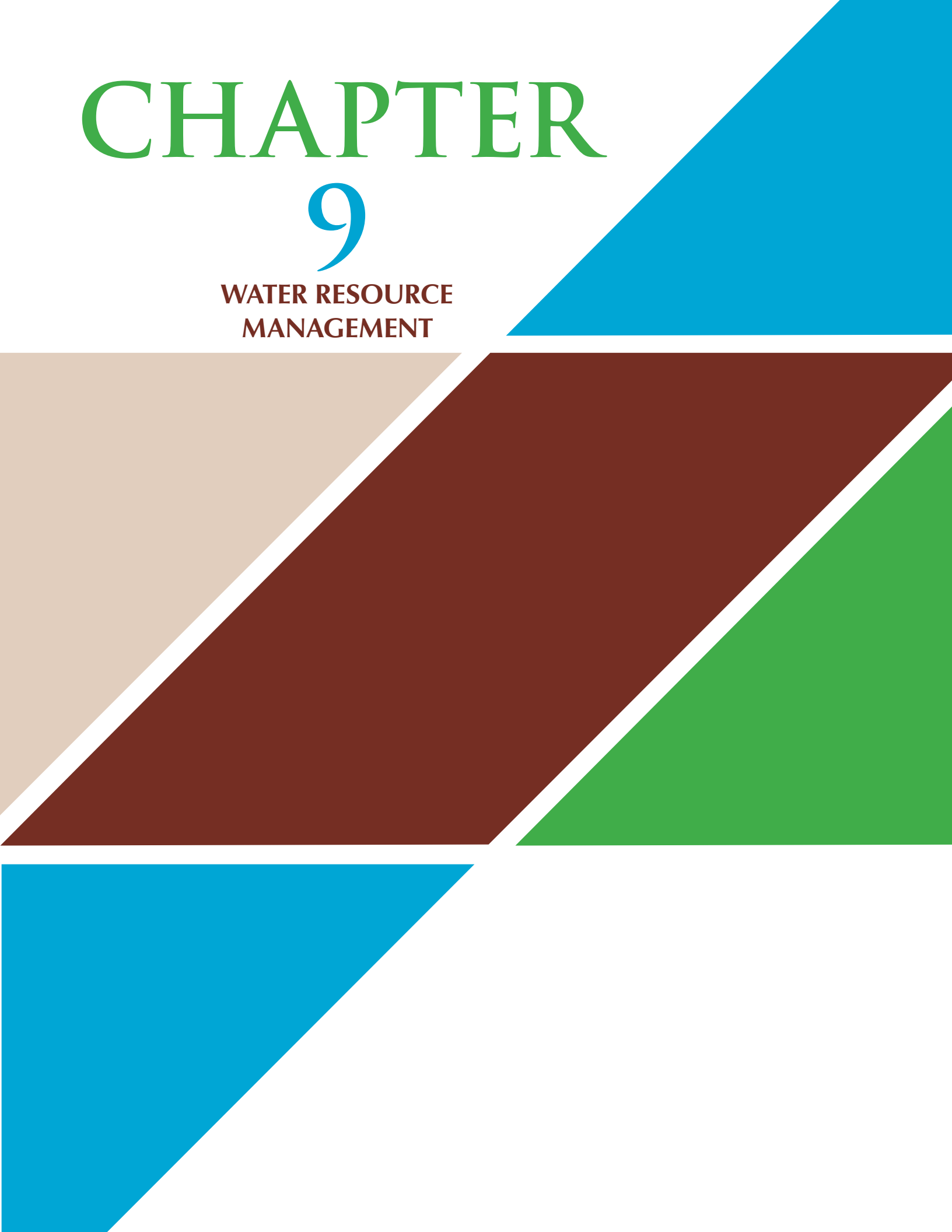


CHAPTER

9

WATER RESOURCE MANAGEMENT





Anonymous, Community Event 2022

WATER RESOURCE MANAGEMENT

BACKGROUND

Regional Water Sources and Providers

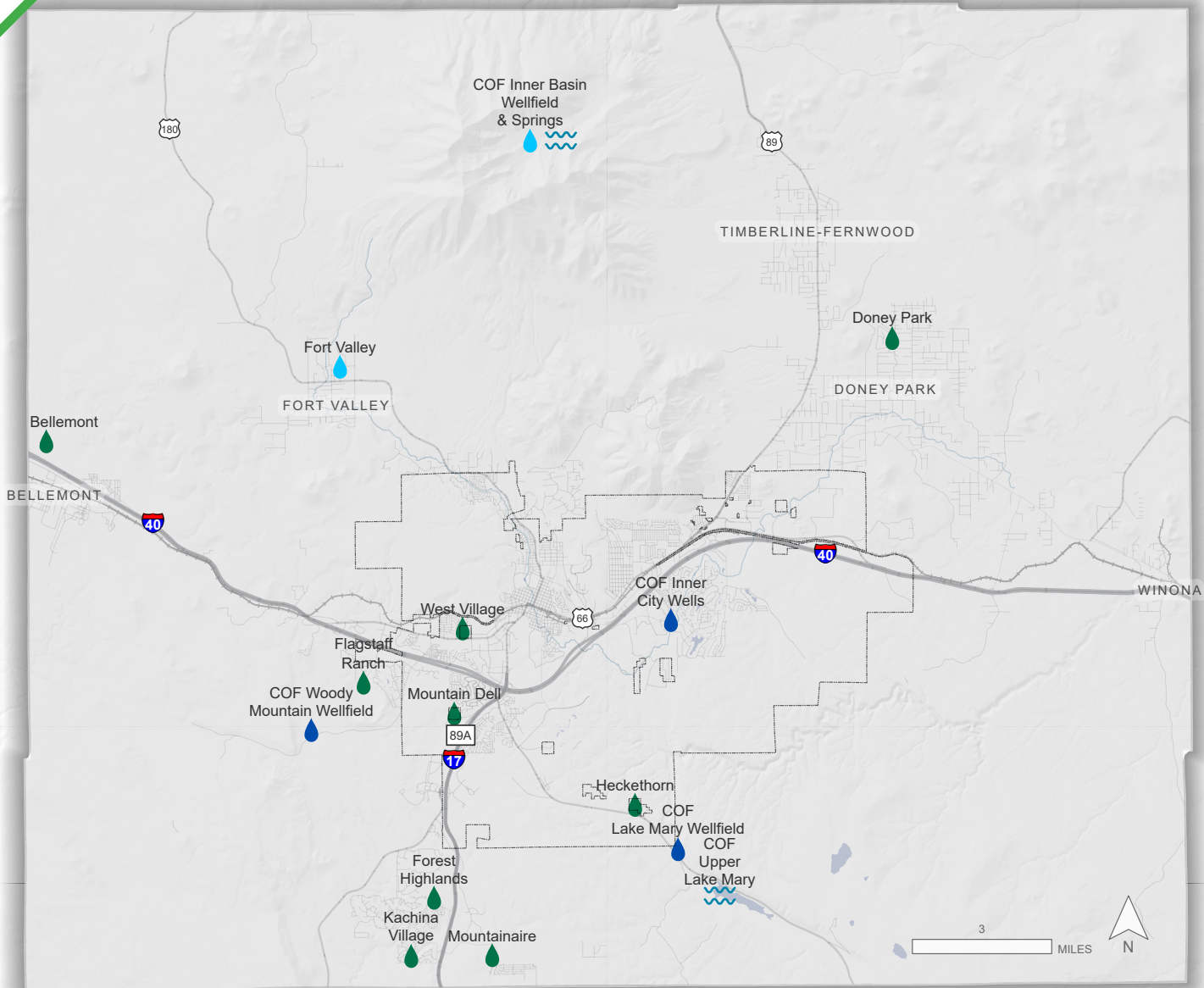
The City is the primary water provider within the Region, serving a population of about 80,000 people with just less than 20,000 water connections within its jurisdictional boundary. In unincorporated areas of the County, households and businesses rely on public or private water systems, individual wells, or water haulers transporting water from standpipe locations in the City or County. A Community Water System (CWS) must be established for any water system that serves 15 or more service connections (also known as “hookups”) used by year-round residents, or that serves 25 or more year-round residents who use water for drinking, cooking, bathing, and cleaning. A CWS may also serve all the businesses and other water users within its boundaries. These systems are regulated by the Arizona Department of Water Resources (ADWR), the US Environmental Protection Agency (EPA), the Arizona Department of Environmental Quality (ADEQ), and the Arizona Corporation Commission (ACC).

In the Region, drinking water comes from a combination of groundwater aquifers, spring water, and surface water sources. The largest water source across the Region is the Coconino (or C) Aquifer, which is a groundwater resource. Community Water Systems and individual homes located within County areas rely almost solely on groundwater. Throughout the Region, the depth to groundwater is variable as is the reliability of the groundwater sources. The depth to water can vary from less than 100 feet to more than 1,000 feet. In some locations where a shallow aquifer exists, it can be dewatered by pumping or by drought and is typically less reliable than the C Aquifer.





Pumping water from its source, delivering it to customers, and then treating it after its use utilizes energy at every stage of the water production and treatment processes. Water operations, including production, treatment, distribution, wastewater collections and treatment, and [reclaimed water](#) distribution, account for approximately 75 percent of the City’s municipal energy use.⁸ As such, conserving water also conserves energy.



