property and violent crime prevention with community needs
- Increase fire prevention and emergency response efforts
- Develop Safe Communities strategies for planning areas to facilitate an understanding of public safety concerns

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Well trained first responders respectfully police all parts of the city equitably and justly in a manner that protects and serves all members of the community	The availability of first responders to any emergency and to address community hazards is a necessity for community resilience	Quick response from City and regional Emergency Medical Services staff ensures members of the public can get help when they need it	Public safety is the bedrock of Las Vegas, ensuring residents, businesses, visitors, property, and infrastructure are secure and protected from violence	Forging unique partnerships between agencies and branches of government allows opportunities for to avoid re-entering the criminal justice system



- Las Vegas Fire & Rescue (LVFR) is an ISO Class I-rated fire department and is a leader in providing superior fire protection. The department is comprised of multiple divisions to provide fire suppression, fire prevention, and medical services. Supporting LVFR paramedics are City authorized franchises for ambulances and emergency responders

The Las Vegas Metropolitan Police Department (LVMPD) provides regional law enforcement and policing for both the City and Clark County, covering more than 8,000 square miles of service territory. After years of deliberation about the cost and duplication of functions between city and county law enforcement, the Las Vegas Police Department and Clark County Sheriff's Department were consolidated and merged to form the Las Vegas Metropolitan Police Department in 1973. Governed by NRS 280, LMVPD is overseen by the Sheriff of Clark County and is jointly funded by the City and County, but neither have any direct organizational control of the agency, aside from fiscal management and affairs.

Supporting the City, LVFR, and LVMPD for public safety and hazard mitigation, prevention and response efforts are a number of other local, state, and Federal law enforcement agencies, including other municipal police and fire departments, Nevada Highway Patrol, and fire suppression from Nevada Division of Forestry and Bureau of Land Management.

The Las Vegas Municipal Court is the judicial branch of the City, in which the City's municipal judges have jurisdiction over all municipal legal affairs, as well as any offenses and misdemeanors committed within or against the City. In addition to overseeing the legal and civil aspects of the City, the City Attorney's Office prosecutes violations of municipal code and statutes taking place within City limits. Other Federal, district, and justice courts, as well as the Nevada Court of Appeals are located within Downtown Las Vegas' Civic and Business Distrct, many of which are within the Regional Justice Center.

PUBLIC SAFETY PROJECTIONS

	2019	2050	DIFFERENCE
Population	675,971	984,738	
# Public Safety Employees (Actual)	1,164		
# Public Safety Employees (Required)	1,014	1,477	463
Actual square feet	275,753		
Required square feet	152,093	221,566	-54,187

Source: City of Las Vegas

LAS VEGAS FIRE AND RESCUE PROVIDES SUPERIOR FIRE PREVENTION AND SUPPRESSION. IT MEETS ITS CURRENT DEMAND FOR BUILDINGS AND FACILITIES, BUT MORE CAPACITY WILL BE REQUIRED AS THE CITY'S POPULATION GROWS TO ENSURE STANDARDS ARE MET

Las Vegas Fire and Rescue has approximately 700 employees who work in a variety of capacities and locations, ranging from firefighter and emergency medical technicians to fire engineers and communication specialists. These divisions are responsible for planning and programming for fire prevention, enforcing fire safety standards, fighting fires, managing hazardous materials, and investigating major fires. LVFR also provides an emergency paramedic service, technical rescue team, hazardous materials unit, bomb squad, and the only Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) unit for all of Southern Nevada, serving all jurisdictions and several counties. New recruits and the City's firefighters train at the City's Fire Training Center in East Las Vegas. In addition to City response, LVFR responds to emergency incidents in areas of unincorporated Clark County surrounding the City, including around the Lone Mountain and Tule Springs planning areas. Through established automatic aid agreements with the County and City of North Las Vegas, LVFR may also respond based on capacity and incident need.

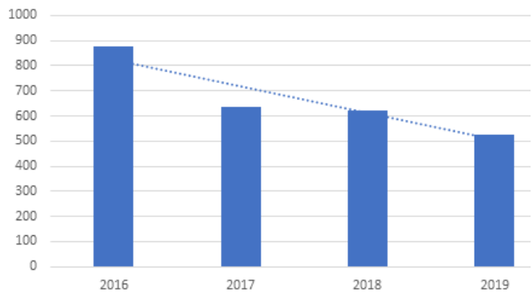
Fire department capabilities and response times are important indicators of the capacity to respond to an emergency. The National Fire Protection Association's (NFPA) standard to deploy fire suppression or paramedics are important benchmarks, for which the first apparatus must arrive within 4 minutes of dispatch, with other assigned units arriving within eight minutes, plus a minute for turnout. The City currently has 22 fire stations and can adequately meet this standard, providing coverage to 88% of all City dwelling units. Many of the newest stations were planned in conjunction with how residential and commercial areas are expected to develop over time. Population growth, density, and development each affect the department's ability to serve an area effectively. Higher density areas require more equipment and personnel to service a greater number of residents, tourists, and structures. Higher density areas also represent a greater risk for fire spreading due to the close proximity of units and buildings. The continued growth anticipated in western and northwestern areas of

the City will require at least 15 new fire stations to maintain adequate coverage for NFPA standards and cover more than 98% of all existing and future dwelling units. While infill stations have not been planned, it is anticipated that the city core and surrounding mature areas will also see an increase in density through infill development, transit oriented development, and the addition of higher density residential units in the downtown core. This may require several replacement fire stations or expansions to handle new capacity or expanded capabilities.

In 2018, LVFR responded to more than 105,000 calls, including 4,800 fires, 12 multi-alarm fires, and 95,000 EMS responses, 28,000 of which resulted in a paramedic transport to a local facility. Unfortunately, $4.5 million worth of property was damaged, and five fatalities were reported. Regardless of the circumstances, Fire and Rescue must continue to be adequately trained, equipped, and funded to remain a trusted resource that will quickly and adequately respond to calls for service.

Overall calls for fires have decreased over time due in large part to improvements in technology and uniform standards for the Fire Code, such as the requirement for fire sprinklers and fire suppressions systems in new residential construction. This, however, is offset by LVFR's overall call for service rates, which have increased over time. Many of these calls, however, tend to be non-emergencies or lower severity calls that likely do not warrant a full dispatch of a unit. In order to enhance community safety and well-being and increase resource availability, LVFR must properly align the appropriate emergency response, with an overall focus of decreasing calls for service through call prioritization efforts. Where possible, LVFR must further develop mobile resources, community paramedics, and focus efforts on non-emergency (311) call lines to decrease unnecessary dispatches of units. The nursing triage program within

VIOLENT CRIME RATE (PER 100,000)



CRIME RATES WITHIN LVMPD JURISDICTION

	2016	2017	2018	2019
Violent Crime	876	638	621	524
Homicide	10.3	12.6	7.5	5.0
Forcible Rape	77.6	82.2	100.9	85.2
Aggravated Assault	466.1	325.4	344.8	308.5
Property Crimes	3,332.0	3,036.1	2,910.2	2,733.5

Source: LVMPD, FBI

the 911 communication center has been an example of an innovative effort to route suspected non-emergency or lower severity calls instead of dispatching a full EMS unit.

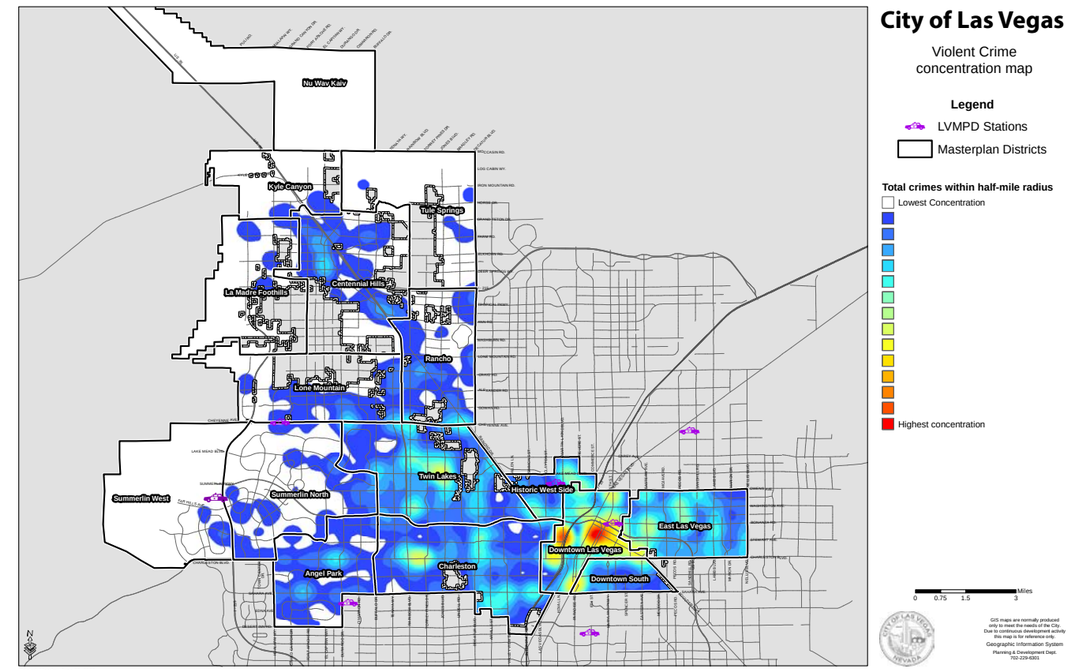
To increase the dependability of Fire and Rescue, while increasing its efficiency and effectiveness, LVFR must also focus on reducing personal and community risks, improving community knowledge, and upgrading the built environment. Many of these efforts have been effective and are well underway already, but only through increasing prevention resources toward prevention will the overall benefits be realized. Use of social media and public outreach have also been an effective tool to educate the public on a number of issues. These education campaigns provide the public with a better understanding of emergency situations. Such campaigns include fire and hazard mitigation - including when to dial 311 or 911, smoke detector and battery maintenance, CPR classes, in-school programs and demonstrations, and the availability of publicly accessible automated external defibrillator units.

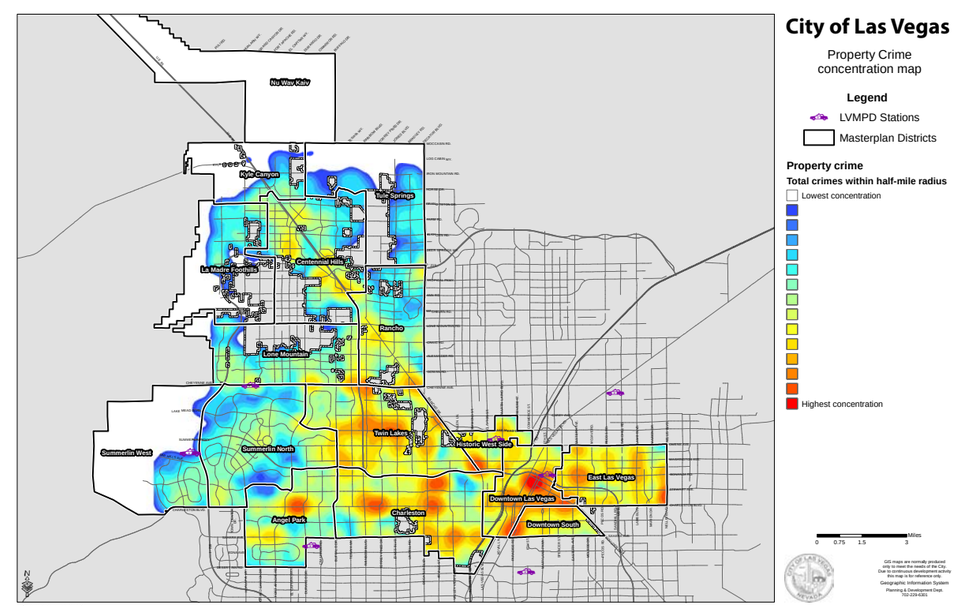
With respect to fire prevention and inspections, approximately 27,000 inspections were conducted in 2018. Because older buildings are more vulnerable and may have higher fire risks due to dated – or sometimes non-existent – standards, assessments of older building stock and multi-family residential units of all types must be conducted to identify and mitigate hazardous conditions. While some of these buildings will ultimately be eliminated through renovations, upgrades, or redevelopment, increasing targeted inspections for the most vulnerable structures will ultimately lead to better enforcement and prevention of loss of life and loss of structures to fire.

Over time, prevention efforts will require the regular, periodic updates of the Fire Code to make sure standards are met. This requires ensuring standards are not overly restrictive and prohibitive of certain means or types of construction and architecture, building heights or sizes, or unreasonably costly. Because of fire prevention improvements, building engineering and wider use of fire sprinklers and suppression systems, the need for new fire stations in growth areas may not be immediately necessitated. This may mean in some cases deferring new station construction or scaling back design to focus each new station as a first responder station that is paramedic and community focused. While adequate coverage must still be maintained, new fire stations of the future, as well as any infill fire stations or expansions, must be reimagined and designed to maximize paramedic response and right-sized for firefighting needs. As a community facility and resource, these stations should be built as such and aligned with the overall identity of the planning areas for which they serve.