Staff at the Lake Mary Water Treatment Plant laboratory



Community Water Systems and Water Sources in the Region

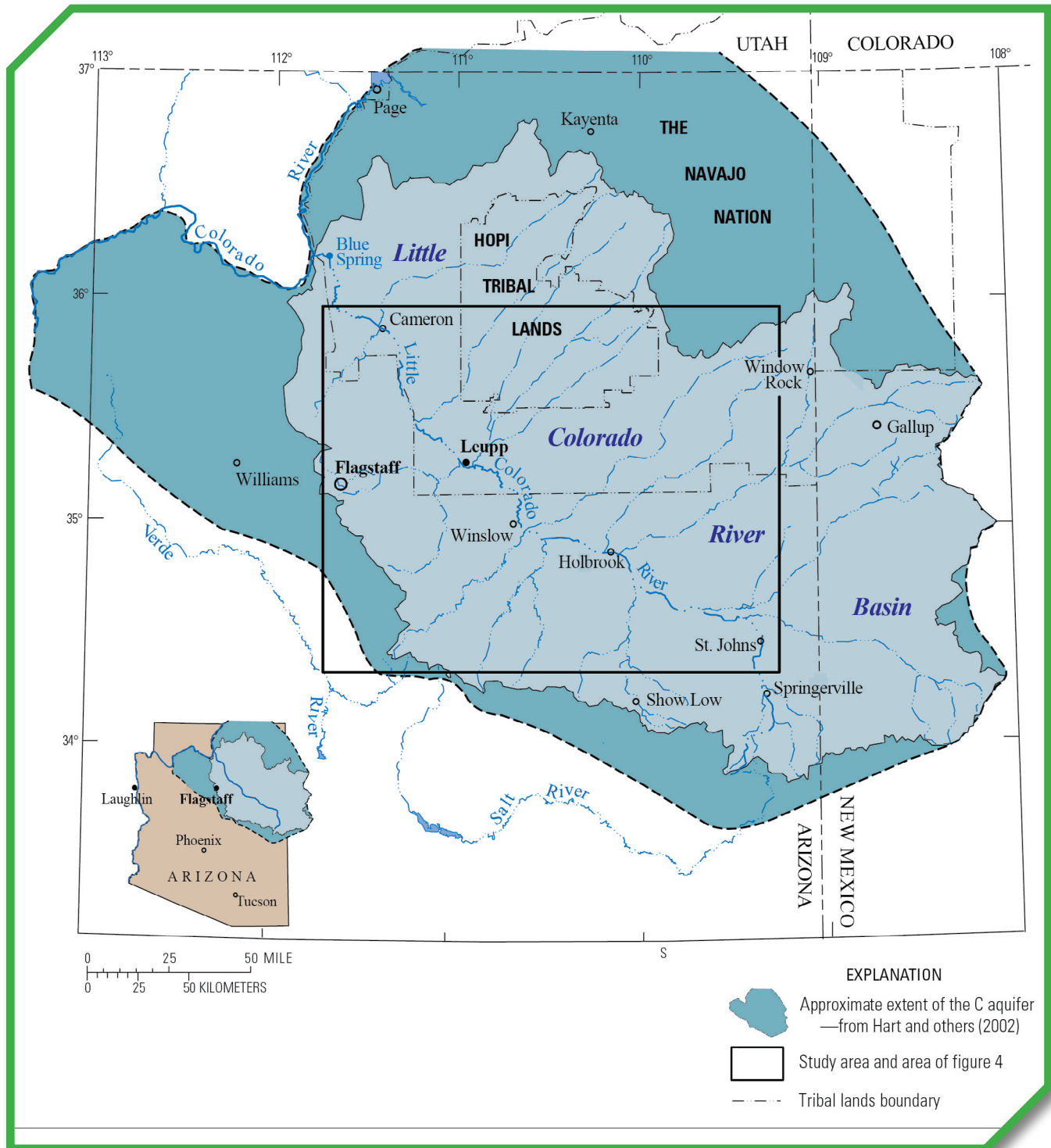
-  City of Flagstaff Surface Water Sources
-  C Aquifer Groundwater Sources - City of Flagstaff
-  C Aquifer Groundwater Sources - Other
-  Shallow Aquifer Groundwater Sources



Information Map 9-1: Community Water Systems and Water Sources in the Region

Airbus, USGS, NGA, NASA, CGIAR, NCEAS, NLS, OS, NMA, Geodastatysrelsen, GSA, GSI and the GIS User Community

The C Aquifer - The C Aquifer is a groundwater resource that extends across much of Northern Arizona and into New Mexico and Utah. It is a deep and reliable source of water for the Region. Depth to the C Aquifer water is commonly 1,500 feet below land surface. Nearly all of the City's wells pump from the C Aquifer. Other users of the C Aquifer include the Navajo Nation, Winslow, and Holbrook. The C Aquifer feeds springs along the Mogollon Rim and Grand Canyon, as well as riparian areas along Clear Creek, Chevelon Creek, and the Little Colorado River. The USGS maintains the C Aquifer Monitoring Program in partnership with the City and the Navajo Nation to track long-term changes in groundwater levels, water use, surface water, and water chemistry.³



City of Flagstaff Water Sources

City-specific water sources include surface water from Upper Lake Mary, spring water, and shallow groundwater from within the Inner Basin of the San Francisco Peaks, groundwater from the C Aquifer, and [reclaimed water](#). The City currently manages 27 groundwater wells located within the Woody Mountain, Lake Mary, Inner Basin, and “local” wellfields (within City limits). On average, 70 percent of the City’s water has come from the C Aquifer since 1949. Groundwater levels are stable in some areas of the C Aquifer and declining in other areas.

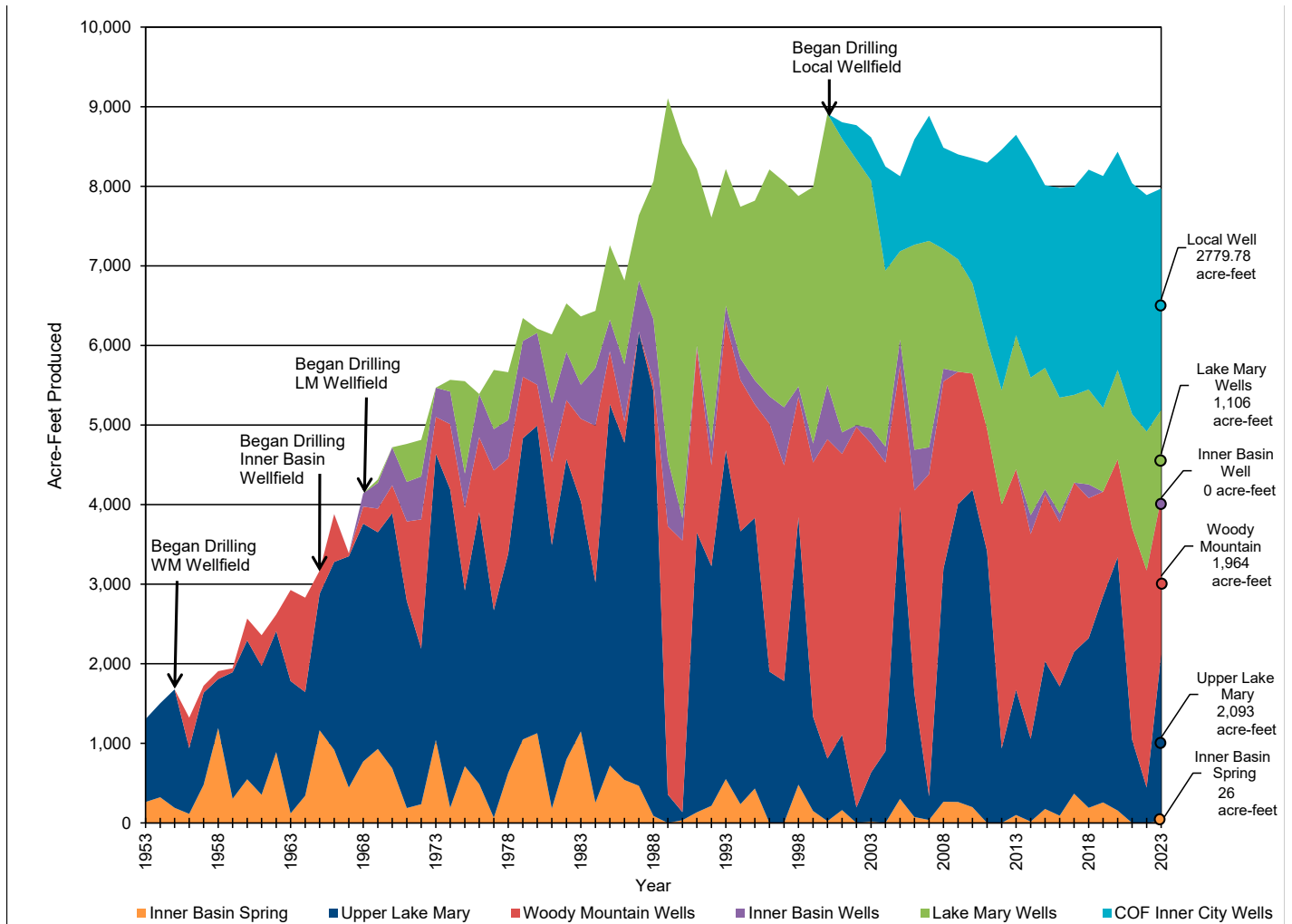


Figure 9-2: City Water Production from 1949 to 2023. Source: City of Flagstaff Water Services

Over time, the City has become increasingly reliant on groundwater, as shown in Figure 9-2. Prior to the onset of well drilling in the 1950s, surface water from Upper Lake Mary and the Inner Basin made up nearly 100 percent of supply. As groundwater was introduced into the City’s water deliveries, the surface water production changed. Since the late 1980s, surface water has accounted for between 25 and 50 percent of total water production, depending on climate conditions and how Lake Mary was operated and utilized. The shift to heavier utilization of groundwater reflects how an expanded diversity in water sources and water systems impacts the utilization of surface water vs. groundwater through a lens of operational efficiency and [resilience](#).

Even so, Upper Lake Mary, with a capacity of 16,300 acre-feet of water, remains an important asset long into the future. Water levels in Upper Lake Mary depend on snowmelt and rain-on-snow events typical of the spring months. The City's Water Services Division is investing in projects that monitor hydrological conditions and inform watershed health through maintenance that benefits runoff and reduces risk of catastrophic wildfire.

The Region's residents must be able to rely on safe, high-quality drinking water. The federal and state government set standards for water quality, and water providers must ensure the drinking water quality meets those standards. The City, like all Community Water Systems, monitors for chemicals and constituents of concern in drinking water as directed by the EPA's Contaminant Candidate Lists and Unregulated Contaminant Monitoring Rule.

These lists change over time and are available at the EPA's websites:

<https://www.epa.gov/ccl> and <https://www.epa.gov/dwucmr>.

The latest group of chemicals under regulation are called "per- and polyfluoroalkyl substances," or PFAS. The EPA provides analytic tools, such as a map providing information about PFAS across the country, from its website at <https://echo.epa.gov/trends/pfas-tools>. The ADEQ enforces all EPA regulations regarding PFAS and other contaminants of concern for all Arizona drinking water systems. It is essential for the City to stay informed about EPA developments to protect public health and the environment.

In the City's water system, water treatment happens in two ways. For surface water, the water goes through one of the City's two water treatment plants: the Lake Mary Water Treatment Plant or the North Reservoir Filtration Plant. Groundwater quality is high enough to meet state standards, so it does not require a treatment plant process. Instead, groundwater is chlorinated by the City where it enters the drinking water distribution system to ensure it is disinfected. The City has a laboratory that rigorously tests the water systemwide and submits reports for regulating agencies and for the public. In County areas, CWS must also meet federal and state quality standards, and their methods for doing so vary depending on the system. The EPA and ADEQ regulate these systems.

City of Flagstaff Potable Water Sources Average 2013-2022

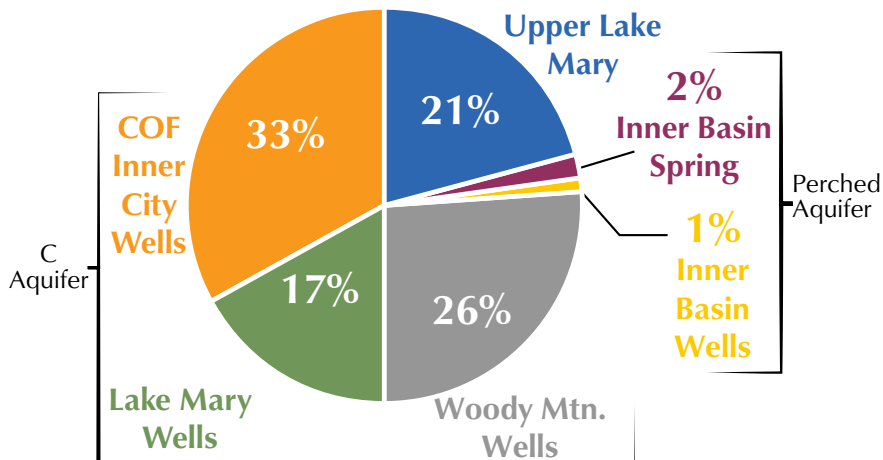



Figure 9-3: Potable Water Sources Averages 2013-2022. Source: City of Flagstaff Water Services



In addition to its drinking water system, the City operates a [reclaimed water](#) system with two plants: the Rio de Flag Water Reclamation Plant and the Wildcat Hill Water Reclamation Plant. Together, they have the capacity to produce up to 10 million gallons of reclaimed water per day. Reclaimed water is sold to local customers, generally for outdoor uses. Demand for reclaimed water typically outpaces supply in summer months via reuse agreements. Most agreements are for irrigation at NAU, schools, parks, and golf courses, and for snowmaking in the winter. The City has an agreement with AZGFD for reclaimed water discharges through 2030 at Frances Short Pond, the I-40 wetlands, and Picture Canyon for ecological benefit. The committed demands total about 2,000 acre-feet per year. Uncommitted reclaimed water totals about 2,500 to 3,500 acre-feet per year and is available during the winter months and during monsoon season when water demand is below production. The uncommitted reclaimed water is released to the Rio de Flag as per the City's discharge permits with the state of Arizona. The City continues to explore options, such as in-stream recharge of water to the C Aquifer, as a means to manage uncommitted water where multiple benefits to riparian habitats and community aesthetics can be realized.

Water Rights – Who has them and what are they?

ADWR administers the state's water laws and develops policies that promote conservation and protect water availability. The Region spans two watersheds where water claims are made: the Verde River and Little Colorado River. Claims to surface water and groundwater rights within both watersheds are subject to results of the adjudication process that is currently in progress for both watersheds.

Early in its history, Arizona adopted the **doctrine of prior appropriation to govern the use of surface water**. This doctrine is based on the tenet of "first in time, first in right" which means that the person who first puts the water to a [beneficial use](#) acquires a right that is senior to later appropriators of the water. Since 1919, **a person must apply for and obtain a permit and certificate to appropriate (use) surface water** per the Arizona Surface Water Code.

Groundwater is more tightly regulated within Active Management Areas (AMAs) and Irrigation Non-Expansion Area (INA) boundaries. Outside of these boundaries, **groundwater can be restricted in terms of its transportation between groundwater basins but is generally subject only to the requirement "for reasonable and beneficial use"** per [A.R.S. § 45-453](#). The Region does not overlap with any AMAs or INAs.

Outside of the AMAs and INAs, ADWR has no statutory authority to regulate the impact of one landowner's pumping on others using the same source unless groundwater is being transferred between basins or sub-basins. ADWR can investigate and inspect wells to ensure that they are properly constructed and that the associated well records are accurate per [A.R.S. § 45-633\[A\]](#). A CWS located outside of these areas still has the requirement to submit annual water use reports to ADWR.

Regarding the legal right to reclaimed water, the municipal provider that generates the treated wastewater has the legal right to that supply and shall submit evidence of that legal right to use wastewater for various state permits.



Water Demand for the City of Flagstaff Water Services

In the City, long-term water use trends show a steady decline in per-capita consumption, resulting in largely steady total consumption in spite of a growing population. In 1989, several water conservation initiatives were adopted by the Flagstaff City Council, most notably the adoption of tiered residential water rates, an outdoor watering ordinance, a water conservation program, fixture retrofit rebates, and the expanded use of [reclaimed water](#) starting in 1996. The formal water conservation program known today was established by the City Council in 2003.

Despite per-capita water use declining, the City anticipates a new water source will be required in the future based on growth projections, land uses identified in this Regional Plan, and changing climatic conditions. There are multiple options under consideration for this new water source. First, the City has the legal right to pump more local groundwater for municipal needs without regulatory oversight of whether enough water is physically available. However, second, City Council wanted more security in planning for growth; so in 2013, the City completed an assessment of water resources sustainability using a groundwater flow model developed by the USGS to achieve a Designation of Adequate Water Supply from ADWR. The criteria for determining water adequacy are:

- » demonstrating 100-years of physical water availability,
- » having [infrastructure](#) in place to meet 20 years of continuous water availability,
- » having the legal rights to the water supplies,
- » complying with ADEQ water-quality standards, and
- » having the financial capability to fund necessary projects.

In its simplest terms, this designation compares the City's current, committed, and future projected growth to its available water supplies over a 20-year timeframe. To maintain this designation, the City monitors water demand each year and submits reports about water adequacy to ADWR, which show the actual water produced and consumed compared to the projected amount. The City uses water planning scenarios like the one in Figure 9-4 to calculate water demand for future projected growth. Each scenario assumes a baseline growth level and water use assumptions.⁴ Per the baseline scenario, the City's projected 10-year total water demand in 2032 is approximately 10,800 acre-feet⁵. This is an increase over the City's total water demand of 9,437 acre-feet for 2022, or a 1.4 percent increase each year in projected water use.⁶

The thresholds for when water demand could trigger the need for an additional water source are determined by considering the annual water availability from Upper Lake Mary (1,925 acre-feet), local groundwater (9,913 acre-feet), and reclaimed water (2,212 acre-feet), or when the community demand exceeds 15,710 acre-feet. City Council may elect to bring on a new source of water sooner if this threshold is compromised due to drought or exceeding groundwater sustainability targets in the local groundwater well fields. One of these potential sources is Red Gap Ranch, purchased in 2005 with 71 percent voter approval of Proposition 203 in 2004. The City's Water Services Division is also continuing to investigate other options, and their relative costs, such as indirect potable reuse or Advanced Water Purification of its uncommitted reclaimed water as permissible by ADEQ.

Advanced Water Purification is what the ADEQ calls using water that has left a home or business and is turned into purified water⁷. ADEQ published rules in 2025 that will allow an Advanced Water Purification facility to be permitted in Arizona. This will help water systems across the state better plan for [resilient](#) water resources.

City of Flagstaff - Water Resource Resiliency & Redundancy Scenario Basecase

Supplies are in acre-feet annually [AFA]