AS CRIME RATES CHANGE OVER TIME, LAW ENFORCEMENT MUST TAKE A PROACTIVE, COLLABORATIVE, AND COMMUNITY ORIENTED APPROACH THAT IS INCLUSIVE AND DELIBERATE

As has been nationally observed, tremendous pressure has been placed on law enforcement to solve community problems. Low graduation rates, mental illness, funding for drug rehabilitation, housing conditions, and a wide range of other issues are factors police encounter and with which they contend, however do not have the capacity, nor may it be appropriate, for them to address. Due to a wide range of factors, crime rates and locations can vary widely; some crimes are those of opportunity, while others can be attributable to socio-economic conditions, the built environment and urban design, the quality of housing and neighborhoods, the provision of social services, and issues





related to mental health. In 2010, as Las Vegas was feeling the greatest effects of the Great Recession, reported crime rates were somewhat elevated on a per person basis. During this year, per 100,000 residents, there were:

- 7.6 homicides
- 46.95 incidents of rape
- 567.88 aggravated assaults
- 3,112.28 incidents of property crime

By 2016, rates of both reported violent and property crimes dramatically improved, decreasing each year to present. A number of factors may have contributed to the overall decline in these rates, such as improving economic conditions, approval of the "More Cops" sales tax, or changes in policing standards and policies. Overall, the clear decline in crime rates over time is a remarkable accomplishment that can be further built upon. However, due to Las Vegas' high profile and unique attributes, the City faces additional concerns including domestic and foreign terrorism, human trafficking, sex trafficking, and illegal drugs.

Public outreach has indicated an expectation of equality, inclusion, and acceptance within the City; this extends to the law enforcement officers that patrol the City, whether under the City's Department of Public Safety or LVMPD. As a guiding principle of this plan, equity requires the City's departments and regional agencies work together to ensure the fairness of policies, programs, and services. The other goals throughout this plan and the provision of law enforcement for public safety, must coalesce. Housing should be inclusive of all incomes. The mix of businesses and community services in the immediate vicinity should be diverse. Urban space must be thoughtfully designed. Transportation must account for all modes (automobile, transit, bicycle, and pedestrian). The lack of any of these can contribute to underlying public safety risks. As indicated, geographic patterns persist. Indicated "hot spots" do show areas where calls for service occur with greater frequency, in which the simple presence of law enforcement can help reduce crime without displacing it to other neighborhoods and increasing positive presence from those that live within those areas. Additionally, when overlaid with other social factors discussed within this plan, there is a clear indication of the need for additional neighborhood interventions, public assistance, and investment to improve the overall quality of life in the areas as a whole.

This does not dismiss other concerns about the quality and methods of local law enforcement. Throughout the City's history, there have been past struggles and concerns over use of force, officer involved shootings, and treatment of people on the basis of race. To address these critical concerns, the Department of Justice investigated LVMPD's use of force and officer involved shootings after several high-profile incidents and issued 75 findings and recommendations for reform in 2012 that were implemented in ensuing years. The provision of body cameras, the uses of de-escalation, and rigorous ongoing training are all examples of measures that can, and continue to be used. To ensure ongoing quality, transparency, and accountability, the City Council must resolve to work with the Sheriff in an effort to train all officers and personnel and continually reform and improve policing. It is important that the City and LVMPD remain vigilant in protecting the community from crimes of all types.

Therefore, the City must sponsor "Safe Communities" strategies that can facilitate a better understanding of community safety and prioritize equitable actions that reduce violent and property crimes while building trust between LVMPD's officers and residents. Due to the City's unique attributes and structure of LVMPD, community public safety will require new attempts at interagency collaboration. The City, in partnership with LVMPD and the County, must meet with each planning area to assess and develop a strategy that includes:

- Engagement and participation from the City Council, heads of City departments and agencies, and officers from LVMPD area commands
- A uniting vision for a hopeful, violence free community
- An interdisciplinary structure for collaboration that includes public, private, and community stakeholders with appropriate staffing and resources for implementation.
- A specific assessment of planning area needs and current status, identification and prioritization of community risk factors and data.
- Community engagement throughout the process, including from youth, adults, faith-based organizations, the business sector, and victims of crime or violence
- Identification of programs, best practices, policies, and recommendations to prevent, intervene, and enforce.
- Funding for implementing recommendations.

To assist in this community-wide endeavor, the City's Department of Public Safety must be the community liaison to facilitate this approach and forge a closer bond with LVMPD. Currently, Las Vegas City Marshals are peace officers of limited jurisdiction. Despite this limitation, the marshals provide a valuable essential public safety service to support the City. A future opportunity may exist for the City to enable reasonable expansion of their scope to work alongside LVMPD and with members of the community. Furthermore, the City must join LVMPD, the County, and the State to examine how to make proper police reforms that carefully balance the community's desire for public safety, constitutional rights, and equity.

CODE ENFORCEMENT AND ENVIRONMENTAL DESIGN STANDARDS CAN IMPROVE NEIGHBORHOOD SAFETY AND PHYSICAL UPKEEP

Crime can have a debilitating effect on livability, especially when borne out of poor urban design and built environment conditions. While redevelopment and infill efforts may address blighting issues that occur over the course of time, common strategies to improve overall safety are to improve the physical appearance and attractiveness and upkeep of neighborhoods and by redesigning the built environment to have "eyes on the street."

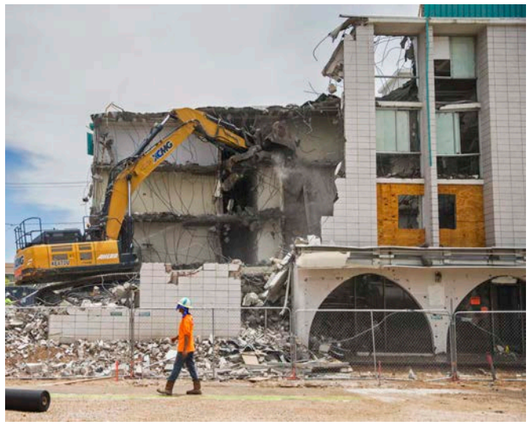
The City's Code Enforcement division helps keep neighborhoods and buildings safe and clean through the enforcement of LVMC and the City's Title 19 Unified Development Code. Enforcement officers often encounter a number of neighborhoods, for which the City has authority to protect public health and safety and may assess fines, civil penalties, or in the most dangerous cases, enforce the abatement of chronic nusiances, including building closure or demolition. They also play an important role in responding to common complaints and nuisances that may be generated by residents or businesses, such as:

- Dangerous buildings
- Waste, junk, outside storage, inoperable vehicles, or illegally parked vehicles on property
- Substandard housing and minimum housing upkeep
- Walls, fences, and non-permitted structures that have been illegally constructed
- Vegetation overgrowth, including the growth of weeds and noxious plants
- Unsecured swimming pools, including those with stagnant water
- Non-permitted signage
- Complaints of illegal squatters

Through proactive and well funded code enforcement, the City can ensure dangerous houses and buildings are brought up to code or removed, neighborhoods appear clean, threats to public safety are minimized, and ultimately mitigate and avoid conditions that may invite property or violent crime.

The principle of crime prevention through environmental design (CPTED), is the process of designing the built environment to reduce the opportunity for, and fear of, stranger-to-stranger predatory crime. It is implemented electronically, using mechanical or technological products or techniques, through building layout and architecture, and organizationally with physical presence. CPTED's main concepts are:

- Defensible space: a range of mechanisms and design features that bring the environment under the control of its residents.
- Natural access control: decreasing opportunities for crime by denying access to crime targets and creating a perception of risk in offenders.
- Natural surveillance: features that maximize visibility of people, parking areas, and building entrances to make intruders easily observable.
- Territorial reinforcement: promoting features that define property lines and distinguish private spaces from public spaces.



- Management and maintenance: operational and management concepts that maintain buildings and facilities in good working order.
- Legitimate activity support: use of natural surveillance, lighting, and design that clearly defines the purpose of the structure or space.

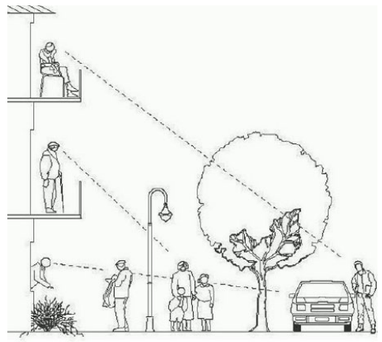
Site design that incorporates CPTED concepts and strategies can make a difference in community safety. Good design that is in place at the beginning can negate the need for other, potentially more expensive deterrents to crime that may need to be added later as deficiencies in design become problems. As such, as the Planning Department conducts site development reviews, it must consider CPTED principles as it reviews development proposals, especially for infill and redevelopment projects and those occurring in the City's new transit-oriented place types. Furthermore, the Departments of Building and Safety and Public Works must incorporate CPTED into their reviews and design standards for public buildings and facilities.

IMPROVED SWORN OFFICER STRENGTH AND CAPACITY WILL PREPARE THE CITY FOR FUTURE GROWTH

There are more than 600 LVMPD officers assigned to the five LVMPD area commands serving the City. Overall, LVMPD meets its stated goal of funding and two police officers per 1,000 residents across the county, while also devoting officers to high visitation areas such as the Las Vegas Strip, the Convention Center, and Downtown Las Vegas. The number of uniformed police officer positions by area

"CPTED" STRATEGIES

- Eyes on the street and natural surveillance
- Provide clear border definition of controlled space
- Provide clearly marked transitional zones
- Relocate gathering areas
- Place unsafe activities in safe locations
- Designate the use of space to provide natural barriers
- Improve scheduling of space



While CPTED principles are designed to help discourage crime, in practice this strategy can reinforce social, racial and cultural divides in our cities, in part by fostering behavior that anyone suspicious is made to feel uncomfortable. Consider reframing less about implementing defensible space and instead commit to asking critical questions and engaging diverse groups to understand safety concerns and design implications

command within City boundaries do not necessarily align, but should meet the current funding formula. LVMPD does not necessarily align either personnel or area command boundaries with those of the City or on tax revenue generation but instead align resources based. In addition to sworn officers, LVMPD is also backed by investigative and support positions, administrative functions, and corrections officers.

Over time and as the City grows and sees increased visitation, LVMPD will require an increase in resources devoted to new growth areas, particularly within the northwestern planning areas. Because of this growth, at least one new area command and LVMPD substation is likely to be needed within the next thirty years, as well as at least 300 new sworn officers. While devotion of those officers will again likely be based on community needs, the City must work with LVMPD and the Sheriff on regular sharing of data to for Safe Communities strategies. Similarly, the number of City Marshals and will need to increase as new parks and facilities are added that are subject to their jurisdiction. If the scope of their service is expanded, Marshals will also play an instrumental role in working with the community. Consideration must also be given to expanding or replacing the City's Detention Center, the 1,050-bed city jail which houses inmates arrested on misdemeanor charges. Because expansion space may be limited and the Downtown Access Project may warrant I-515's (future I-11) right of way widening, a new facility may be required in the future.

THE CITY'S SPECIALTY COURTS ARE INNOVATIVE EFFORTS TO HELP KEEP PEOPLE OUT OF THE CRIMINAL JUSTICE SYSTEM

Nevada has a total jail and prison incarceration rate of 763 per 100,000, considerably higher than the national rate of about 700 per 100,000 residents. According to the Nevada Department of Corrections, more than 42,000 Nevadans, many of which are in Southern Nevada, are within Nevada's criminal justice system, including about 19,000 on parole or probation, 13,000 in state correctional facilities, and 7,000 in local detention centers. Generally mirroring national trends, the vast majority of these groups are men and are typically younger, less than age 40. A significant racial and ethnic disparity also exists, with African Americans being incarcerated or otherwise in the criminal justice system at nearly four times the rate as whites and Latinos. While overall crime rates have been falling, Nevada's inmate population has been increasing. These troubling trends and rates have been lingering for decades and are part of larger societal issues the nation is currently confronting and addressing at the state and Federal levels. Recent efforts to release non-violent offenders, decriminalizing offenses, and expunging prior felonies have been taking place nationally, including within Nevada.

At the City level, the City's Municipal Court, which will move from the Regional Justice Center to its new courthouse adjacent to City Hall, has jurisdiction over criminal misdemeanors and infractions against Las Vegas Municipal Code. The City's judges oversee specialty court programs that are problem-solving courts established and designed to address underlying causes of criminal activity. Ultimately, these courts are designed to promote individual responsibility and accountability that keep people out of jail or from being repeat offenders, provided they meet the conditions of the program and successfully complete the amended sentence. Closely coordinated between the law enforcement agencies, city attorneys, and other judicial administrators, specifically developed specialty courts have helped hundreds of people turn their lives around. Examples have include the City's "YO" Court, which focuses on young offenders, the Mental Health Court, designed for people with diagnosed mental health disorders, and the "HOPE" Court which focuses on habitual offenders.

Even as crime rates decline, the constitutional need for fair, speedy trials, appropriate sentences and punishments must remain a priority for the court system, whether at the City's Municipal Court, or at other district courts serving the City. To the extent that the City can create or encourage specialty courts or judicial reforms, it must to ensure equitable justice.