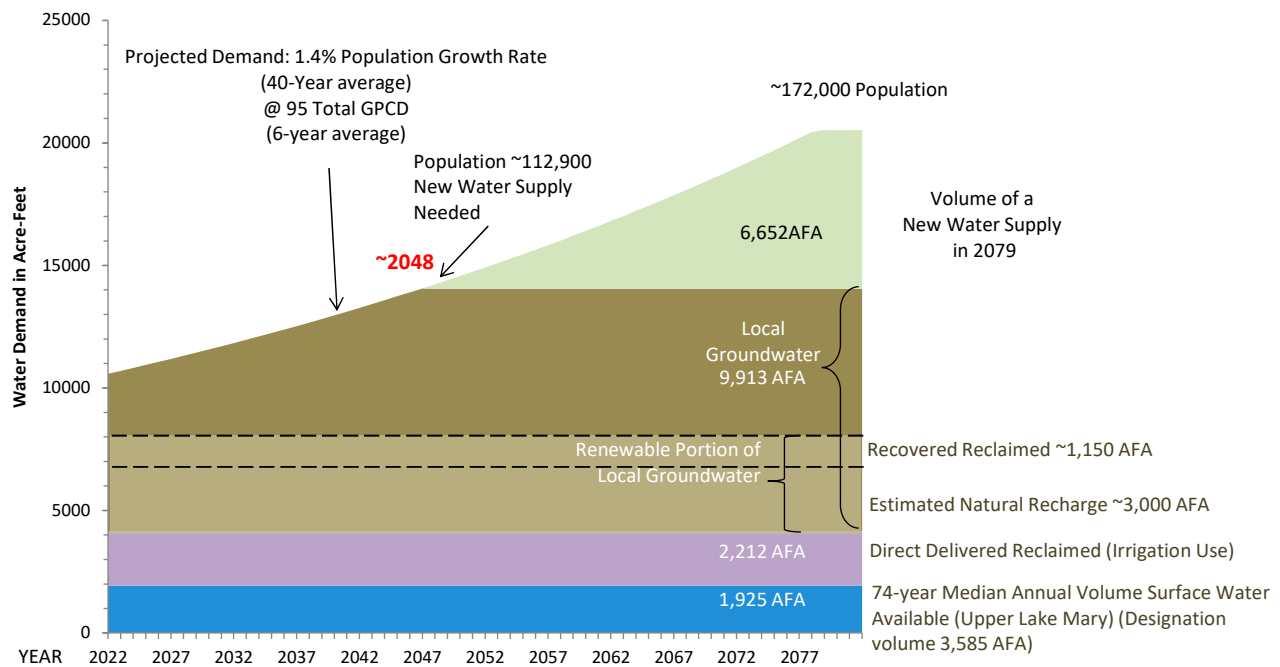


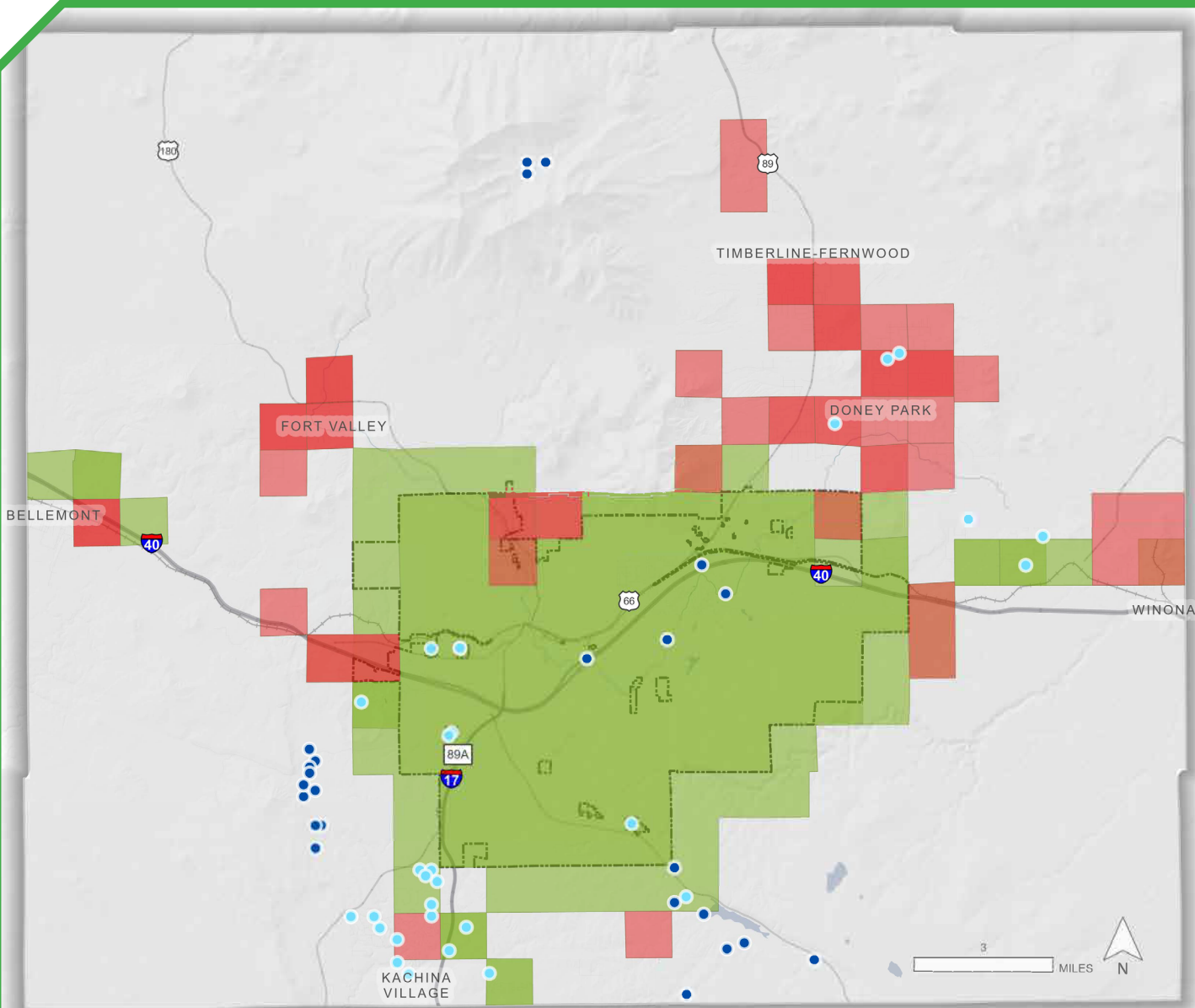
Figure 9-4: Water Scenario Basecase

City Drought Plan

City Water Services has provided water to the Flagstaff community for about 140 years. The droughts of the 1950s, 1990s, and early 2000s resulted in actions that have increased the Flagstaff community's [resilience](#) to water shortages during periods of no-to-little precipitation. The City has adopted policies that minimize the risk of water shortages due to drought. The 2018 Climate Profile for the City predicts warming summer temperatures and warmer winters.¹ The *Water Services Integrated Master Plan Water Policies Chapter*, adopted by City Council in 2014, includes policies and practices that protect water resources and the City from long-term, drought-based water shortages through strategic planning of all City water resources. Should a short-term water emergency occur, such as a drought-induced wildfire that impacts the City's water supply or water infrastructure, Flagstaff City Code 7-03-001-0014 outlines a community water curtailment plan. In this case, three "Water Availability Strategies" exist, each triggered by how much of the City's water sources are available compared to water demand. The strategies would be implemented if water demand exceeds water production thresholds.

Water Sources and Demand for Unincorporated Areas of the County

CWS or private wells are the primary water resources for residents in unincorporated areas of the County. Water resources are legally available as long as the appropriate records were filed and permits acquired from the ADWR. Sixty-nine applications have been submitted to ADWR to determine if a water service provider has met the criteria for water adequacy. Seventeen were determined to have an adequate water supply, either through a [Designation of Adequate Water Supply](#), a Physical Availability Determination, or a Water Report (see [Information Map 9-2](#)). The total water demand submitted from 67 of the 69 applications totals 2,969 acre-feet of water at "build out" of each community. This is the closest estimate available for total water demand for the Region outside of the City's Designation.



Groundwater Pumping Wells & Ownership

- City of Flagstaff
- Others

Water Supply Determinations

- Issued Adequate
- Issued Inadequate


The darker shade indicates where there is overlap with multiple determinations in the same section.

The Arizona Department of Water Resources (ADWR) Adequate Water Supply program was created to address the problem of limited groundwater supplies outside the "Active Management Areas" of Arizona where groundwater development is more restricted. The Adequate Water Supply program evaluates the availability of a 100-year water supply considering current and future demand, as well as growth projections. It ensures that the water adequacy or inadequacy is disclosed in the public report provided to potential first purchasers and that any water supply limitations are described in promotional or advertising material.



Airbus, USGS, NGA, NASA, CGIAR, NCEAS, NLS, OS, NMA, Geodatastyrelsen, GSA, GSI and the GIS User Community

Information Map 9-2: Current areas with an adequate or inadequate water supply permit. Source: ADWR Assured and Adequate Water Supply Database, 2024



Unlike the City, most County areas do not have centralized wastewater treatment systems. Still, water reuse occurs in the County on a smaller or individual scale. The County Building Code requires a [gray water](#) stub out for clothes washers located on an exterior wall of a building. Several systems in the County recycle wastewater for non-potable uses. The Kachina Village Improvement District, Flagstaff Ranch Water, and Utility Source in Bellemont produce and reuse [reclaimed water](#) for irrigation. The Kachina Village Wetlands, City of Flagstaff I-40 Wetlands, and Picture Canyon are examples of areas where treated wastewater is released from the treatment plant with benefits to the environment, especially wildlife, and as an amenity to the community.

[Regional Water Planning Efforts](#)

The Coconino Plateau Water Advisory Council and Coconino Plateau Watershed Partnership (CPWP) were formed in 2000 out of an increasing awareness about the impacts of drought and growth on the area water supply. The agencies, organizations, and tribes involved in these organizations are not only dedicated to protecting the health and beauty of the Region's environment, but are also assessing studies about the current and long-term impacts to water resources, and working to find solutions to the Region's water issues. The City and County are partners in the CPWP, which helps to create unified data and advocacy around groundwater and surface water sustainability throughout Northern Arizona.

CPWP has studied groundwater availability issues, with a focus on ecosystem health and [services](#) provided by surface water and groundwater resources of the Coconino Plateau, which encompasses the Region. A few of the notable trends identified through the recent *Water-Related Ecosystem Services Assessment*² include:

- » Recent decreases in total water use in Coconino and Navajo counties even as populations have increased.
- » Increases in the number of wells in the study area but decreases in the rate at which they are added.
- » Apparent declines in select index wells' groundwater levels and in summer (June) flow at certain stream gages.
- » Increases in wildfire frequency, but also sustained forest restoration efforts.
- » Steady increases in visitation associated with tourism and recreation and in visitor spending in Coconino County.

[Water Conservation](#)

In 2020, the Flagstaff City Council approved the 2020 [Water Conservation Strategic Plan](#). The plan describes water conservation initiatives the City will implement from 2020 to 2040 (see [Figure 9-5](#)). These initiatives were selected via an intensive public outreach process as well as an in-depth cost-benefit analysis. A significant portion of the water saved through water conservation planning occurs outdoors. Outdoor water conservation is beneficial for the municipal wastewater collection system since indoor water conservation can reduce the velocity of waste moving through the gravity fed sewer system. Slower flows can cause areas of the system to stagnate and corrode the pipes.

The City and County also promote water conservation through rainwater harvesting, which involves collecting and using local precipitation close to where it falls. In the County, harvested water—with proper treatment that follows County regulations—can be used to meet daily water needs. A large storage capacity is needed to capture a sufficient quantity of water for potable use to cover daily needs. Homes outside of a municipal water system that otherwise need to haul water typically use these systems. The County regulates potable use of harvested water through its Building Code. In the City, harvested water is recommended for landscape use only.

Passive and active rainwater harvesting helps to alleviate demand on the potable water system. Updates to City landscape and rainwater retention codes for water conservation outcomes will be executed as per the [Water Conservation Strategic Plan](#).