	2019	2050	NEED
Population	675,971	984,738	
# LVMPD Officers (Approximate CLV assigned area commands)	616		60
# LVMPD Officers (CLV area commands - required for 2 officers / 1,000 residents)	676	985	309

PLANNING AREA	PUBLIC SAFETY FACILITY AND SERVICE NEEDS BASED ON 2050 POPULATION
Angel Park	Adequately served, but may require additional community policing based on calls for service
Centennial Hills	Low need. Requires new fire stations (Station 148); police service and area command
Charleston	Adequately served, but may require additional community policing based on calls for service
Downtown	Adequately served, but may require additional community policing based on calls for service; new municipal court
Downtown South	Adequately served, but may require additional community policing based on calls for service
East Las Vegas	Adequately served, but may require additional community policing based on calls for service; Possible replacement of Detention Center
Kyle Canyon	Low need, due to long term development buildout and master planned community service provision. Requires new fire stations (Stations "I," 49); police service and area command
La Madre Foothills	Low need, due to long term development buildout and master planned community service provision. Requires new fire stations (Stations "G," 142); police service and area command
Lone Mountain	Adequately served; new fire station (Station 145)
Nu Wav Kaiv	Low need, due to long term development buildout. Requires new fire station, police service and area command
Rancho	Moderate need, new fire station (Station 109, possibly one new in southern area)
Summerlin North	Adequately served
Summerlin West	Low need, due to long term development buildout and master planned community service provision. Requires new fire stations (Station 147, possibly one new in western growth area)
Tule Springs	Low need, due to long term development buildout. Requires new fire station (Station 149, possibly one new in southern area); police service and area command
Twin Lakes	Adequately served, but may require additional community policing based on calls for service
West Las Vegas	Adequately served, but may require additional community policing based on calls for service

IMPLEMENTATION STRATEGIES

- Continue to adequately hire, train, equip, and fund public safety staff and officers to remain a trusted resource that will quickly respond to a call for service.
  - Fund and hire new firefighters, Marshals, and LVMPD officers to ensure the City's ratio meets standards
  - Work with LVMPD's Fiscal Affairs Committee on dedication of resources based both on need and appropriate coverage
  - Work to maintain accreditations for public safety agencies and departments
- Increase fire prevention and emergency response efforts
  - Align to the appropriate emergency response, with an overall focus of decreasing calls for service through call prioritization efforts to decrease unnecessary dispatches of units.
  - Develop mobile resources, community paramedics.
  - Make periodic updates of the Fire Code that balance fire safety standards that protect occupant safety but do not impose additional unreasonable costs to development
  - Increase inspections of older building stock and multi-family residential units of all to identify hazardous conditions.
  - Continue targeted public education and social media campaigns for fire prevention and safety
  - Ensure AED access in public spaces
- Construct the recommended public safety capital projects to provide adequate police and fire protection coverage when need is warranted, including:
  - Recommended fire stations, especially in growth areas to meet the established response times
  - Monitor density and growth to anticipate station response needs
  - Retrofit existing stations and upgrade apparatus and equipment
  - Ensure new stations are designed to maximize paramedic response and right-sized for firefighting needs.
  - New area commands, including at least one serving northwestern planning areas
  - Assess the feasibility to expand, renovate, or construct new Detention Center space to accommodate current and forecasted staffing, as well as the current and future inmate populations and joint facility use, with consideration of freeway corridor expansion
- Improve built environment safety and adopt a safe communities strategic plan with an approach that balances property and violent crime prevention with community needs
  - Consider CPTED principles during site development reviews, especially for infill and redevelopment projects and those occurring in the City's new transit-oriented place types
  - Incorporate CPTED into their reviews and design standards for public buildings and facilities.
  - Increase proactive code enforcement efforts to enhance community aesthetics, reduce unsafe conditions, and abate nuisances
  - Exchange data between LVMPD and other public safety agencies to track trends and identify emerging community needs
  - Work with the Sheriff and LVMPD to incorporate community policing and procedural justice into police operations to build community trust
  - Implement violence prevention programs and strategies to address community-identified risk and protective factors
  - Educate community members about public safety and law enforcement programs and strategies
  - Develop partnerships with local agencies, nonprofit organizations, schools, and residents to implement public safety strategies
  - Develop programs to support at-risk families and youth that prevent violence
  - As part of a larger legislative package, request expanded scope for City Marshals
  - Review LVMC to reform misdemeanor violations and penalties, as necessary
  - If necessary, evaluate if additional City Council oversight is required for public safety needs
- Implement specialty judicial programs and alternative sentencing that ensures justice while reducing detention rates and provides new pathways for individuals to keep them out of the criminal justice system.

SAFETY: HAZARDS

NRS 278.160.1(g)

SEE ALSO:
Clark County All Hazards Mitigation Plan

STRENGTHEN RESILIENCE TO CLIMATE CHANGE RISKS, NATURAL AND MAN-MADE HAZARDS AND EXTREME EVENTS

Las Vegas is vulnerable and at risk from both natural and man-made hazards. As outlined in Resolution R-32-2017, the City of Las Vegas must incorporate "community resilience goals, objectives, and strategies" into this master plan. The City currently engages in hazard and resilience planning, and mitigation and adaptation efforts in various ways to reduce community risks, vulnerabilities, and costs from future emergencies.

As a guiding principle of the plan, resilience is the capacity to absorb stresses and maintain function in the face of hazards, and adapt, reorganize, and evolve into configurations that improve the systems and operations; it is comprised of mitigation, adaptation, response and recovery. Short-term emergency response needs must be balanced with long-term preparedness and recovery capacity, all of which address existing threats to human life and property. Appropriate hazard planning and preparedness also requires consideration of how the city adapts to recurring hazard events and changing circumstances, stronger and more resilient so subsequent events are less disruptive or and damaging, and ensures that recovery and response efforts are equitable across all communities and planning areas:

- Mitigating hazards focuses upon the City and region's preparation for disasters and long-range planning for post-disaster recovery. It includes actions that can reduce the severity or intensity of a hazard's impact and begins with preparation, avoidance, and minimization. Strong and robust mitigation efforts can reduce the need and expense of response and recovery; mitigation planning ultimately aids agencies at all levels in saving lives, property, and money, speeding recovery from hazards, reducing risks and vulnerability from future disasters, improving community health, safety, and welfare.
- Adaptation entails modifying the natural or built environment to make it more suited to changed or changing conditions and situations. Adaptation can also mean changes in community behavior that better safeguard human and environmental health when faced with the stresses imposed by hazards. It also addresses ongoing and long-term hazards, including climate-oriented threats to human life and property.
- Response is the ability to effectively protect public safety, health, and well-being from a hazard, whether immediately or over time.
- Recovery facilitates repair, replacement, and improvement, ideally to a more resilient condition than before the disaster.

Resilience often focuses on the region's physical characteristics; it must be considered in every infrastructure and capital investment made by the City, as it is critical for siting, specifications, and other factors for cost, maintenance, or feasibility. However, social and economic resilience, including public health, also has an impact on recovery.

While other plans, including the City's Emergency Operations Plan, Continuity of Operations Plan, and the Clark County All-Hazard Mitigation Plan, this plan establishes general hazard guidelines and provides a framework to navigate these challenges. Implementation of these plans in a consistent manner will be a major outcome of this Plan by providing an opportunity to integrate all types of hazard mitigation and adaptation planning for both current and future hazards. The plan:

- Identifies resources, both City and regional stakeholders and assets

OUTCOMES

- By 2050, no homes or critical infrastructure are located in high-risk hazard prone areas, unless appropriate mitigation, prevention, or adaptation measures are taken.
- Earn accreditation by the Emergency Management Accreditation Program (EMAP) by 2025.
- Percentage of residents living in high risk areas reduced over time.

ASSESSED HAZARDS & RISK

- CLIMATE CHANGE: Drought – VERY HIGH
  Addressed by Water Goal
- CLIMATE CHANGE: Extreme Heat – VERY HIGH
  Addressed by Urban Foresty goal
- CLIMATE CHANGE: Severe Storms and Flash Flooding – HIGH
  Addressed by Flooding Goal
- Civil Disobedience, Riots, and Social Disturbances - MODERATE
- Dam Failure – VERY LOW
- Earthquakes and Seismic Activity - HIGH
- Hazardous Materials - HIGH
- Infectious Disease - HIGH
- Infestation - LOW
- Subsidence - LOW
- Terrorism – VERY HIGH
- Wildfire – LOW

KEY ACTIONS

- Develop hazard prevention, mitigation, vulnerability and recovery frameworks that apply to hazards
- Continue infrastructure investments for natural hazards with greatest vulnerability, especially drought, flooding, and seismic activity.
- Prepare for long-term, seasonal hazards such as extreme heat by investing in cooling infrastructure and developing urban design standards that mitigate the urban heat island effect.
- To lessen economic severity of all types of hazards, develop a comprehensive economic recovery framework that's context sensitive and adaptable to a variety of hazard scenarios.
- Increase funding reserves and rainy-day funding to ensure adequate resources are available for emergency operations, preparedness, and response.

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Addressing natural and man-made hazards will reduce risks for the City's most vulnerable populations and neighborhoods, including low income, ethnic and racial, and elderly communities.	Adaptation to community hazards increases the capacity of the community and builds environmental and socio-economic redundancies.	Preparing for hazards ensures community health and well-being, mitigating loss of life, and ensuring the health care system is not shocked nor stressed.	If well-prepared for shocks and stresses resulting from community hazards, properties will be protected and overall costs will be kept low.	As the economy diversifies, new techniques, engineering, and innovations will help the City prepare for specific hazards and impacts.

- Includes a vulnerability assessment.
- Provides strategies for implementation and evaluation of progress, ranging from specific projects to changes in operations, along with a strategy for keeping other emergency plans current through revisions.

To address future stresses and shocks from hazards, there is a pressing need for modernization and long-term investments that will likely yield a safer, healthier, and more resilient Las Vegas. Local businesses and private service providers, including hospitals and health care providers, ambulance and EMT franchisees, disaster relief organizations, and other commercial entities frequently play a key role in providing necessary resources and aid. These are an important component in not only an emergency response effort, but also for preparedness and recovery. A variety of city, regional, state, and Federal agencies help mitigate, adapt to, and respond to hazards, as well as engage in recovery efforts.

A number of City of Las Vegas departments play roles in hazard mitigation and response:

- The Office of Emergency Management (OEM) coordinates preparedness efforts for major emergencies or disasters affecting the city, including from its Emergency Operations Center (EOC), and provides training for the community. It coordinates directly with the state Office of Emergency Preparedness and other county and local emergency services.
- The Office of Communications has been essential to notifying the public and media through a variety of means; clear and concise communication is essential in the event of an emergency.
- The Department of Public Safety, which includes the Las Vegas City Marshals, patrol city buildings and facilities, as well as operate the Detention Center.
- Las Vegas Fire and Rescue provides fire suppression, emergency medical response, as well as fire prevention and education, and fire marshal services (fire code). It also houses two important specialty units: a hazardous materials team and a chemical/biological/radiological/nuclear/explosive (CBRNE) unit.
- Development Services departments, including Building and Safety, Planning, and Public Works ensure the structural safety and stability of buildings, enforce the building code and LVMC, and construct, maintain, and operate roadway, flood control, and wastewater treatment infrastructure.

State and regional service providers can assist with coordination and response; they can also be the key to unlocking Federal aid, disaster funding, and resources in the event of an emergency:

- Clark County, which prepared the most recent Multi-Jurisdiction Hazard Mitigation Plan in 2018. This plan similarly identifies the hazards facing the region and mitigation strategies.
- Southern Nevada Health District
- Las Vegas Metropolitan Police Department
- State of Nevada agencies and departments, including the State Department of Public Safety, Division of Emergency Management, the Nevada National Guard, the Nevada Department of Health and Human Services, the Nevada State Public Health Lab, as well as smaller offices, bureaus, and academic institutions provide statewide services to help prepare for, respond to, and recover from a hazard.
- A diverse array of Federal agencies, particularly:
  - The Justice Department and US Department of Homeland Security, which includes a number of Federal law enforcement and justice agencies, including the FBI, DEA, ICE, ATF, and US Marshals, all of which are dedicated to the investigation and enforcement of man-made hazards. The Southern Nevada Counter Terrorism Center is a multi-agency fusion center that can respond to all types of incidents; the center brings together local resources and intelligence with national data and threat assessments in an effort to ascertain foreign or domestic terrorism plots or activities.
  - FEMA coordinates responses to disasters when requested by state and local authorities and is a key provider of resources and funding. FEMA also established the National Incident Management System (NIMS) as a nationwide, comprehensive system that provides standard terminology, organizational structures, and procedures to enable federal, state, local, and other responders to effectively communicate and work together during all-hazards emergency events.
  - The Centers for Disease Control provides national expertise on epidemiological hazards to public health.