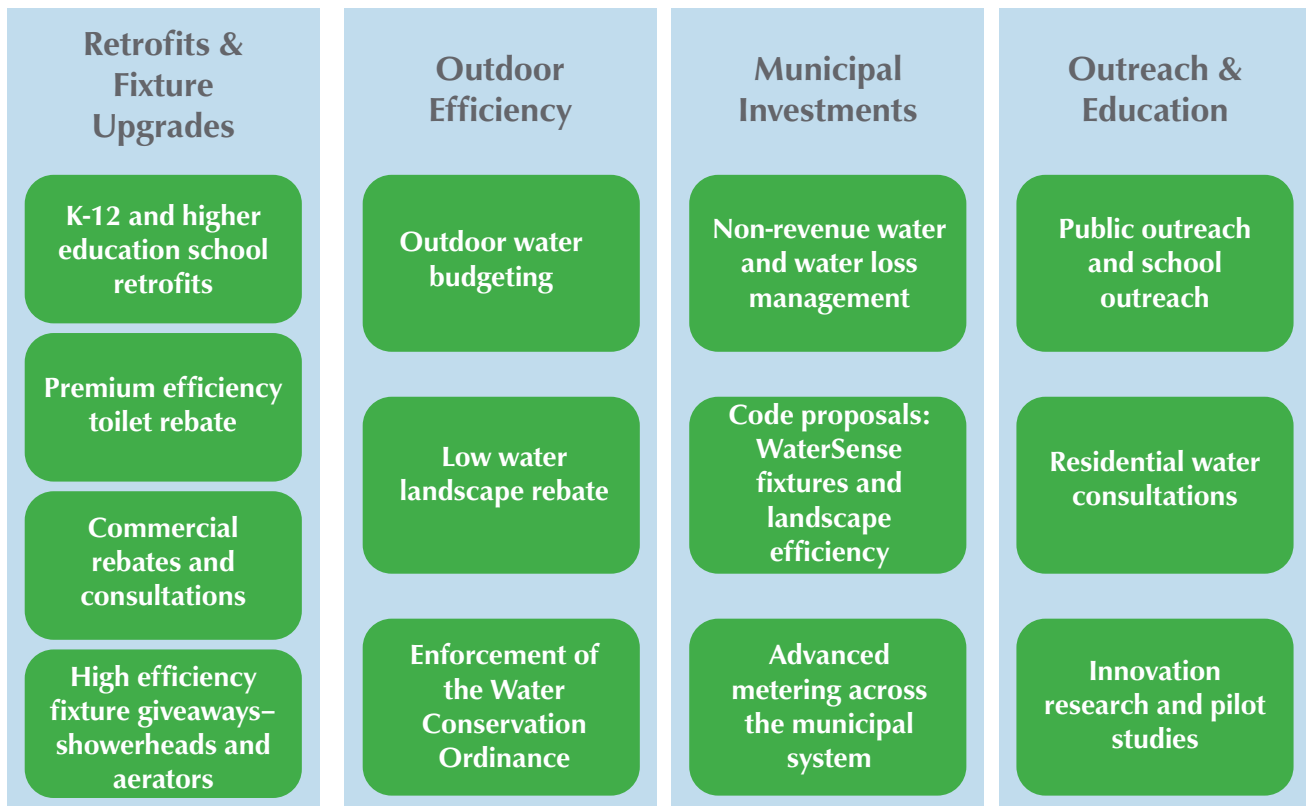


Figure 9-5: Key Recommendations of the 2020 Water Conservation Strategic Plan

Stormwater Management

Region-wide water quality is also addressed through stormwater management. Runoff from rain and flooding events can wash contaminants into the watershed, including sediment, chemicals, and bacteria. The City has a stormwater system made up of pipes, drains, culverts, and water storage facilities, which are separate from its water and wastewater infrastructure. In addition to traditional stormwater systems, low impact design (LID) approaches are implemented to manage rainfall runoff at the source using decentralized, small-scale controls that are uniformly distributed throughout a site and designed to mimic natural watershed functions. Such systems allow for capture, filtration, storage, and infiltration of stormwater runoff. Traditional storm drain systems, in conjunction with LID, are helping to address flooding and assure water quality.

The City's [Stormwater Strategic Plan](#) outlines how the City will approach detection, prevention, and elimination of pollution sources; review of development plans; erosions and sediment control; the management and oversight of construction activities relative to stormwater; and public participation and engagement. These management practices constitute the normal operations of the Stormwater Section that are essential to protecting water quality. The *Stormwater Strategic Plan* outlines the challenges of the increasing responsibilities of, and [climate change](#) impacts on, stormwater infrastructure and resources. The *Stormwater Strategic Plan* sets nine strategic objectives:

1. Respond to Wildfire Flooding Risks and Events.
2. Clarify Climate Change Characteristics and Overall Stormwater Challenges.
3. Maximize/Optimize Stormwater System Maintenance.
4. Clarify Service Levels and Enhance Customer Service.
5. Increase Support for Floodproofing of Individual Structures.
6. Enhance CIP Process and Update Priorities.
7. Enhance Development Review Process and Developer Support.
8. Improve Communications and Collaboration.
9. Address Stormwater Section Human Resource Needs.

The County Flood Control District is charged with minimizing the impact of flooding on human safety, health, and welfare and restoring and preserving the natural and beneficial values served by floodplains throughout the County. As a governmental body, the District conducts Flood Risk Assessments, implements Flood Mitigation [CIPs](#) in Federal Emergency Management Agency (FEMA) Floodplains, supports the National Flood Insurance Program, conducts Post-Fire Flood Mitigation Activities, and supports Forest Restoration Initiatives.

The City and County agencies that manage the Region’s water resources are essential partners in preserving water quality and addressing the costs, mitigation, and risks of flooding.

Action Items

High Priority Action Items. See [Appendix C](#) for additional information.

Type of Action	Item	Timing
Plan/Partner	Continue to optimize existing water resource options to ensure a redundant and resilient water supply exists today and for generations. This includes supporting water conservation activities and expanding the capacity for future water supplies such as, but not limited to, Advanced Water Purification, direct and indirect aquifer storage and recovery, sustainable groundwater use, expansion of the reclamation system, and a pipeline easement or other entitlements for a regional project at Red Gap Ranch consistent with the Northeastern Arizona Indian Water Rights Settlement Agreement (NAIWRSA).	Long term
Plan	Assess wildfire trends and identify project and staffing needs associated with building and maintaining new stormwater infrastructure specific to addressing wildfire-related flooding.	Mid term
Plan	Maintain an ADWR 100-Year Adequate Water Supply Designation for the City’s water system.	Continuous
Educate/ Partner	Support science and data that allow for spring preservation and protection as environmental monitoring for watershed health.	Continuous
Plan	Continue to identify, prioritize, and mitigate conditions in neighborhoods that remain at higher risk for flooding and develop a CIP through prioritization to mitigate flood risk.	Continuous

Other Action Items: While important, these projects may be prioritized as opportunities and funding arise.

Type of Action	Item	Timing
Plan	Complete and update a regional water demand study for the Coconino Plateau Watershed Partnership.	Continuous
Code	Continue to develop water use policies that integrate current best projections of climate change effects on the Colorado Plateau’s water resources and emphasize conservation and water resiliency in coordination with regional partners.	Continuous
Partner	Continue partnerships that include state agencies, the County, Indigenous nations, cities, and water providers through the Coconino Plateau Watershed Partnership, NAIWRSA, and the Little Colorado River Adjudication Process, where applicable, to work toward regional opportunities for water supply evaluations and solutions for long-term sustainability of water sources and environmental flows.	Continuous
Plan	Regularly update the City’s Water Conservation Strategic Plan and share its findings with Regional partners and the public to assist in conservation efforts.	Continuous
Fund	Develop resources for expanding water and sewer facilities in support of affordable housing .	Long term

Type of Action	Item	Timing
Plan	Analyze new burned area flooding risks and build preventative measures before flooding occurs.	Long term
Partner	Create an Intergovernmental Agreement (IGA) between the City of Flagstaff Water Services and the Coconino County Flood Control District to define roles and responsibilities better.	Mid term
Plan	Conduct modeling of various climate change and land use change scenarios to determine the range of stormwater system capital investment needed to meet future challenges.	Long term
Code	Develop more detailed standards related to service levels for maintaining and enhancing system assets and risk mitigation for individual properties and customers.	Long term
Fund	In coordination with the City's Water Services, Sustainability, Housing, and Planning and Development Services divisions, work to develop a program and funding for technical and financial support for customers in areas of need who wish to implement flood proofing measures.	Long term
Fund	Identify funding sources to pay for long-term water supplies.	Long term
Plan	Stay up to date on exploration of water treatment technology and research and its potential applications in the Region.	Continuous
Fund/Plan	Implement regional detention and retention flood basins for WUIs with substantial upstream catchment areas, and prioritize them by the risk, vulnerability, and density of the downstream populations.	Mid Term
Plan/Partner	Maintain administrative floodplains within the City. Within the County, share information from the Fort Valley Initial Engineering Assessment with developers and residents, and conduct new studies based on need and available funding.	Continuous
Partner	Coordinate stormwater management between the City and County to support a high-quality water supply for the Region.	Continuous
Plan	Monitor and improve ecosystem services in watersheds that serve the Region and to protect the quality of existing and future water resources and dependent riparian ecosystems.	Continuous
Partner	Encourage County water providers to achieve 100-Year Water Adequacy through the ADWR.	Continuous

Chapter 9 Endnotes

1. CLIMAS, *Climate Profile*, 2018.
2. Coconino Plateau Water Advisory Council, *Water-Related Ecosystem Services Assessment*, 2020.
3. USGS, "C Aquifer Monitoring Program," 2017.
4. The baseline scenario assumes Flagstaff's 40-year average growth rate, while the Regional Plan scenarios are based on the moderate growth projections. The baseline scenario is therefore conservative about the timing of a new water supply water availability. Additional scenarios are provided in Hill, B., *Water Resource Scenario Planning, Resiliency and Redundancy Technical Memorandum*, January 2025.
5. A scenario like what is provided in Figure 9-4 demonstrates projected water use, which is not a direct comparison with actuals given the growth rate and per-capita water use rate are not constant from year to year. Scenarios are not static and are updated and recalibrated for accurate modeling based on new data and conditions. Therefore, scenario planning is an important tool for looking at a range of projections to capture and prepare for the range of demands Flagstaff might experience.
6. City of Flagstaff, *Report to the Water Commission*, 2023.
7. ADEQ. *Advanced Water Purification*. 2025
8. City of Flagstaff internal energy use data.