EMERGENCY PREPAREDNESS AND HAZARD MITIGATION COORDINATION HAVE BEEN A CITY AND REGIONAL STRENGTH

The City of Las Vegas Office of Emergency Management has been effective at coordinating and preparing for any major emergency or disaster caused by hazards affecting the City. It complies with and administers FEMA preparedness and training protocols, including those from the NIMS. As the City prepares for and mitigates hazards over the next thirty years, future implementation efforts will utilize a Hazard Prevention Framework that includes:

- Preparation and training – For all hazards, the City's Emergency Operations Plan describes what the City's actions will be during a response to an emergency. The plan describes the role of the EOC and coordination that occurs between City departments and other response agencies, as well as being a liaison between local, state, and federal governments in times of disaster. Continuity of operations are also further identified. Further information about this plan and functions cannot be further disclosed due to its sensitive nature.
- As part of ongoing preparedness, the Office of Emergency Management (OEM) conducts pre-disaster preparedness exercises, often performed alongside the Nevada Division of Emergency Management, Clark County, and other local governments. As part of the City's long-term strategy, public and private critical infrastructure of different types have been identified and prioritized for protection, but not disclosed, as they are critical components of infrastructure.
- Also crucial for emergency response and recovery efforts is financing; While Federal aid may be made available through FEMA, and increase in funding reserves and rainy-day funding to ensure adequate resources are available for emergency operations, preparedness, and response will help ensure increased chances of negative financial impacts.
- Stakeholder involvement and Interagency Coordination - The lack of communication and cooperation among various actors in the time before, during, and after disasters is one of the biggest challenges to be addressed in the hazard mitigation planning process. Proper coordination can get infrastructure and resources in place and can direct aid more quickly to the disaster victims. As the City goes through a disaster, the City must be able to bring together City Council members and city leadership with the media and community stakeholders to communicate events and clear facts. In the prevention phase, stakeholders are also essential to ascertaining hazard and mitigation viewpoints, including vulnerabilities and mapped risks and recommended mitigation strategies. Furthermore, City departments must be incorporated with community partners in the hazard mitigation and adaptation process; residents, businesses, health care and social service agencies, disaster relief organizations, community leaders, educational institutions, should be involved in order to incorporate economic, social and environmental viewpoints into both mitigation and recovery efforts.
- Expanded interagency partnerships and collaboration as part of emergency preparedness for both current and future hazards is important for the sharing of resources and data. While the City has good cooperation between different public agencies, the private and nonprofit sectors, and disaster relief organizations, further coordination can always foster resilience.
- Protocols and agency leads among agencies and nongovernmental organizations enable better coordination in responses when emergencies arise, especially with respect to community resources critical to disaster response, such as emergency shelters and places of assembly. Specific public and private roles and responsibilities must be exercised routinely to determine what works within realistic parameters. Engagement must also be ongoing to ensure outcomes are equitable and address both vulnerable and underrepresented populations and neighborhoods
- Public Education – For hazard mitigation efforts to be successful, information must be conveyed on how to

prepare for hazards, what people can do personally and for their families to prepare (including for seniors, children and pets), how businesses can prepare, and what the City is doing and how it will take action. This also includes the continuous development of web and social media content to engage the public; while the City currently does this,

- OEM prepares the community by providing training and coordination for the Southern Nevada Community Emergency Response Team (CERT) program. CERT training includes disaster preparedness, fire suppression, medical operations, light search and rescue, team organization, weapons of mass destruction/terrorism and disaster psychology. Following a major disaster, professional-first responders providing fire, police, and medical services may not be able to meet the demand for these services; trained CERT graduates know what to expect following a major disaster in terms of immediate services, how to communicate the message about their responsibility for mitigation and preparedness, and how to use needed life-saving skills, with emphasis on decision making skills, rescuer safety and doing the greatest good for the greatest number of people.

- Mitigate risks through policy, incentives, and capital improvements- A fundamental principal of zoning and the City's Unified Development Code is to protect public health, safety, and welfare in an effort to encourage or discourage development in known hazard-prone areas. The City can make changes to Title 19 to mitigate some of the negative impacts of the region's hazards in an effort to avoid or reduce the impact if a disaster occurs by further incorporating resilience as a guiding principle in land use decisions, while integrating those principles into annual CIP decisions. Since many facilities have solar, enursing battery storage and redundancy can help keep critical electrical loads operational; where possible, microgrids should be developed, especially within the Las Vegas Medical District. Finally, the City can advocate for the enhancement and ongoing refinement of the Southern Nevada building codes through the Southern Nevada Building Officials to require stronger and seismically fit buildings and greater resilience when constructing in identified areas of hazard. Doing so may have a positive long-term effect on insurance rates. Properly applied incentives can support informed investments as well; the SNWA Water Smart landscapes incentive program has been an effective mitigation and adaptation incentive tool.

SOME HAZARDS HAVE VARIED RISKS AND VULNERABILITIES THAT CAN IMPOSE BOTH HIGH SOCIO-ECONOMIC AND ENVIRONMENTAL COSTS AND BURDEN EMERGENCY SERVICES AND CRITICAL INFRASTRUCTURE

Comparatively, the City of Las Vegas faces major man-made and environmental hazards at a different scale than other communities. Certain hazards tend to have similar and predictable impacts from each occurrence, but the specific location and impacts from others are far less predictable. Geography, historical records, computer modeling and weather forecasting provide the ability to analyze locations and timing to provide some level of predictability and preparedness.

To assess current and future risk and vulnerability to hazards, governments have been using a simple but focused approach that involves the rating hazard vulnerability on two component variables. This plan utilizes an adapted assessment derived from climate change vulnerability assessments, but broadly explains hazards based on duration, intensity, and extent of each event type, among other variables that impact the City's environmental, economic, and social systems. Adapting this framework to utilize and formulate a ranking ultimately measures vulnerability to areas of operation. This matrix-based analysis ranks Low-to-High as well as determine areas of potential opportunity; using this qualitative assessment, it is possible to identify what the most critical areas are providing a baseline to follow when prioritizing projects, programs, and capital improvements that affect development and operational capacity of the City. It measures:

- Adaptive Capacity: The ability of a system to adapt to changing conditions.

- Sensitivity: The degree to which a system or area of operation is affected.

- Vulnerability: A measure derived by the assessment of Adaptive Capacity and Sensitivity within a system or area of operation. As an example, high Vulnerability should be addressed by implementing policies and programs that reduce it and promote resilience.

- Potential Opportunity: Sensitivity to a hazard is comparatively low and the ability and capacity to adapt is high, leading to the ability to pursue an opportunity to the benefit of the community.

- Based on the potential hazard-related impacts and the background adapted qualitative analysis within each of the City's Planning Areas and systems, specific details have been identified and assessed in terms of Vulnerability, with the ability to rank and assess ris based on the tables below.

- Specific responses may be governed by the Cit Emergency Operations Plan, the Clark County Hazard Mitigation Plan, and a recovery plan to adopted; however, reductions in vulnerabilities throu mitigation can:

- Avoid the conditions that have changed to reduce threat or occurrence.

- Address the specific risk by reducing or moving peo or infrastructure out of the hazard zone.

- Adapt to the hazard. If an impact cannot be avoid or addressed, an increase in adaptive capacity, reduction in sensitivities allow for the City to rebound from an impact.

As an example, the City and region is vulnerable to climate change. Southern Nevada has always dealt with extreme heat, limited water, extreme drought, and extreme storm events. However, the extremes of these hazards have intensified over the past decades and are expected to continue intensifying. As described in Goal TI-x, data and research from the Desert Research Institute and Nevada State Climatologist indicate that increasing atmospheric greenhouse gas emissions are expected to cause a variety of changes to local climate conditions and increasing the region's overall vulnerability for three specific hazards: extreme heat, drought, and flooding that result from reduced mountain snow pack, more frequent and intense storms, and overall higher temperatures. The specific probability of the extent and frequency climate change induced

		Sensitivity				
		S0	S1	S2	S3	S4
Adaptive Capacity	AC0	V2	V3	V4	V5	V5
	AC1	V1	V2	V3	V4	V5
	AC2	V1	V1	V2	V3	V4
	AC3	PO	V1	V1	V2	V3
	AC4	PO	PO	PO	V1	V2

RISK RANKING TO DETERMINE VULNERABILITY: DEGREE OF RISK BASED ON SENSITIVITY AND ADAPTIVE CAPACITY

Likelihood or probability of occurrence	*Rare / Small*	*Intermittent*	*Frequent, reoccurring, or ongoing*
Critical Function Impacts	Non-critical function / Improving critical function	Improve critical function / Mend a non-critical function	Mend a critical function / Maintain critical function
Citizens or Businesses Affected	Few / Less than total City of Las Vegas population	City of Las Vegas population only	Totality of Las Vegas Valley population
Threat to Life	No / Uncertain	Elevated	Yes

impacts of the three greatest hazards varies and depends on different climate modelling assumptions. However, at larger scales, the impacts of climate change may involve radically shift ecosystems, destabilize economies, and threaten quality of life by exacerbating the stress on already strained infrastructure and community systems. A potential opportunity may also exist; a 2019 USC study suggests Las Vegas may be a city that could experience mass in-migration as a result of climate induced sea level rise, resulting from out-migration of coastal communities, primarily along the West Coast. Similarly, increases in high intensity hurricanes or storms resulting from climate could also translate to in-migration patterns.

IN THE EVENT OF AN EMERGENCY CAUSED BY AN IDENTIFIED HAZARD, THE CITY MUST BE QUICK TO RESPOND WITH MEASURES THAT PROTECT THE HEALTH AND SAFETY OF RESIDENTS AND VISITORS, CRITICAL INFRASTRUCTURE, AND PRIVATE PROPERTY

Disasters and emergencies strike unpredictably and at different sizes and scales. Any unexpected occurrence may require immediate action by the City to avoid substantial financial loss to the City. With proper preparation and mitigation of hazards, the City will ensure sufficient emergency systems are in place to respond during or immediately after an emergency takes place from a natural or man-made disasters utilizing an Immediate Response Framework.

Take Action, Declare an Emergency, and Notify the Public – As head of the City, the Mayor may take necessary action for public health, safety, and welfare. Similarly, the City Council can enact emergency management provisions, declare an emergency, activate the EOC, mobilize first responders and resources, and enter into mutual aid agreements utilizing the provisions of the Las Vegas City Charter, Las Vegas Municipal Code, and applicable chapters of Title 36 of NRS – Military Affairs and Civil Emergencies. Should additional assistance be needed or required, LVMPD and state assistance can be obtained. Major Disaster Declarations and Emergency Declarations issued by the Governor after a natural catastrophe, or upon determination of the President based on the magnitude and severity, can help supplement efforts and available resources to states local government, as well as to protect public health and safety and further damage to property.

- As an emergency occurs, time is often of the essence; therefore, the City must:
- Activate the Emergency Operations Center and follow the Emergency Operations Plan for the hazard(s) taking place
- Adopt emergency ordinances as necessary
- Mobilize resources and request aid if needed
- Ensure continuity of City operations
- Communicate the hazard, risk, and situation with the public and/or through the media. Enable the emergency broadcast system and push notifications through a variety of means to as many residents and visitors as possible, including through TV, radio, smartphone push notification, and RTC dynamic message signage along roadways. Implementing real-time disaster warning systems with built-in redundancies will allow the City to reach all segments of the community, including those with limited communication technology and non-English speakers.

Protect public health and safety – Move people out of harm's way, treat the injured and prevent new injuries, minimize and avoid deaths.

- Ensure hospitals have capacity to rapidly accept patients, that ICU capacity levels between hospitals are monitored, and that Level I Trauma at UMC can respond to the most severe cases.
- If an evacuation is necessary, use RTC's ITS infrastructure and dynamic signage to direct the evacuation. Consider the utilization of resources for evacuated or displaced residents, school and transit vehicles, and potential shelter-in-place locations, including City community centers or CCSD schools.
- Consider supply chains necessary to sustain the people and systems of the City and Southern Nevada, particularly the transportation of food and supplies along the Interstate 15 corridor, water delivery from Lake Mead, and wastewater treatment. Restoring regular supply chains can be more important than obtaining disaster relief supplies.
- Depending on the need and type of emergency, ensure water, ice, and food distribution is mobilized in a timely manner and that assistance for vulnerable and protected populations is available.

Protect public and private property and critical infrastructure – While mitigation and prevention efforts are intended to avoid property damage or destruction, not all efforts will be successful and some preventative measures may fail. Decades of land use and infrastructure decisions may not cope with some hazards, especially those exacerbated by deferred maintenance. As the emergency unfolds, as data is collected, and as the situation and facts dictate, officials, engineers and subject matter experts may advise on specific means or methods of property and infrastructure preservation; if damaged or destroyed, they may also advise on closure or usability.

RECOVERY AFTER AN EMERGENCY OR DISASTER REQUIRES AN ONGOING COMMITMENT TO THE INVESTMENT IN SERVICES AND INFRASTRUCTURE

After an emergency takes place or as emergency response winds down, it is important that the City assess means of recovery for economic, environmental, social, and public health systems. This also means determining how to rebuild or redevelop in a way that reduces the potential for future loss while simultaneously ensuring an equitable future condition for all residents. Resiliency standards with proven effectiveness to mitigate disasters must be employed. This can be done through a Recovery Framework that speed and streamline response and recovery efforts, including through the adoption of a recovery ordinance and plan to guide management and policy outcomes in recovery that codifies a commitment to achieving outcomes:

Restoration of services and infrastructure– This involves the immediate reconstruction or repair by Public Works officials or utility service providers, sometimes at interim or temporary levels until a new, higher quality, and resilient replacement is developed or constructed. Essential services and businesses that must immediately operate are also a key means of recovery.

Rebuilding– The City must develop public outreach and education strategies for post-disaster conditions to assist with social recovery from devastating and catastrophic events. Distribution of FEMA relief funds and other funding sources aid rebuilding affected properties and restore essential businesses and infrastructure.

Resilience- As disasters traumatize whole communities, not just individuals, a framework and resources for emotional resiliency among residents must be developed to allow communities to rebuild in a way that is better than it was before the event. While the damage caused by a disaster can be devastating, the disaster may be an opportunity to rebuild in a more resilient manner. Rebuilding areas that are damaged to resilient standards may reduce damage from future repeat events. The City can approve the reconstruction of homes and structures as they previously existed, however, rebuilding and recovery must consider the likelihood of a repeat of the disaster. The City may consider the use of redundant smaller-scale infrastructure to promote the resilience of physical networks. Natural solutions, including green infrastructure, could have environmental co-benefits and can be cost effective for mitigating natural hazards when properly used .