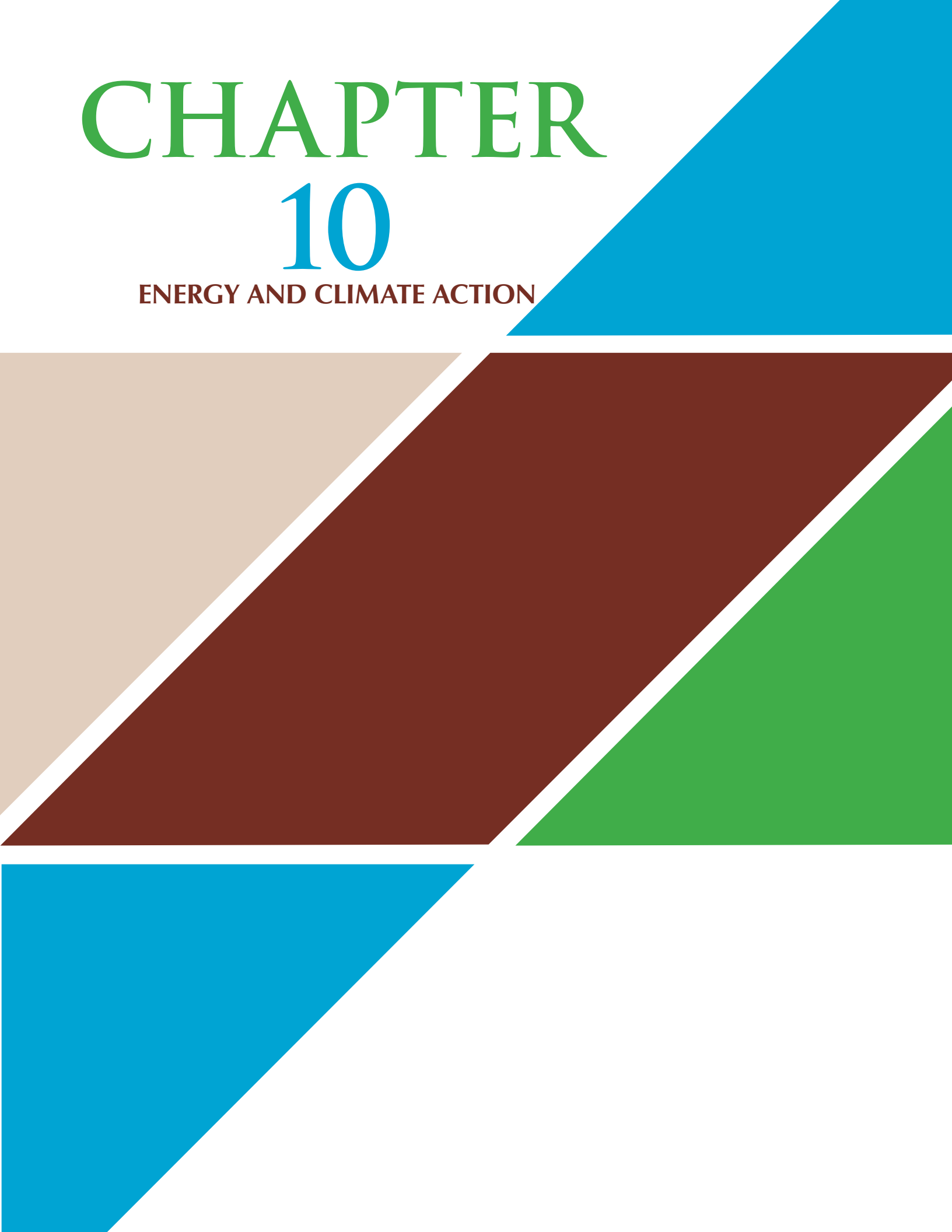


A diver entering the Buffalo Park reclaimed water tank to vacuum sediment.

CHAPTER

10

ENERGY AND CLIMATE ACTION





Ponderosa's Soul, Jane Birchard, 2022

ENERGY AND CLIMATE ACTION

BACKGROUND

Energy is an essential community resource created by a complex multijurisdictional system where the public, private sector, and federal, tribal, state, and local governments must collaborate to provide services and meet the demands of communities, while planning for the future. In the Region, Arizona Public Service Company (APS) provides electricity and Unisource Energy Services provides natural gas utilities.

The Region’s electricity needs will continue to rise due to warming temperatures, drought, increased dependence on technology, the adoption of [EVs](#), electric heating in homes, and growth in population and tourism. In January 2020, APS made a ‘[carbon free](#)’ commitment, setting goals of 65-percent carbon-free grid electricity by 2030 and 100-percent carbon free electricity by 2050. This is a 30-percent improvement compared to the local grid in 2020. The City’s goal of achieving [carbon neutrality](#) is intrinsically linked to APS’ carbon free commitment. With the growing demand for electricity, the City is prioritizing energy efficiency and educational strategies to reduce demand and utilize cleaner sources of energy.¹ The proportion of emissions from natural gas use is expected to rise as emissions from electricity decline with an increasingly cleaner grid.

Unisource provides natural gas to over 25,000 Flagstaff customers. Approximate half of natural gas usage in Flagstaff is residential, and the other half is almost evenly split between industrial and commercial customers. Unisource is creating a Renewable Natural Gas Feasibility Study and may look to partner with the City and County on methane capture and other CO2 removal projects as part of its strategy.

Energy and Emissions: Energy use in buildings is the largest source of human-caused GHG emissions and accounts for approximately 50 percent of the City’s total emissions. Reducing energy use, using energy more efficiently, and switching the fuels used in buildings and for transportation are critical components of reducing [GHG](#) emissions.

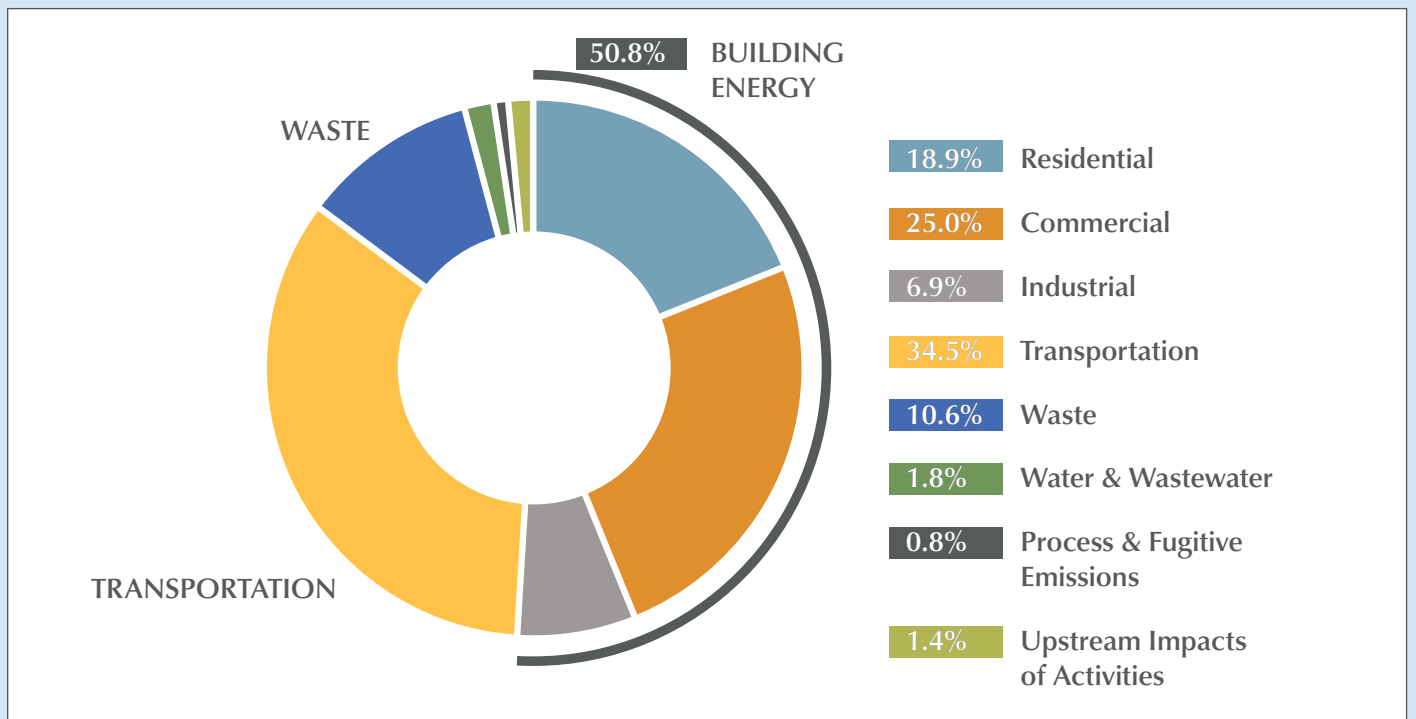


Figure 10-1: City of Flagstaff Emissions by Sector in 2020. Source: Climate and Energy Regional Snapshot

Building Energy

Energy use in buildings use has a direct impact on a community's health, safety, air quality, environment, and economic development. The City and County influence energy use through their policies, codes, programs, and outreach, but the types of energy available to the City and County are driven by the electric and gas utility providers and regulated by the ACC.

Improving energy efficiency, coupled with switching building fuel, are two of the quickest methods to reduce energy demand and emissions from buildings. Building fuel switching is the process of moving from on-site combustion of fossil fuels (such as natural gas) to electricity for building appliances. This includes changing out appliances for cooking, space heating, water heating, or drying clothes. Electric appliances are more efficient than gas-powered appliances, and lead to large reductions of emissions. On-site combustion of natural gas produces approximately 44 percent of the City's building emissions, including approximately 56 percent of residential emissions² (see [Chapter 7, Resource Stewardship and Resilience](#), for more information on air quality).

An estimated 69 percent of households in the City use natural gas for heating, which is notably higher than the County-wide rate of 49 percent. In both the City and County, about 24 percent of households use electricity for heating. In the County, it is more common for households to rely on wood stoves (15 percent) and propane or other bottled gas (nine percent) for heat. Within City limits, only about six percent of households use a non-utility source for heat.³ Removing natural gas utilities entirely from existing customer properties may be cost prohibitive in some cases. Therefore, increasing the efficiency of natural gas appliances and heaters and providing [weatherization](#) assistance are important tools for reducing emissions when fuel switching is not a financially feasible option.

The City has an incentive program to reduce emissions through being energy efficient and switching to electricity as the primary energy source for buildings. This strategy will reduce climate pollutants, especially as the proportion of [renewable energy](#) that powers the electrical grid increases. Emissions from electricity currently constitute approximately 25 percent of all of the City's [GHG](#) emissions.⁴ Fuel switching on pace with APS's objective to have a 100-percent clean electricity grid by 2050 would eliminate one quarter of the City's emissions. In combination with the various fuel switching strategies, the impact of clean electricity could be even greater.

Increased energy efficiency is an important goal for the City and County, as it results in lower costs for residents, increased [resilience](#), and reduced GHG emissions. Energy efficiency solutions can be applied to new construction or as a retrofit to an existing building. Examples of construction methods and tools that can reduce energy use and GHG emissions include but are not limited to weatherization, smart thermostats, energy-efficient appliances and windows, cold-climate electric or dual source heat pumps for space and water heating, [distributed energy generation](#), water conservation, and energy storage (batteries). New construction is generally more energy efficient than existing buildings because it meets the newest Building and Energy Code requirements; however existing buildings have higher [embodied carbon](#).

The Cost of Energy Inefficiency: The existing building stock is expected to make up more than 90 percent of the Region's buildings in 2030,⁵ making energy efficiency retrofits an important priority for the City and County. Flagstaff's older building stock would benefit from energy efficiency and electrification upgrades, which would improve indoor air quality and health and reduce costs for residents. Energy-efficiency investments reduce the amount of energy needed to heat and cool buildings, which leads to lower energy bills and less reliance on outside fuels. This, in turn, can ease the financial burden of extreme weather on middle- and lower-income households. More efficient buildings help City residents be better prepared for the extreme weather that is predicted due to [climate change](#), such as excessive heat, large winter storms, or extreme cold. Home weatherization, a low-cost energy efficiency tactic, also improves health for residents—particularly for children who suffer from asthma.⁶ Energy-efficient building practices and demand management will be needed to ensure that buildings in the Region are well-insulated and require less heating and cooling.