CITY OF LAS VEGAS HAZARD VULNERABILITY ASSESSMENT

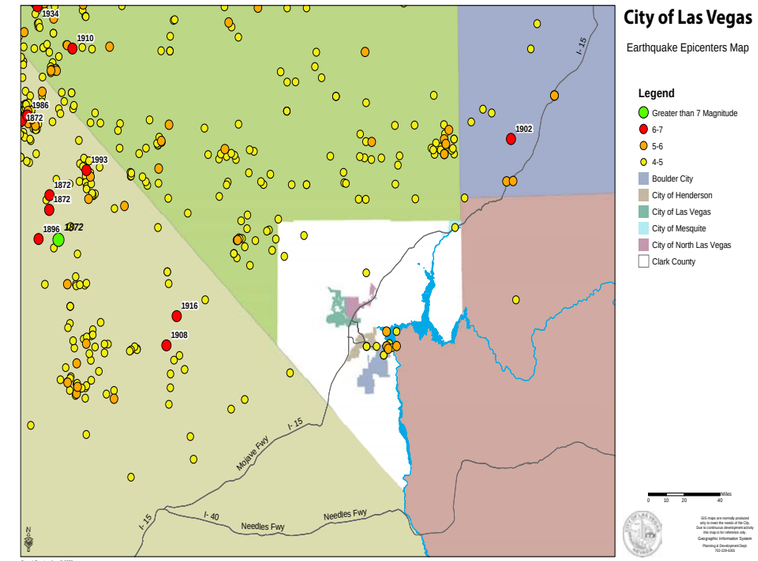
CLIMATE CHANGE: EXTREME HEAT	
Overall Vulnerability and Risk based on assessed adaptive capacity and sensitivity	**VERY HIGH –** Currently experiencing; 100 degree (or greater) days are projected to occur more frequently and grow in intensity and duration; scientists anticipate that the average temperature in region is expected to rise between 2.5 and 8 degrees Fahrenheit throughout the 21st Century. • Low adaptive capacity for most systems; some systems can adapt to higher temperatures, but physical infrastructure, may have the least capacity to adapt • High sensitivity for most systems; Electrical infrastructure, transit, and aviation extremely sensitive during high load and high temperature periods; sensitive populations may have greater health concerns
Likelihood or probability of occurrence	• Frequent, Reoccurring and Ongoing • Likely to increase in frequency, intensity, and duration
Critical function impacts	Maintain critical functions: • Greater summer electrical load (for cooling) • Potential harm to electrical and grid infrastructure • Public transit operations • Aviation operations (especially at McCarran Airport • Economic activity that occurs outdoors, including tourism and construction
Citizens or Businesses Affected	Totality of Las Vegas Valley population
Threat to Life	Elevated, especially for vulnerable populations: • Children • Elderly • Sick • Low income • Certain socioeconomic and demographic groups, especially within Downtown Las Vegas, West Las Vegas, East Las Vegas, Charleston, Twin Lakes, and Downtown South
Mitigation and Prevention Measures	• Prepare City facilities to be cooling centers • Ensure shelters have trained staff that can address the needs of at-risk populations • Develop monitoring system for house-bound at-risk populations. • Develop better communication with NV Energy and Southwest Gas so vulnerable populations do not have utilities cut off for non-payment during periods of extreme temperatures • Budget for increased number of high heat days
Adaptation Measures	• Design future buildings, public spaces, and infrastructure to accommodate heat – modify building and zoning codes with respect to orientation, passive heating and cooling • Increase urban tree canopy to provide more shading • Adjust working schedules for those that work outside
Immediate Response Actions	• Set up cooling stations in advance of extreme heat • Activate warnings and communications when forecasted extreme heat is expected
Recovery Measures	• Repair or replace damaged infrastructure

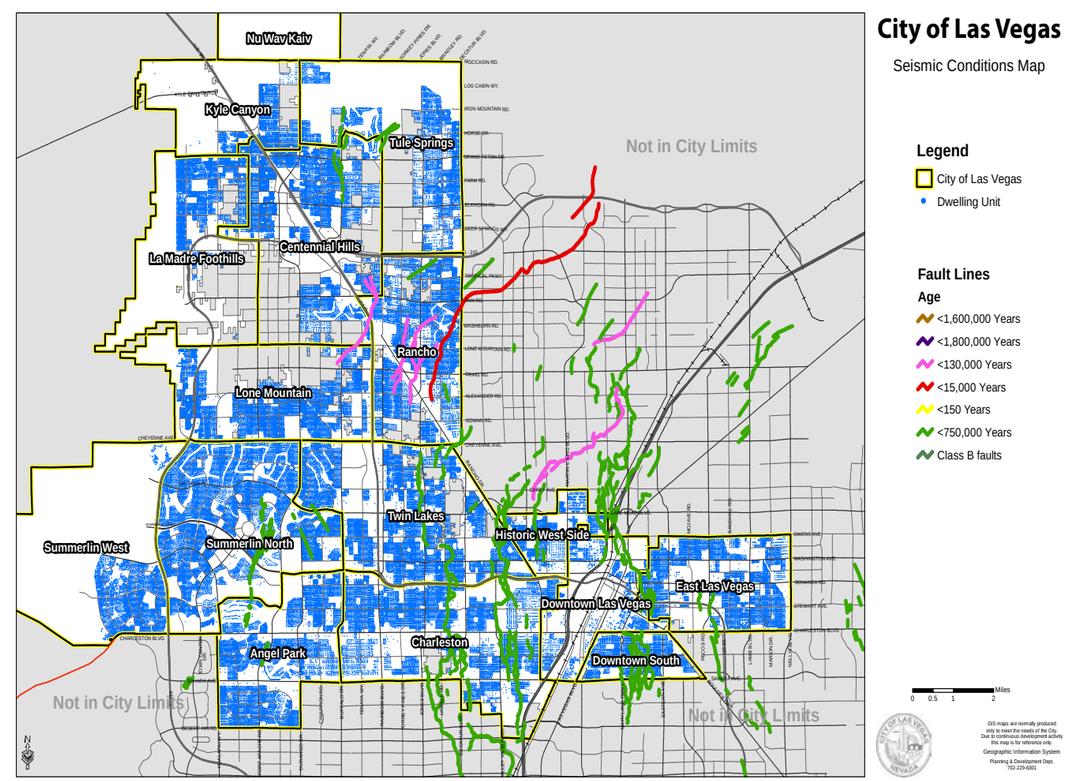
CLIMATE CHANGE: DROUGHT	
Overall Vulnerability and Risk based on assessed adaptive capacity and sensitivity	**VERY HIGH** – Currently experiencing; Unlike other hazards, droughts have unique attributes as a result of their According to climate scientists and SNWA, there is an 80 to 90 percent chance that Southern Nevada will experience another decade's long drought occurring this century. As described in the water goal, this hazard has the immediate effect of a shortfall of water supplies across all Colorado River water users; the long-term effect will also be economic and environmental • Very low adaptive capacity for some systems, low for others; reduced water supplies may inhibit population growth and economic activity • High sensitivity for most systems; the impact to environmental and economic systems could potentially be substantial, albeit even if over an extended period of time.
Likelihood or probability of occurrence	• Frequent, Reoccurring and Ongoing • Likely to increase in frequency, intensity, and duration
Critical function impacts	Maintain critical functions: • Gradual loss of water supply through negotiated cutbacks • Decrease in water quality • Inability to serve resident and commercial population • Loss of hydroelectric capacity at Hoover Dam • Potential loss of economic activity • Impacts to sensitive wildlife ecosystems • Increased risk of desert (range) wildfire along urban fringe
Citizens or Businesses Affected	Totality of Las Vegas Valley population
Threat to Life	No
Mitigation and Prevention Measures	• Scientific study, data collection, and sharing of drought conditions, hydrologic forecasts, snow studies • Policy changes, negotiations, and agreements with other Colorado River Basin states • Securing additional water supplies as described in SNWA's Water Resources Plan • SNWA water conservation strategies, including water use restrictions and regulations, tiered pricing for water consumption, incentives for turf reduction and water, and education
Adaptation Measures	• Completion of third intake to provide redundancy and additional intake for water at lower elevation • Construction of low lake level pumping station • Incorporate "bulletproof" drought tolerant species into Title 19 zoning standards • Addressing additional hazards that are exacerbated by drought, including flooding and wildfire
Immediate Response Actions	• Long term conservation strategies, as adopted by SNWA and implemented by the City • Increase public communication on drought risks and response
Recovery Measures	• Implement strategies discussed in Water Goal

CLIMATE CHANGE: SEVERE STORMS AND FLASH FLOODING	
Overall Vulnerability and Risk based on assessed adaptive capacity and sensitivity	**HIGH** – Currently experiencing; Southern Nevada is projected to see an increase in the frequency and severity of storms that can cause flash flooding events, especially during summer monsoonal seasons. Most issues are related to disruptions to transportation, emergency response, minor property damage, and the impact of rapid flash flood events. Through mitigation over time, both the number and overall percentage of residential buildings and residents within the City located has decreased. Safety and loss of life tend to be greatest along flood control facilities and channels. • Moderate adaptive capacity for most systems; flash flooding typically causes temporary nuisances that are being addressed through the Regional Flood Control District's master plan • Moderate sensitivity for most systems, with the impact to transportation and emergency response greatest; the impact of property damage and is greatest within high flood risk areas.
Likelihood or probability of occurrence	• Frequent, Reoccurring and Ongoing • Likely to see increase in frequency, intensity, and duration of monsoonal thunderstorms and flash flooding events
Critical function impacts	Improve critical functions: • Increase storm drain capacity and necessary flood control infrastructure in flood-prone areas so surface streets and low-points on roadways clear rapidly and ponding is avoided
Citizens or Businesses Affected	Totality of Las Vegas Valley population • Flash floods can occur miles away from actual storm occurrence and impact areas downstream or at spot locations • Development may alter drainage patterns
Threat to Life	Yes: • Distant storms may generate unpredictable flash flood conditions; homeless residents, or those that inadvisably use storm drains and flood control facilities as shelter are those at greatest risk. • Safety risks may increase for anyone entering flooded areas
Mitigation and Prevention Measures	• Continue the Regional Flood Control District's communicating the threat of flash flooding, to stay out of flash flood water and the loss of property resulting from floods • Eliminate high-hazard flood locations . • Ensure neighborhoods within flood zones are provided flood control relief • Develop and communicate flood risks and mapping. • Clean and clear storm drains and other flood control facilities of debris
Adaptation Measures	• Adopt flood control design regulations that apply to the 500-year flood • Revise and implement development standards that impose higher flood resilience standards, including hydrologic, grading, and drainage studies for public and private critical infrastructure • Provide detailed mapping to applicants for projects within flood zones • Construct future and upgrade existing flood control facilities to higher flood capacity and resiliency standards
Immediate Response Actions	• Activate warnings and communications when forecasted flooding is possible or occurs • Monitor storm drains and flood control facilities for people • Conduct swift water rescues, especially in known flooding locations
Recovery Measures	• Implement strategies discussed in Flooding Goal • Repair or replaced damaged infrastructure; clear flood facilities of debris

CIVIL DISOBEDIENCE, RIOTS, OR SOCIAL DISTURBANCES	
Overall Vulnerability and Risk based on assessed adaptive capacity and sensitivity	**MODERATE** - Civil and social disturbances or riots are typically not pre-meditated human caused acts but occur as a result of a catalytic event. Pursuant to the City Charter, the City Council is empowered to prevent riots and ensuring public order; however, should the situation arise, the Mayor can take action to suppress riots and disturbances, using the assistance of Las Vegas Metropolitan Police Department, or if necessary, the Nevada National Guard. • High adaptive capacity for most systems; Most systems can be adaptive to rapidly changing circumstances, Protected buildings and infrastructure offer some levels of security and counter-measures to assure public safety • Low sensitivity for most systems; public spaces and critical buildings and structures are dynamic. In addition, utility infrastructure and services, high stress could be placed on detention and enforcement capabilities, fire suppression efforts, and public health systems for injuries and deaths
Likelihood or probability of occurrence	• Infrequent; Likely to depend on cause of civil unrest
Critical function impacts	Improve critical functions: Police, fire, and emergency response Utility infrastructure, especially energy Key city operational facilities All hospitals and health care facilities Other high profile public places, commercial, and tourism destinations
Citizens or Businesses Affected	Less than total City population
Threat to Life	Uncertain; potential for threat to life exists
Mitigation and Prevention Measures	• Ensure lawful and peaceful assembly and protest to ensure the protection of Constitutional rights • Communicate threats through a public warning system to avoid certain areas • Create or install security barriers to prevent rioting during periods of known assembly • Increase surveillance and protection of infrastructure and public spaces from civil disobedience, gun violence, and social unrest.
Adaptation Measures	• Ensure policies of the City are equitable and do not discriminate • To the extent practical, avoid or minimize political, social, or justice issues likely to spark unrest
Immediate Response Actions	• Immediate law enforcement response • Enact emergency ordinances, curfews, and disbursement tactics • Request aid of LVMPD, Governor, and/or National Guard, as necessary • Set up mobile field hospitals or treatment centers • Potential evacuations of affected areas, or the issuance of shelter-in-place orders • Assess buildings and structures for damage and/or habitability or usability
Recovery Measures	• Repair or replace damaged infrastructure • Repair or replace damaged residential or commercial buildings and structures • Facilitate peaceful mediation of contrasting viewpoints • Economic recovery