Clean Energy Production

The Region already benefits from some clean, [renewable energy](#). APS and private developers who sell energy to utility companies provide sources such as wind, solar, and hydropower. Residents and businesses also generate renewable energy through on-site production such as smaller-scale photovoltaic panels, wind turbines, and [biomass](#). The benefits of renewable energy include lower pollution, reduced [GHG](#) emissions, and increased energy independence. Importantly, utility scale solar and wind, combined with energy storage, are now the least expensive sources of energy generation and are becoming a much larger component of the electricity grid. Because of their low costs, wind, solar, and battery power plants comprised 82 percent of all new energy generation in the US in 2023.⁷ The 15-year [APS Integrated Resource Plan](#) preferred action plan would increase the total installed capacity by 16,000 megawatts by sunseting coal power; increasing [microgrid](#), wind, solar, and [distributed energy](#); and through efficiencies gained via demand response and energy efficiency.⁸ In addition to the energy sources shown in Figure 10-3, the City has a power allocation from the Hoover Dam, providing renewable hydroelectric power for municipal use.

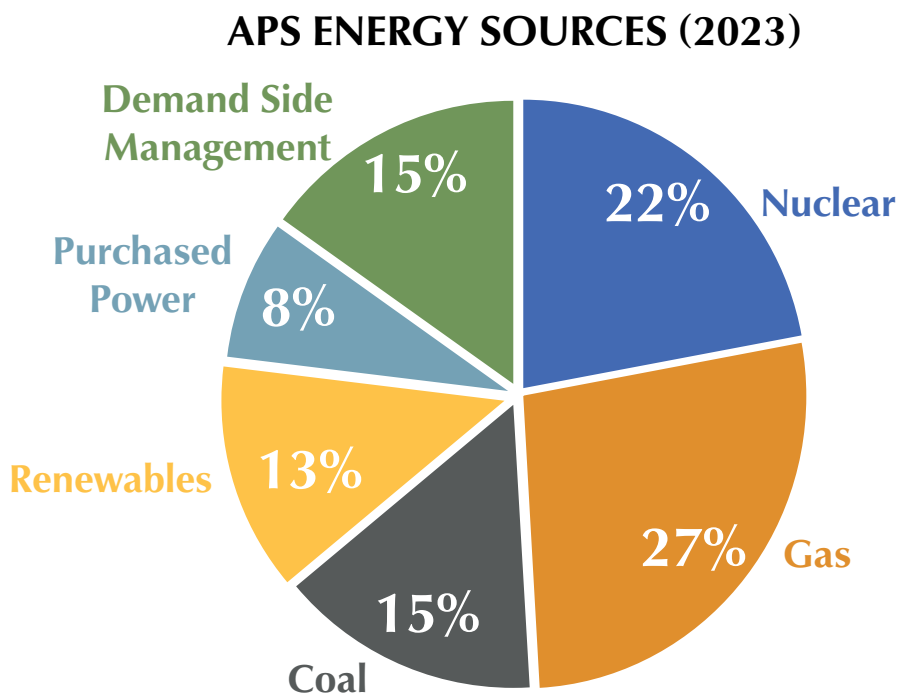


Figure 10-2: APS Energy Sources in 2023 across the entire APS service area, which covers much of Arizona. APS generates power through various generation stations and through purchased power agreements. "Demand Side Management" refers to energy conservation and storage measures. Source: APS

The City Zoning Code permits small-scale and renewable energy solutions in all zones by right. The County Zoning Code also allows for distributed renewable energy systems in all zones. This means that adding solar panels or a wind turbine to an existing developed site is permissible. Many commercial and residential energy customers have taken advantage of rebates, cooperative models, and tax incentives to produce on-site energy. These activities also provide clean energy into to the grid through agreements with APS under its existing programs.

Data Centers and Chip Manufacturing: In recent decades, the demand for digital services has grown rapidly, requiring a network of energy- and water-intensive data centers and semiconductor chip manufacturing facilities. These data centers use 10 to 50 times the energy per square foot of floor space than a typical office building and account for approximately two percent of total US electricity use.⁹ Several data centers are planned or are under construction within APS’s service territory, though none are currently proposed for the Region. APS projects that data centers will be a primary driver of forecasted energy growth and is planning for increases in annual peak demand and energy needs due to data center load.¹⁰ Manufacturing of semiconductor chips (for computers, phones, cars, and other technological devices) is a growing land use in Arizona and across the US that can use millions of gallons of water every day. Although there are currently no semiconductor chip manufacturers in the Region, it is important to consider the potential future impacts of these facilities on local energy and water supplies.

Coconino County’s 2015 [Comprehensive Plan](#) identified the need to develop a utility-scale energy ordinance to provide developers with direction on the appropriate siting of utility-scale projects. Utility-scale [renewable energy](#) systems produce electric power and transmit it to supply energy to the electric grid for off-site uses. In 2022, the County adopted a utility-scale renewable energy ordinance that provides location criteria and specific standards for developing utility-scale renewable energy throughout the County, including the portion of the County within the Region. To date, there is one utility-scale project within the Region: an APS solar installation located on Highway 89 in Doney Park. Several existing and planned projects are located within greater Coconino County.

Opportunities to develop utility-scale solar production on City property exist at a limited number of large City-owned properties. Large private properties such as Babbit Ranches and Arizona State Land also support utility-scale renewable energy production for the economic benefit of the property owner to trustees. Utility-scale solar on large properties in the Region could generate an equivalent amount of electricity to cover government operations and meet the electricity needs of a sizable portion of the community.

Shifting to clean electricity decreases the current impact fossil fuels have on historically marginalized neighborhoods and communities. At the same time, the economic, [sustainability](#), and air quality impacts of new utility-scale energy facilities must be balanced with potential consequences for natural resources, cultural sites, and practices valued by Indigenous residents. The County’s Utility-Scale Renewable Energy Ordinance therefore identifies “Project sites that retain current and traditional land uses, including ceremonial uses for Native Americans, and allow multiple uses of the land such as ranching, agricultural, and recreational uses, are preferred over single-use projects” as preferred site criteria for locating and designing new installations.


[Grid Modernization](#)

Grid modernization is rooted in four basic principles:

1. Better integration of various sources of electricity to ensure a [resilient](#), reliant, and flexible grid.
2. Improve grid security.
3. Address the challenges of energy storage and [distributed energy](#).
4. Provide a critical platform for the US to compete and innovate in the global energy economy.

While APS is transitioning from fossil-fuel-based energy to clean and renewable energy sources, the *APS Integrated Resource Plan* forecasts that the electrical demand from data centers, large industrial and manufacturing sites, [EVs](#), and commercial and residential uses will increase by nearly 24,000 Giga watt hours statewide by 2040.¹¹ This growing demand will require expansion of the grid in the next few decades, which will have landscape-scale effects on Northern Arizona. For example, transmission mains must be replaced, updated, and expanded. Without these necessary [infrastructure](#) expansions, the Region will not be able to meet its carbon reduction objectives. At the same time, the environmental impacts of expanding and extending large-scale electrical infrastructure will need to be evaluated and, where possible, mitigated.

To increase grid stability, APS has begun to develop redundancy loops of transmission lines, including one that benefits the Region. Redundancy is key to grid modernization. It ensures the continuity of electrical service during repairs, equipment issues, or unexpected events. The 230-kilovolt lines planned and under construction are needed



to meet the *Integrated Resource Management Plan* goal “to provide service to a new high-load customer and additional redundancy to new and existing high-load customers in the area. The in-service date is predicated on ramp rate of customer load.”¹² From a land use perspective, these facilities are considered “utilities” in the City and County zoning codes and are allowed by right. The complexity of permitting and constructing them to and from the Region requires coordinating with federal lands and balancing the need to complete this [infrastructure](#) and ensure its stability with conserving the Region’s natural and [cultural resources](#).

Electric Vehicle Charging Infrastructure

Electrification of the transportation sector requires a robust network of [EV](#) charging infrastructure. Investing in and encouraging expansion of electric charging infrastructure for EVs increases access for residents and enables visitors with EVs to select the Region as a destination. Ideal sites for charging stations include businesses, public facilities, hotels, multifamily residential complexes, and individual homes. The City is supporting the transition by implementing charging standards for new developments and redevelopments, installing EV charging stations on City property, and providing public education and outreach. The City has worked with APS to install charging ports for public use at City facilities and update code to promote EV-ready parking spaces at commercial and multifamily new construction. The County has installed EV charging stations at four locations throughout the County, two of which are publicly accessible, through the APS Take-Charge Program, and will install additional units as funding becomes available.

ADOT’s [Electric Vehicle Infrastructure Deployment Plan](#) “seeks to increase the long-range mobility of EV drivers by reducing gaps in electric vehicle supply equipment infrastructure (EVSE; i.e., an EV charging station) and contributing to an equitable, reliable, resilient, and accessible national EVSE network.” The plan identifies the charging network along Alternative Fuel Corridors established by the FHWA. I-40, from the interchange with I-17 in Flagstaff, east to Winslow is designated as a corridor that is ready for EV charging designed for the traveling public. US Highway 89, from Flagstaff to Utah, is pending based on necessary upgrades to the existing electrical infrastructure.

Household Energy Costs and an Equitable Energy Transition

The transition to clean energy and the impact of energy costs on households are important considerations in establishing regulations and programming for building energy efficiency. Residents in cold climates in the western US spend an average of \$1,550 on annual energy costs.¹³ Three in 10 households in the US face challenges in meeting their energy needs.¹⁴ Low-income households face a disproportionately higher energy burden, meaning they spend a greater portion of gross household income on energy costs. In the City, low-income households spend 13 percent of their income on energy each year; higher-income households spend between one and three percent. This large and disproportionate energy burden leads to a high cost of living, limited disposable income, and financial insecurity for the City’s low-income families. As the City transitions to more energy-efficient and electric homes, prioritizing the homes of low-income residents, who suffer the most from inefficient buildings and high energy prices, is critical.

There are many ways to reduce home energy consumption and costs in existing and new homes, such as net-zero building strategies, Green Building standards, and other methods. The combination of energy-efficient, all-electric appliances and equipment and home [weatherization](#) can reduce annual energy use and costs, especially if paired with on-site photovoltaic solar panels. For example, all-electric homes can have lower upfront costs and utility bills compared to mixed-fuel (electric/natural gas) homes, including in places where electricity is significantly more expensive than natural gas per unit of energy.¹⁵ These savings result from avoiding the cost of installing new natural gas infrastructure and using heat pumps for space and water heating, which transfers heat instead of creating it. Other methods of improving energy efficiency have higher upfront costs but more return on investment in long-term costs. For example, green homes and net-zero homes have higher upfront costs (12 to 20 percent higher than houses built to minimum code requirements) which can be reduced through financial incentives and reduce energy costs by [\\$1,500 to \\$1,800 per year](#).