EARTHQUAKES AND SEISMIC ACTIVITY	
Overall Vulnerability and Risk based on assessed adaptive capacity and sensitivity	**HIGH** - As the third most seismically active state in the county, earthquakes and seismic activity Southern Nevada is susceptible to surface ruptures and ground failures from earthquake faulting and shaking, with the region located within "strong" to "very strong" shaking range for an earthquake. Most importantly, because earthquakes can be highly damaging and disruptive and because Southern Nevada is relatively isolated, ensuring accessibility for the movement of freight, especially food and supplies, must be a high priority. Tectonic faulting is found within the valley's surrounding mountains and traverse the valley floor in a north-south trending series. While there have been few high magnitude earthquakes within Southern Nevada itself, tremors from seismic activity can be felt as a result of stronger earthquakes located throughout Central Nevada and Southern California. Because of these occurrences, the Las Vegas area is classified in Seismic Zone 2B of the Uniform Building Code. According to the University of Nevada's Seismology Lab and Nevada Bureau of Mines and Geology, there is potential for moderate damage to buildings and structures. More than two-thirds of the land and 75 percent of the population within the City is at risk of "very strong" ground shaking from earthquakes and seismic events, while one third of the area and 25 percent of the population are at risk of "strong" ground shaking; another 15 percent of the area and a quarter of the population is at risk of liquefaction. • Low adaptive capacity for most systems; newer buildings, structures, and infrastructure have greater adaptive capacity, but older structures will have the least capacity to adapt unless properly designed for seismic events. • High sensitivity for most systems; buildings and structures, especially those that are pre-code, have greatest sensitivities; all utility infrastructure, transportation, and critical operational facilities; immediate high stress could be placed on public health systems for injuries and deaths
Likelihood or probability of occurrence	• Small • Likely to depend on location and depth of epicenter and magnitude of temblor; most seismic activity within Southern Nevada is small, but any larger regional earthquake is likely to be felt
Critical function impacts	Maintain critical functions: • All hospitals and health care facilities • Key city operational facilities • All utility infrastructure, especially energy, water, and sewer • Ensure freight traffic on Interstate 15 from Southern California and by rail • Ensure operation of natural gas and fuel pipelines into Southern Nevada • Interstate 515 (Future I-11) through Downtown Las Vegas has high potential for failure until replaced • All bridges and structures • Older residential and commercial structures
Citizens or Businesses Affected	Totality of Las Vegas Valley population
Threat to Life	Yes





EARTHQUAKES AND SEISMIC ACTIVITY (CONTINUED)	
Mitigation and Prevention Measures	• Maintain and periodically updates seismic safety maps that document areas of collapsible soils, subsidence, faulting, and fissuring • Discourage or prohibit development and reclassify areas unsuitable for development because of geologic conditions. • Study, research, and develop partnerships to develop a regional seismic activity prediction and detection warning systems • Conduct "shake-out" seismic safety drills • Communicate and report seismic events with the public through a variety of means • Continue to upgrade and enforce building standards; require shaking intensity and duration be considered and ensure safety be protected and building functionality can be maintained following an earthquake. • Work with regional and statewide leaders to focus resources on strengthening key transportation routes and critical facilities so that the services necessary to maintain the social and economic structure of communities can be quickly and effectively returned after a seismic event. • Assess and rate critical infrastructure for seismic risk, particularly water, wastewater, electrical, natural gas pipelines, bridges, transportation systems; health care facilities and emergency service providers; and significant employment generators in seismically active areas whether within the City, Southern Nevada, or elsewhere within Nevada, California, Utah, or Arizona.
Adaptation Measures	• Led by the Department of Building and Safety and pursuant to NRS 278.580, adopt seismic provisions of the International Building Code, as well as standards for investingating seismic risks to buildings from surface ruptures and liquefaction • Equip key City facilities and fire stations with solar powered energy storage systems; establish microgrids for redundancy if feasible • Develop, fund, and support a retrofit program that can use best engineering standards for structures located in seismic zones. • Design future buildings, public spaces, and infrastructure to accommodate seismic activity
Immediate Response Actions	• Potential evacuations of affected areas • Conduct search and rescue operations if necessary • Open shelters for affected populations • Assess buildings and structures for damage, habitability, or usability • Shut down pipelines and utility infrastructure • Conduct immediate clean ups of spills
Recovery Measures	• Restore utility service • Reopen closed transportation routes • Demolish, upgrade, or repair damaged structures • Repair or replace damaged infrastructure • Engage in community clean up and restoration

HAZARDOUS MATERIALS	
Overall Vulnerability and Risk based on assessed adaptive capacity and sensitivity	**HIGH** - The City is vulnerable to both fixed and transportation-related hazardous material events. Because there are relatively few large-scale locations that manufacture or store hazardous materials within the City, most are likely to occur along a transportation facility (freeway, UPRR railroad, or along pipelines) and could be biological, chemical, radiological in nature. Hazardous material events can lead to secondary impacts leading to short or long-term transportation system closures, evacuations, or social disruption. An additional consideration is storage and transportation of high-level radioactive nuclear waste at the proposed Yucca Mountain repository within the Nevada Nation Security Site. The City's long-standing opposition to the Yucca Mountain project led the City to declare itself a "Nuclear Free Zone." The State of Nevada routinely opposes and litigates the project. The Nuclear Regulatory Commission has suspended the licensing process for the facility and is unfunded by Congress. Ending the project would require Congressional action. • Low adaptive capacity for most systems; spills, fires, releases, explosions or other accidents can lead to long-lasting economic, environmental, and public health harm. Most systems cannot adapt to human-caused accidents unless they are avoided or eliminated completely • High sensitivity for most systems; most systems are highly sensitive to hazardous materials. The consequences of exposure have equally great issues.
Likelihood or probability of occurrence	• Intermittent • Likely to depend on location of incident
Critical function impacts	Maintain critical functions, depending on the type of hazardous materials incident: Police, fire, and emergency response, especially the City's CBRN and HazMat unit Key city operational facilities, hospitals and health care facilities Utility infrastructure, especially energy, water, sewer, and fuel/gas into the region Ensure rail service and freight traffic on Interstate 15 from Southern California
Citizens or Businesses Affected	Less than total of City population
Threat to Life	Yes
Mitigation and Prevention Measures	• Limit, regulate, and frequently inspect transportation routes for hazardous materials, especially pipelines and UPRR through Downtown Las Vegas • Limit, regulate, and frequently inspect the distribution, storage, and disposal of hazardous materials through zoning; especially from poor or disadvantaged neighborhoods or vulnerable populations.
Adaptation Measures	• Coordinate hazardous materials transportation with NDOT or NHP means to reroute or restrict transportation through the City or during peak travel periods. • Conduct shelter-in-place safety drills • Communicate hazardous materials incidents through a variety of means and provide immediate instructions
Immediate Response Actions	• Potential evacuations of affected areas, or the issuance of shelter-in-place orders • Conduct immediate clean ups of spills or abate areas containing gas • Conduct search and rescue operations if necessary • Open shelters for affected populations • Assess buildings and structures for damage, habitability, or usability • Shut down pipelines and utility infrastructure
Recovery Measures	• Restore utility service and reopen closed transportation routes • Demolish, upgrade, or repair damaged structures and infrastructure • Engage in community clean up and restoration

INFECTIOUS DISEASE	
Overall Vulnerability and Risk based on assessed adaptive capacity and sensitivity	**HIGH** - The City and Southern Nevada are susceptible to infectious diseases, particularly due to being an accessible transportation hub and convening location for events and tourism. Typically, those highest at risk for contracting an illness are children, the elderly, or health compromised individuals who currently experience respiratory or immune deficiencies. Because of the communicable nature of infectious diseases, tourism centers or areas with high population densities, such as the Las Vegas Strip, are considered more at risk. Infectious disease impacts are difficult to evaluate due to the wide variation in disease characteristics and the ability to mutate over time. However, infectious diseases can cause human illness and death, as well as economic disruptions at various levels, depending on the extent and severity of the pathogen. • Low adaptive capacity for most systems; biological threats can lead to long-lasting economic and public health harm. Most systems can adapt based on the type of disease and its characteristics, unless vaccines and treatments are available and the avoided or eliminated completely • High sensitivity for most systems; most systems are highly sensitive to disease, leading to acute and chronic illness and death, especially for vulnerable populations. The consequences of exposure have equally great factors that can affect economic systems and supply chains.
Likelihood or probability of occurrence	• Intermittent • Likely to depend on type of infectious disease and communicability
Critical function impacts	Maintain critical functions, depending on the type of infectious disease:: All hospitals and health care facilities Key city operational facilities Ensure freight traffic on Interstate 15 from Southern California and by rail and air
Citizens or Businesses Affected	Totality of Las Vegas Valley population (including visitors)
Threat to Life	Yes, depending on the type of infectious disease
Mitigation and Prevention Measures	• Ensure interdisciplinary teams of public health experts, physicians, community health workers, scientists, media, and communications professionals are in place to help build capacity to recognize and manage critical public health and issues, including outbreaks, immediately following detection and before resources can be mobilized • Activate a citywide or regional communications plan for consistent and timely public health information on the appropriate individual and business responses to disease outbreak. Set up mobile field hospitals or treatment centers • Increase investments in infrastructure and regulation to protect water and food sources and supplies from contamination and effectively remove disease-carrying vectors • Ensure that federal, state, and local plans are in place for managing pandemics, including the potential for economic disruption, widespread shelter-in-place orders, increasing hospital and health care system capacity, and an associated increase in fatalities. • Protect SNWA infrastructure from disease or contamination should water be a vector for exposure • Should pathogens or disease result from animal or insect origin, plants and vegetation, or vermin, abate pursuant to LVMC nuisance ordinances

INFECTIOUS DISEASE	
Adaptation Measures	• Ensure a recovery plan is in place to adapt to shutdowns or modified operation of public services, including school closures, business closures, public facilities, public transportation, and ensure the safe use of public space for the duration of the restrictions, unless quarantines are required • Prepare and stockpile necessary supplies, resources, medication or vaccines (if available) • Ensure strategic supply of personal protective medical equipment, disinfectant supplies, for city officials and health care providers
Immediate Response Actions	• Issue consistent guidance in coordination with the Centers for Disease Control, the State of Nevada's Division of Public and Behavioral Health, and Southern Nevada Health District • Potential evacuations of affected areas, or the issuance of shelter-in-place orders • Enact and enforce quarantines and closure ordinances or orders should communicable diseases prove to have especially high rates of communication, infection, health complications and/or mortality • Adopt additional public health and safety provisions • Set up mobile field hospitals or treatment centers • Ensure or make available personal protective equipment and disinfectant supplies for the public • Ensure supply chains are not disrupted
Recovery Measures	• Resume City operations • Lift quarantines, closures, or • Economic recovery • Notify and prepare public health officials and other appropriate subject matter experts for the after-effects of spread, if necessary

TERRORISM	
Overall Vulnerability and Risk based on assessed adaptive capacity and sensitivity	**HIGH** - Terrorism, whether foreign or domestic, is unpredictable and can take many forms. Las Vegas has been identified by the Federal government as "high-threat, high density," with regard to acts of terrorism. In addition to Downtown Las Vegas and the Strip, a number of other high profile locations and key infrastructure exist throughout the region. Lessons learned from other terrorism events, including 9/11 and the October 1 shootings, have helped the City better prepare and secure public locations and events. • Moderate adaptive capacity for most systems; Most systems can be adaptive to rapidly changing circumstances, Protected buildings and infrastructure offer some levels of security and counter-measures to assure public safety • High sensitivity for most systems; public spaces and critical buildings and structures are dynamic. Critical facilities and iconic locations may carry additional risk due to their importance. In addition, utility infrastructure and services, unless built with multiple redundancies, can be subject to fail if deliberately tampered with or destroyed; immediate high stress could be placed on public health systems for injuries and deaths
Likelihood or probability of occurrence	• Intermittent • Likely to depend on type and scale of incident
Critical function impacts	Improve critical functions: Police, fire, and emergency response All utility infrastructure, especially energy, water, and sewer Key city operational facilities All hospitals and health care facilities Other high profile public places, commercial, and tourism destinations
Citizens or Businesses Affected	Less than total City population
Threat to Life	Yes
Mitigation and Prevention Measures	• Ensure Federal, local, and state laws allow for the lawful collection of surveillance and intelligence data while ensuring the balance and protection of Constitutional rights • Require security plans for areas with gatherings or special events • Communicate terrorism threats through a public warning system • Coordinate security and prevention efforts with the Department of Homeland Security, the state, LVMPD, the National Guard, and other community security authorities on special events, plans and responses to minimize the threat to people and property • Create or install security barriers in high pedestrian areas where necessary • Increase surveillance and protection of infrastructure and public spaces from terrorist threats, gun violence, and cyberterrorism.
Adaptation Measures	• Expand investments in cybersecurity systems to protect critical infrastructure. • Increase the use of Crime Prevention Through Environmental Design (CPTED) approaches for areas that may have a high threat risk.
Immediate Response Actions	• Immediate law enforcement response • Enact emergency ordinances • Set up mobile field hospitals or treatment centers • Potential evacuations of affected areas, or the issuance of shelter-in-place orders • Assess buildings and structures for damage and/or habitability or usability
Recovery Measures	• Repair or replace damaged infrastructure • Economic recovery

IMPLEMENTATION STRATEGIES

- Develop and utilize a Hazard Prevention Framework that prepares for a wide range of hazards:
  - Prepare and train for man-made and natural hazards
    - » Routinely evaluate and update the City's Emergency Operations Plan
    - » Conduct pre-disaster and operations-based preparedness exercises for identified hazards involve the public and emergency management personnel.
    - » Regularly conduct NIMS compliant resource inventories
    - » Increase in rainy-day funding reserve
    - » Expand interagency partnerships, collaboration, and mutual aid agreements
    - » Ensure emergency response considers provisions for evacuating or sheltering low-income, disabled, and other residents that may need assistance
    - » Led by the Departments of Building and Safety and Public Works, adopt updated codes and standards for buildings and infrastructure
  - Engage public and private stakeholders and coordinate with agencies at all levels
    - » Participate in cross-department/agency mutual aid response systems
    - » Integrate departmental and jurisdictional interoperability into public safety communications systems
  - Continue educating the public on the hazards the City faces and how to prepare for each
    - » Disseminate data on the magnitude, frequency, vulnerability risk, and locations the City's hazards.
    - » Continue offering Community Emergency Response Team (CERT) training
    - » Publish resources for residents and visitors to develop emergency kits and evacuation plans, and encourage businesses to develop emergency procedures and shelter-in-place plans
    - » Assemble or collect donated emergency kits and supplies to low-income and vulnerable residents
  - Mitigate risks through policy changes, incentives, and capital improvements
    - » Continue infrastructure investments for the hazards with greatest vulnerability, especially drought, flooding, and seismic activity
    - » Implement the identified prevention and adaptation actions for each hazard
- For each identified hazard within the vulnerability assessment with high socio-economic and environmental costs:
  - Continue evaluating each hazard's vulnerabilities, as well as potential mitigation, adaptation, response, and recovery efforts
- In the event of an emergency, protect the health and safety of residents and visitors, critical infrastructure, and property using a NIMS-based Immediate Response Framework:
  - Bring together City leadership with the media and community stakeholders to communicate events and clear situational facts.
  - Communicate and notify the public using a variety of notification and warning systems
  - Implement the identified emergency response actions for each hazard
- To lessen economic severity of all types of hazards, develop a comprehensive recovery framework that's context sensitive and adaptable to a variety of hazard scenarios
  - Immediately prioritize and restore critical infrastructure and essential services
  - Rebuild for buildings and structures to higher, more resilient standards; relocate structures away from identified hazard prone areas, if possible
  - Repair environmental damage and restore natural areas as buffers from the effects of future disasters
  - Use green infrastructure and low impact development to restore environmental health

IV.C SAFETY: FLOODING

NRS 278.160.1(a)(1)

MINIMIZE FLOODING RISKS TO PREVENT DAMAGE TO PROPERTY AND INFRASTRUCTURE

As identified in the Hazard Mitigation goal, flooding has historically been one of the largest and costliest environmental hazards affecting Las Vegas. The overall vulnerability and risk remains high and flooding remains a seasonal occurrence, but the City has adapted well to the overall hazard. The Las Vegas Valley's Hydrographic Basin has only one drainage-way: the Las Vegas Wash, which empties to Lake Mead. Water must flow to the Wash through its tributaries or through storm drains and channels. Flooding usually results in disruptions to transportation, emergency response, minor property damage, and the impact of rapid flash flood events. Severe storms can also have the secondary effect of increasing traffic accidents, sometimes involving the rescue of motorists from flooded areas.

Las Vegas also experiences severe summer thunderstorms when monsoonal moisture from the Gulf of California and Mexico is pushed northward, leading to intense rainfall during short time periods. Combined with the valleys topography and impervious desert soils and surfaces, storm water rapidly flows and collects at lower elevations of the urbanized valley, such as East Las Vegas. As the City has grown, so have the problems with flooding and their associated costs. Since 1960, Southern Nevada has experienced at least 12 floods totaling over $1 million in damages each, 23 flash floods, and 33 deaths.

The Nevada Legislature created the Clark County Regional Flood Control District (RFCD) in 1985 to develop a coordinated and comprehensive Master Plan to address flooding, to plan, fund and coordinate construction of flood control infrastructure, to educate the public of flood dangers, and to monitor rainfall and flow data during storms. The RFCD is governed by a Board of Directors comprised of the same membership as the Regional Transportation Commission, including two members of the Las Vegas City Council. To finance regional flood control infrastructure, a quarter cent sales tax was approved by voters. In additional to major regional facilities, the City's Public Works Department designs minor and local facilities and infrastructure. These can be financed through the creation of Special Improvement Districts. Public Works

also reviews and approves drainage studies addressing the existing, interim and future hydrology for private developments greater than two acres or are located within a FEMA designated flood zone (which must also be approved by the RFCD and FEMA). Upon project completion FEMA requires a map revision (LOMR) to reflect the actual change to the flood zones.

The RFCD's 2018 Las Vegas Valley Flood Control Master Plan Update is the guiding document for future flood control facilities, as required by NRS 543. The plan and its hydrologic analyses may be subject to further amendments and revisions in the future as more detailed analyses are completed for facilities during engineering design, and other activities that warrant modification. It encompasses 1,637 square miles over eleven watersheds. This plan, as well as all previous updates are based on future growth and development assumption to represent ultimate conditions. The city also develops its own neighborhood studies that work in conjunction with the RFCD's Master Plan and concentrate on localized and detailed hydrologic analysis, proposed drainage facilities and engineering for specific areas. Each are used as guidance by Public Works.

Finally, as addressed by the Waste and Environmental Justice Goals, the City and RFCD are co-permittees to the region's NPDES stormwater discharge permit that authorizes stormwater discharge to the Las Vegas Wash, provided monitoring best management practices efforts are taken to reduce pollutants. Facilities such as detention

PROPOSED NEW FLOOD CONTROL FACILITIES

Detention Basins

- Upgraded Meadows Basin
- Arroyos within Summerlin West
- Box Canyon Detention Basin
- Grand Park Detention Basin (Summerlin West)
- Upgraded Ann Road Detention Basin
- Upgraded Kyle Canyon Detention Basin
- Kyle Canyon Sediment Basin
- Kyle Canyon channels
- Upgraded ULVW Basin
- Upgraded Gowan South Basin

Channels and conveyance

- RCB: Charleston Blvd/Maryland Pkwy, West Charleston Blvd, Sahara, Rancho-Gowan
- RCP: Box Canyon, Stewart-Bonanza

KEY ACTIONS

- Construct the recommended improvements contained within the RFCD's Master Plan to eliminate as much of the FEMA designated flood zone within the City as possible, thereby protecting residents and property.
- Determine the effect an increasingly active monsoonal season may have on storm water infrastructure.
- Increase the number of multi-use facilities and utilize low-impact development and other natural drainage techniques
- Continue coordinating with the RFCD and National Weather Service on early warning notificatations and education on the risks of flooding

OUTCOMES

- By 2050, no residences, businesses, or critical infrastructure are located within flood zones
- No deaths attributable to flooding occur
- Maintain or exceed the City's Community Rating System (CRS) Class 5 status as part of the National Flood Insurance Program.

SEE ALSO:
RFCD Flood Control Master Plan

EQUITABLE	RESILIENT	HEALTHY	LIVABLE	INNOVATIVE
Address flooding problems in planning areas with higher rates of poverty and minority populations must be prioritized.	Addressing and adapting to flooding has made the City and region more resilient and better prepared for potential increases in frequency and intensity of storms.	Well-designed multi-Use flood control facilities provide opportunities for recreation and can be developed to improve the health of the natural environment.	Ensuring proper drainage and flood control protects property and ensures safe transportation and emergency response during storm events.	Low impact development and other natural flood control solutions may be just as effective at preventing flooding.

basins help extract pollutants and capture and remove sediments from stormwater inflow. All flood control design and construction projects should be consistent with NPDES permit requirements and incorporate design strategies that reduced stormwater pollutants. Similarly, construction sites must comply with stormwater permitting requirements and have a Stormwater Pollution Prevention Plan to be in compliance with the Clean Water Act.

THE REGIONAL FLOOD CONTROL DISTRICT'S PLANNING AND INFRASTRUCTURE EFFORTS HAVE SUCCESSFULLY HELPED MITIGATE FLOOD RISKS WITHIN THE CITY

Due to successful flood control and prevention efforts over the past three decades, there are now fewer FEMA designated Special Flood Hazard Areas within the City, fewer flooding incidences, and reduced impacts resulting from precipitation events. Special Flood Hazard Areas (SFHA) that currently exist are now mostly along the Las Vegas Wash and major storm drains including along the Rancho Dr and Washington Ave corridors. Two percent of the City's land is within the 100-year floodplain and 2.5 percent is within the 500-year floodplain. Through mitigation over time, both the number and overall percentage of residential buildings and residents within the City located in the SFHA buildings have decreased. All subdivisions constructed after 1992 have been designed to protect against the 100-year flood (a 1 percent chance of a flood event occurring in a year). Safety and loss of life tend to be greatest along flood control facilities and channels.

Regional facilities safely convey and detain major flood flows with a minimum 100-year frequency flood event flow of 500 cubic-feet-per-second (cfs) or a minimum contributing drainage area of 1 square mile. Analyzing conditions have helped determine what areas may be prone to flooding and help prioritize future facility construction. "Category A" facilities are considered essential for the protection of existing development, and are given priority for the District funding. "Category B" facilities consist of planned flood control improvements that are not required to protect existing development and are typically located in undeveloped areas or may replace an existing facility which currently provides a level of flood protection, but cannot convey the entire 100-year peak flow.

FACILITY DESIGN PERIODS FOR 1" OF RAIN

The following flood types indicate how long it will take for an inch of precipitation to fall.

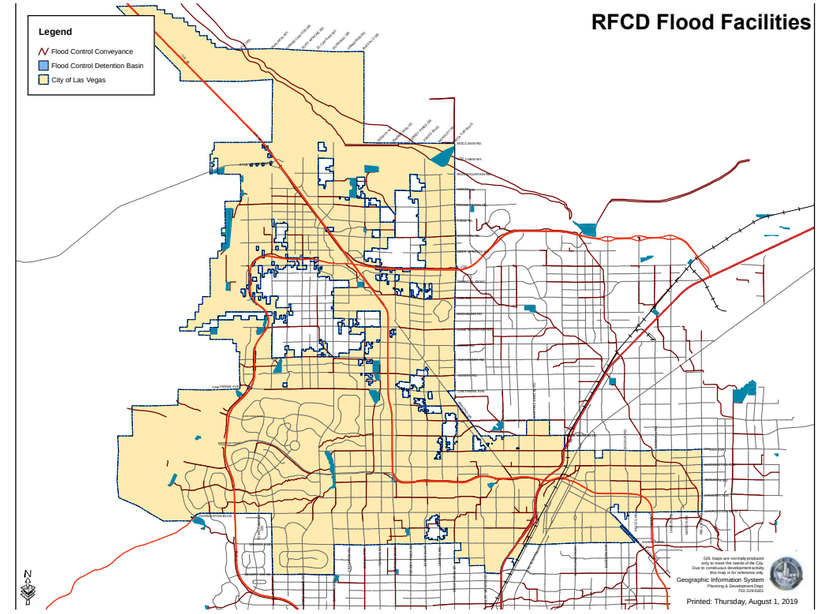
- 2 year: 20 hours
- 5 year: 2 hours
- 10 year: 30 minutes
- 25 year: 15 minutes
- 50 year: 12 minues
- 100 year: 10 minutes

- Detention basins provide temporary storage of floodwaters during flood events with high rates of inflow and slow discharge. Retention basins are similar, but typically don't discharge water and hold larger volumes. In principle, each detention basin has a maximum area and associated volume to hold flood water, which allows it to drain without overwhelming downstream conveyance systems. Depending on the storm event, each will fill within five to six hours; spillways allow floodwaters to pass through downstream.
- Storm drains (reinforce concrete box or pipe) and typically convey flood waters either underground or streets while open flow channels are used if right-of-way is available. Channels are typically less expensive than storm drains and easier flow.
- Many neighborhood surface streets in the Valley act as conveyance corridors for flood flows during major storm events. Local facilities help to decrease the volume of water conveyed to regional facilities via surface streets thereby lessening the impact of surface flow on adjacent properties and allowing for the safe passage of vehicular traffic during a major flood event.

The 2018 Regional Flood Master Plan calls for:

- 793 total miles of conveyance, 484 miles have been built with 309 unbuilt (180 miles are Category A, 129 Category B)
- 110 detention basins, of which, 78 have been built, 14 require expansion, and 32 basins are unbuilt (16 A / 16 B)

Three major watersheds of the Las Vegas Wash cover the City of Las Vegas, each of which require their own facilities based on future changes and development patterns.



INVESTMENT IN REGIONAL FLOOD CONTROL FACILITIES HAS HELPED REDUCE ADDITIONAL COSTS ON RESIDENTS AND BUSINESSES

Areas with new subdivisions, rural preservation areas, and locations with relatively underdeveloped flood control and drainage infrastructure are likely to be the locations that experience flooding impacts until new facilities are constructed. The RFCD's Master Plan covers a 10-year capital improvement program and is updated every five years due to constantly changing hydrologic conditions. However, new facilities and infrastructure upgrades should be prioritized for the planning areas with higher rates of poverty and minority populations, which may need or require flood insurance. Because most of the City's mapped flood zones fall within West Las Vegas, Downtown Las Vegas, and East Las Vegas, which have historically faced a greater share of flood damage and cost burden, mitigation and adaptation measures should be focused there to reduce overall threats to property damage and potential for loss of life.

However, these investments have helped mitigate flood damage losses for many residents and businesses. FEMA's Community Rating System recognizes community flood plan management activities that exceed FEMA requirements. The program rewards insured residents for their community's continued involvement, while providing an incentive for new flood protection activities, including reducing flood losses, facilitating accurate insurance ratings, and promoting awareness of flood insurance. The City holds a rating as a Class 5 community translating into a 25 percent flood insurance rate reduction for city property owners within a flood zone.

SOUTHERN NEVADA IS LIKELY TO SEE AN INCREASE IN THE FREQUENCY AND SEVERITY OF STORMS THAT CAN CAUSE FLASH FLOODING EVENTS, ESPECIALLY DURING SUMMER MONSOONAL SEASONS; HOWEVER, UNCERTAINTY IN MODELING WILL LIKELY MAKE FLOOD EVENTS DIFFICULT TO PREDICT

Throughout the 20th Century, the amount of precipitation falling within the desert southwest has been below average, despite an overall increase throughout the remainder of the United States. However, climate research suggests the number of extreme high intensity rainfall events, in

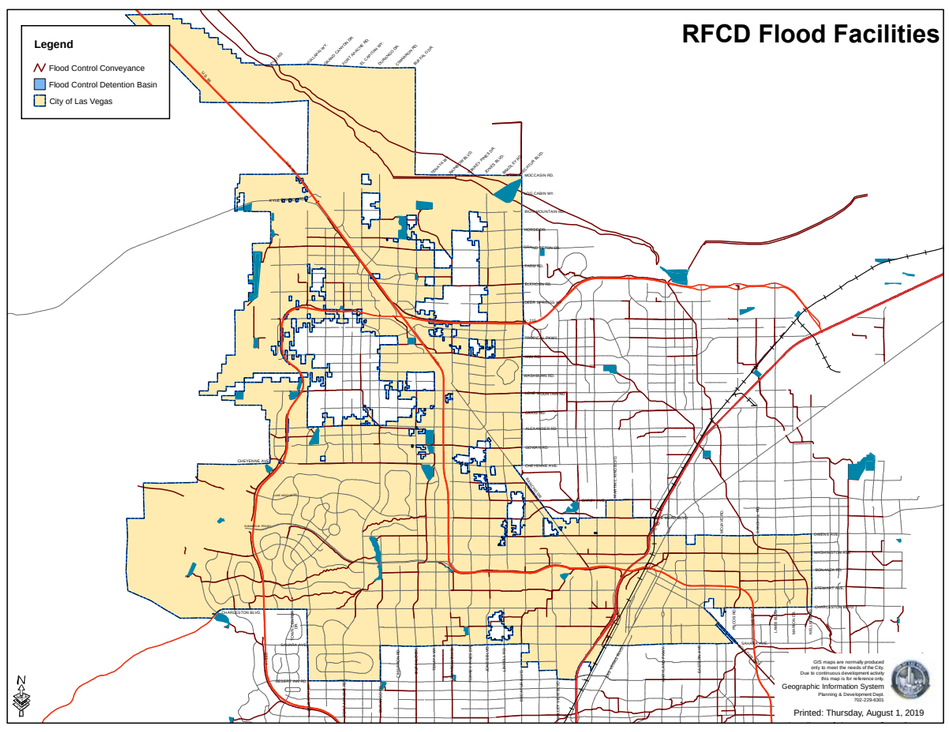
UPPER NORTHERN LAS VEGAS WASH

- $399 million invested in 8 detention basins and 44 miles conveyance
- $204 million Category A facilities proposed and $160 million Category B facilities proposed

This 629 square mile watershed covers the northwestern valley and much of the Nu Wav Kaiv, Kyle Canyon, Centennial Hills, and Tule Springs planning areas, much of which is undeveloped. Stormwater from Mount Charleston and the Sheep Range ultimately drain into the Upper Las Vegas Wash. Thus, the City of Las Vegas is responsible for programming flood control funds for the Upper Northern Las Vegas Wash Watershed. It contains two discharge points: the Upper Las Vegas Wash Detention Basin and a confluence at Ann Road and Ferrell Street. Since Tule Springs Fossil Bed National Monument was created and is a sensitive natural wash, the area will remain undisturbed, necessitating a number of changes and modifications to flood control facilities elsewhere in the watershed. Several future projects must be completed within the next decade to protect existing and future development:

- Expansion of Kyle Canyon Detention Basin
- Expansion of Upper Las Vegas Wash Detention Basin
- Construction of Moccasin Outfall 2
- Construction of Kyle Canyon Sediment Basin

A number of smaller storm drains and channels are proposed for addition or expansion to accommodate the growth within the watershed, most of which flow to detention basins or to other facilities. Within Skye Canyon, a Master Drainage Study recommends improvements as a part of the development.



CENTRAL

- $570 million invested in 4 detention basins and 57 miles conveyance
- $519 million Category A facilities proposed and $53 million Category B facilities proposed

The 56 square mile Central Watershed, located in the middle of the Las Vegas Valley is completely developed. Three main discharge locations exist: the Las Vegas Wash, the Las Vegas Creek and Freeway channels that flow into the Lower Northern Las Vegas Wash Watershed, and a Boulder Highway facility draining into Flamingo Wash. With fewer detention basins, much of the watershed is interconnected by conveyance facilities leading to each respective discharge point. Much of the Central watershed contains FEMA identified flood zones; this requires major modifications and additions of facilities within West Las Vegas, Downtown Las Vegas, and East Las Vegas, including:

- Expansion of the Meadows Detention Basin
- Modify the Carey-Lake Mead Detention Basin to provide a second outlet and is categorized as a priority project
- The East Charleston-Boulder Hwy storm drains
- The West Charleston
- Sahara storm drain
- Stewart and Bonanza storm drains

These conveyance facility modifications are all required due to subsequent hydrology changes occurring elsewhere within the watershed, for which new volumes and flows will create more utilization of each facility. Changes to roadways resulting from freeway improvements such as those made by Project Neon, completely alter the drainage network, thus necessitating the downstream improvements. Additionally, modifications to minor facilities made through street improvements, infill development, and redevelopment all have associated effects on flow.

GOWAN

- $448 million invested in 8 detention basins and 57 miles conveyance
- $127 million Category A facilities proposed and $108 million Category B facilities proposed

The 84 square mile Gowan watershed covers the western Valley and includes much of the rapidly growing La Madre Foothills, Lone Mountain, Rancho, Summerlin West, and Summerlin North planning areas. It is the major western tributary of the Las Vegas Wash, receiving runoff from the Spring Mountains and Red Rock Canyon. Because much of the northwest valley outside of the I-215 Beltway and within Summerlin West is undeveloped, new drainage and flood control facilities connected by conveyance facilities are required, as well as several major modifications and additions.

- Expansion of Gowan South Detention Basin to accommodate new development to the west
- Expansion of Ann Road Detention Basin to accommodate new development to the west
- Construction of Box Canyon Detention Basin to mitigate the Box Canyon flood hazard
- Alexander-Rancho storm drain system to mitigate surface flooding
- Construction of Grand Park Detention Basin as Summerlin West development occurs
- New Summerlin West flood control and conveyance facilities as new development occurs

which heavy precipitation occurs in short periods of time, is likely to increase. Since 1948, the frequency of storms in Southern Nevada with heavy precipitation have increased 30-45%. Academic reports, climate models, and studies seem to confirm the likelihood of more frequent, more intense flash flood seasons, even with a decrease in total annual precipitation. However, most models do not give an accurate prediction of a total increase in incidences or the respective intensities of individual rainfall or flood events. As with other climate hazards impacting the City, it is clear that more research and study will be required to understand the potential increase in the hazard to the City and to what extent design standards for future RFCD facilities or existing flood control infrastructure may be required. Despite these unknowns, flood control infrastructure is currently suited well to the 100-year flood, but adapting flood control design

regulations to greater designs may be warranted. Other adaptation measures, including more resilient development standards for local flood control and drainage, detailed mapping for applicants and developers, and the construction of future and existing flood control facilities to higher flood capacity standards may be warranted as more information is known about future precipitation and flood events.

FLOOD CONTROL FACILITIES HAVE BEEN CONSTRUCTED AT THE EXPENSE OF NATURAL DRAINAGE, LOW IMPACT DEVELOPMENT, AND GREEN INFRASTRUCTURE.

Flood control facilities are intended for safe detainment and conveyance of flood flows to protect property and public safety. In many cases the proper functioning of flood control facilities is paramount and sometimes cannot be compromised by other uses or functions. Concrete channels, dams, and detention basins convey and store flood water effectively and efficiently, require less maintenance and, when designed properly, eliminate the potential for erosion. However, the aesthetic value, creation of nuisance space, and loss of large areas from developable land and nuisance areas and environmental benefits of concrete detention facilities are minimal.

Multi-use opportunities exist with many master planned facilities. Detention basins and linear parks have been designed as joint-use detention facilities that include recreational, space, open space, and sports fields and trails, such as Buckskin Basin in Lone Mountain and Pueblo Park in Summerlin North. Therefore, in early planning stages, the City must work with the RFCD to identify and take advantage of multi-use opportunities afforded by flood control facilities included in the Master Plan.

Similarly, natural washes and arroyos help preserve some desert habitat and corridors and are preferable natural amenities over engineered concrete or earthen flood control infrastructure. Natural washes or other "soft linings" to convey flood flows can be done in a way that ensures a proper level of protection for adjacent properties and flow. While steep slopes and can create higher flow velocities, riprap, gabion, and limited use of lined channels can help preserve the desert environment. There are some areas within the City where remaining natural wash corridors be maintained. On the other hand, the potential of erosion

exists resulting in scour and downstream deposition that could potentially block or dam conventional downstream concrete culverts, grate inlets, and channels, rendering the flood control facility ineffective and damage other areas. Therefore, for facilities in which natural washes are used, the construction of sediment basins, over-sizing culverts, drains, and inlets may be required to account for debris and sediment clogging.

To improve the resiliency of Southern Nevada for increased storm intensities and frequencies, the City must integrate Mojave Desert oriented green infrastructure and Low Impact Development (LID) design standards, utilizing native and adaptive plant species, into Title 19 and other Public Works standards, including:

- Xeriscaped bioretention areas, including in amenity zones, buffer areas, parks, civic spaces, and parking lots
- Curb extensions and openings
- Permeable pavements
- Sediment basins

Using less concrete, revising drainage regulations for new development, and implementing LID green infrastructure techniques can decrease the expected increase in runoff due. Ancillary benefits of implementing these techniques include improving air quality, providing shade, creating wildlife habitat, groundwater recharge, reducing the urban heat island effect, and more. These additional benefits increase the overall value of the flood control solutions to the residents. Because storms and flooding do not follow political jurisdictional boundaries, regional collaboration on LID between the City, RFCD, and other local agencies is critical in order to implement new approaches to mitigating the effects of flooding and improving resiliency.

WARNING THE PUBLIC OF IMPENDING FLOOD EVENTS REMAINS A PRIORITY TO PROTECT PUBLIC SAFETY

As the City and RFCD have constructed flood control infrastructure, deaths attributable to flooding have decreased, but the risk factor remains. As a hazard mitigation and prevention measure, communicating the threat of flash flooding and to stay out of flash flood water during or prior to a storm must continue as an immediate response action. The City must align with both RFCD and National Weather Service messaging during flash flood watches and warnings through social media and other messaging means. As flood events occur, early warning systems can be deployed not only in the areas, but in areas downstream from the flood. Throughout the flash flood season, motorists are warned to take precautions when driving during storms and to stay out of flooded roadways. In known areas of spot flooding, utilizing RTC's FAST dynamic message signage can also help warn motorists to slow down and avoid any flooded areas. Safety is especially important along flood control facilities, the Las Vegas Wash, and its tributaries. Water flowing through channels and into detention basins can quickly rise and move as quickly as 30 miles per hour, can contain debris, and can be especially dangerous for children and animals. Tunnels, bridges, and culverts can be especially dangerous, as they can injure or trap people; homeless individuals, who commonly use drainage areas as places of refuge, especially during hot summer monsoonal months are particularly susceptible; these areas should be monitored for people, especially ahead of possible flooding events.

IMPLEMENTATION STRATEGIES

- Construct the recommended improvements contained within the RFCD's Master Plan within the Upper Las Vegas, Gown, and Central watersheds to eliminate as much of the FEMA designated flood zone within the City as possible, thereby protecting residents and property
  - Prioritize facilities within West Las Vegas, Downtown Las Vegas, and East Las Vegas planning areas
- Determine the effect an increasingly active monsoonal season may have on stormwater infrastructure
  - In conjunction with the RFCD, commission or request an academic report, model, or study to determine future frequencies and intensities of flash flood seasons.
  - Determine modifications to design standards for future RFCD facilities or existing flood control infrastructure
- Increase the number of multi-use facilities and utilize low-impact development and other natural drainage techniques
  - Provide a user-friendly document to guide staff, developers, and other entities through the MS4 permit process within the city of Las Vegas.
  - Identify natural drainage channels rather than concrete where feasible to convey stormwater though the region.
  - Amend Title 19 to permit and provide design guidelines for LID and green infrastructure
- Continue coordinating with the RFCD and NWS on early warning notifications and education on the risks of flooding
  - Monitor tunnels and culverts
  - Post additional warnings and signage
  - Construct new barriers to flood control facilities