Energy efficiency and electrification upgrades in existing homes can also lead to cost savings, improved comfort, and improved health. As a result, retrofitting existing buildings can impact residents in a positive way and reduce energy use in the coming decades. The City provides some programming to assist moderate-and-low-income residents with the installation of energy-efficient technologies and appliances, which can also bolster the anti-displacement strategies this Regional Plan supports.

Carbon Storage and Carbon Dioxide Removal

Carbon storage and removal are both key to future climate action. The Region has numerous landscapes that act as natural carbon sinks, removing and storing carbon dioxide from the atmosphere. Carbon dioxide removal or “CDR” refers to approaches that remove CO₂ from the Earth’s atmosphere - mimicking the [carbon storage](#) abilities of the forests. CDR encompasses a wide variety of technological and biological approaches, including direct air capture of CO₂, carbon removal using plants or algae to capture it, soil carbon sequestration to increase the carbon content of soil, reforestation, permanently storing carbon in rocks or minerals, and ocean-based CDR which amplifies the ocean’s natural carbon-storing processes. The carbon stored in the Region’s forests is also important to measure and protect by providing forestry and fire treatments that minimize mortality from wildfire and drought. All these approaches store the captured carbon long term in rocks, plants, oceans, or manufactured products like low-carbon concrete.¹⁶ Many of the technological solutions are in development and there are pilot projects throughout the western US testing their efficacy.

CDR is a critical component of the City’s [Carbon Neutrality Plan](#), which relies on both reducing [GHG](#) emissions and removing CO₂ from the air. This means that the Flagstaff community’s GHG emissions must be reduced, and any remaining emissions must be balanced by removing an equivalent amount of CO₂ from the atmosphere, through CDR.

The City and the larger Flagstaff community are currently supporting local CDR strategies and projects, including large-scale land-use and industrial processes. Larger landscape-scale initiatives—such as regenerative agriculture and [ranching](#), urban forestry, and rehabilitation of riparian and degraded lands—remove CO₂ from the atmosphere and store it in plants and soils. Carbon burial is a process for reducing carbon emissions in which harvested [biomass](#) is buried, sealed, and monitored to prevent the release of carbon during decomposition of the wood. Other types of CDR initiatives rely on industrial processes to remove CO₂ from the atmosphere and store it long term in materials, such as low-carbon concrete, or inject it into geologic formations.

Developing a portfolio of CDR strategies to meet [carbon neutrality](#) goals will require multi-jurisdictional collaborations with local, regional, state, and federal partners. Most of the land available for landscape-scale CDR projects is in the County, outside of City limits. Adding to or updating City and County codes to support land uses that serve as CDR projects will also be critical to meeting the City’s carbon neutrality goals. While the County has not adopted a carbon neutrality goal, it can update regulations to support land uses that help move the City and Region toward this goal.

Action Items

High Priority Action Items. See [Appendix C](#) for additional information.

Type of Action	Item	Timing
Code	Review and revise existing City Codes, plans, and processes to achieve carbon neutrality through updates and equitable access to reflect rapidly changing technology related to energy efficiency, renewable energy , energy or battery storage, and electrification.	Mid term

Other Action Items: While important, these projects may be prioritized as opportunities and funding arise.

Type of Action	Item	Timing
Partner	Collaborate with the construction and development industry, realtors, property managers, and the public to increase general and technical knowledge and workforce capacity for building energy efficiency and fuel switching.	Mid term
Code/Partner	The City and County will continue to coordinate on adopting the International Code Council building and energy codes in a manner that supports plan priorities.	Mid term
Code	Update the City Sustainable Building Resolution and Sustainable Residential Building Incentives to further implement net-zero energy standards.	Short term
Fund	Modernize and incorporate renewable energy and innovative technology into the energy systems at City facilities, especially the Wildcat Hill Water Reclamation Plant and the Cinder Lake Landfill.	Long term
Partner	Develop public and private partnerships and incentives to install Level 2 and Level 3 (aka Direct Current Fast Charging or DCFC) EV charging stations in publicly accessible parking areas along tourism corridors, at workplaces, businesses, and in multi-family housing developments.	Mid term
Partner	Support solar cooperatives that assist residents in obtaining solar electricity for a lower price.	Short term
Plan/Fund	Promote and expand the resources for the County's sustainability efforts by providing support for climate action in the Region.	Short term
Fund	Explore the establishment of a revolving loan fund for energy efficiency upgrades and retrofits to make affordable financing available to commercial and residential properties. (City only)	Long term
Code	Work toward ensuring access to EVs by incentivizing the installation of charging infrastructure for low-income residents and multi-family housing developments.	Short term
Plan	Develop and fund a plan to ensure Region-wide fast charging opportunities that are not met by the ADOT Electric Vehicle Deployment Plan , such as along the US 180 corridor, to support the tourism economy.	Mid term
Fund	Actively pursue federal, state, and other funding sources to advance the electric charging capabilities for public transportation, including school and transit routes and hubs. (City only)	Short term
Fund	Create a Renewable Energy Incentive District ¹⁷ to promote development of renewable energy utilities. (City only)	Long term
Plan	Engage in utility planning efforts such as the APS Integrated Resource Planning process to advocate for adequate energy efficiency programs, promote decarbonization, and to increase clean and renewable energy sources.	Continuous

Type of Action	Item	Timing
Partner	Encourage or assist industrial operations in the City to capture carbon emissions at the source to prevent emissions from being released into the atmosphere or support an equivalent amount of CDR .	Mid term
Code	Establish initiatives and maintain and update City and County codes to support CDR on lands in and around Flagstaff in a manner compatible with Fire-Adapted Communities practices.	Short term
Plan/Fund	Pilot building electrification, water conservation, and other climate initiatives at a block or neighborhood scale to more cost-effectively transition to climate-friendly energy, water, and resource use.	Mid term
Partner	Partner with utilities to plan for adequate charging capacity and increased demand for electricity.	Continuous

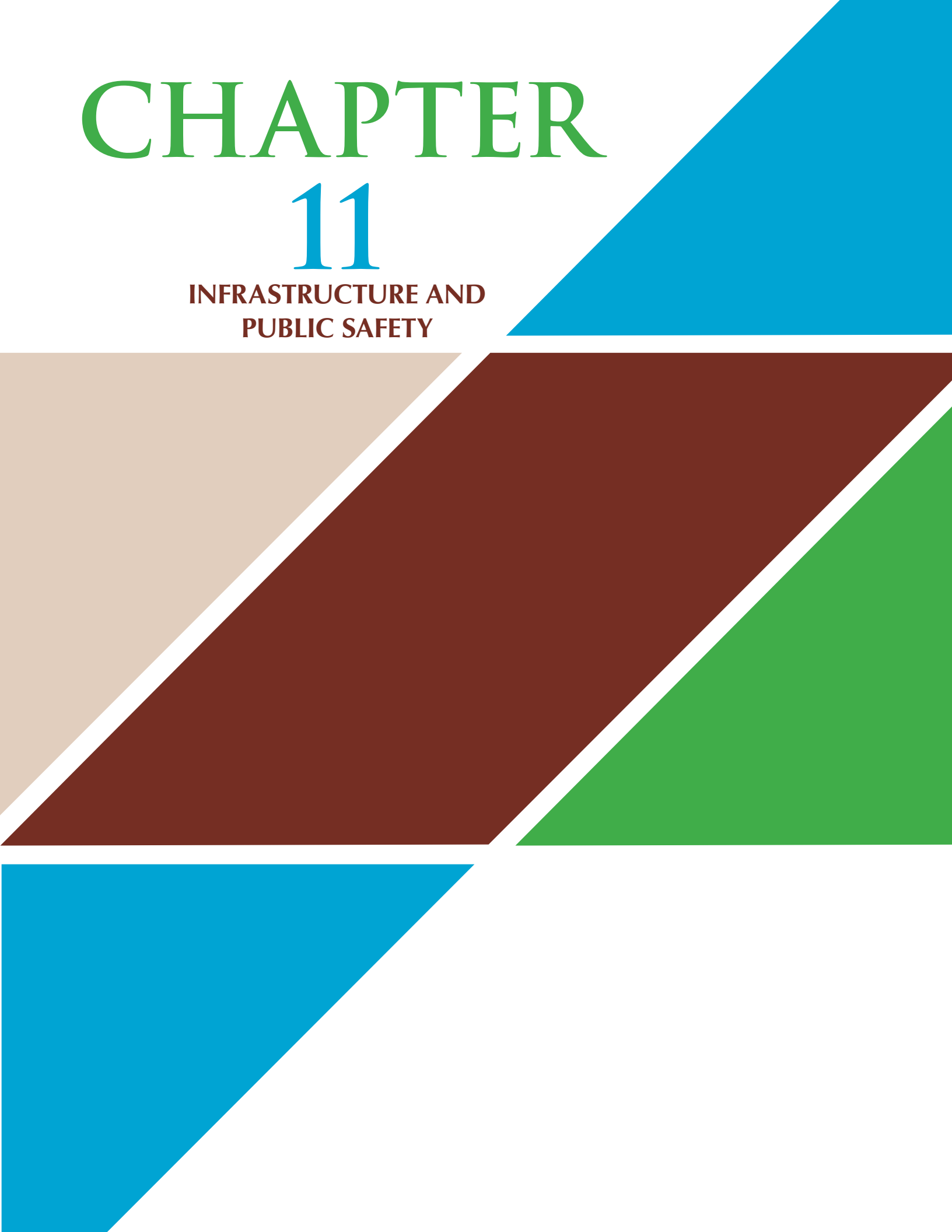
Endnotes

1. City of Flagstaff, *Carbon Neutrality Plan*, 2022.
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3. US Census Bureau, *2022 American Community Survey 5-Year Estimate*.
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CHAPTER

11

INFRASTRUCTURE AND PUBLIC SAFETY





Anonymous, Community Event 2022

INFRASTRUCTURE AND PUBLIC SAFETY

Dependable [public facilities](#) and services such as electricity, [broadband internet](#), water and sewer distribution and treatment, stormwater management, and trash collection ensure that the Region is a functional, clean, and healthy place to live, work, visit, and pursue an education. Safety and emergency response systems protect the well-being of the Region’s residents and visitors. Looking to the future, growth in the population, increased tourism, and the expected impacts of [climate change](#) will increase demands on and test the Region’s [infrastructure](#) systems and services. This requires forward-thinking, thoughtful planning, and significant investment to achieve long-term [resilience](#).

BACKGROUND

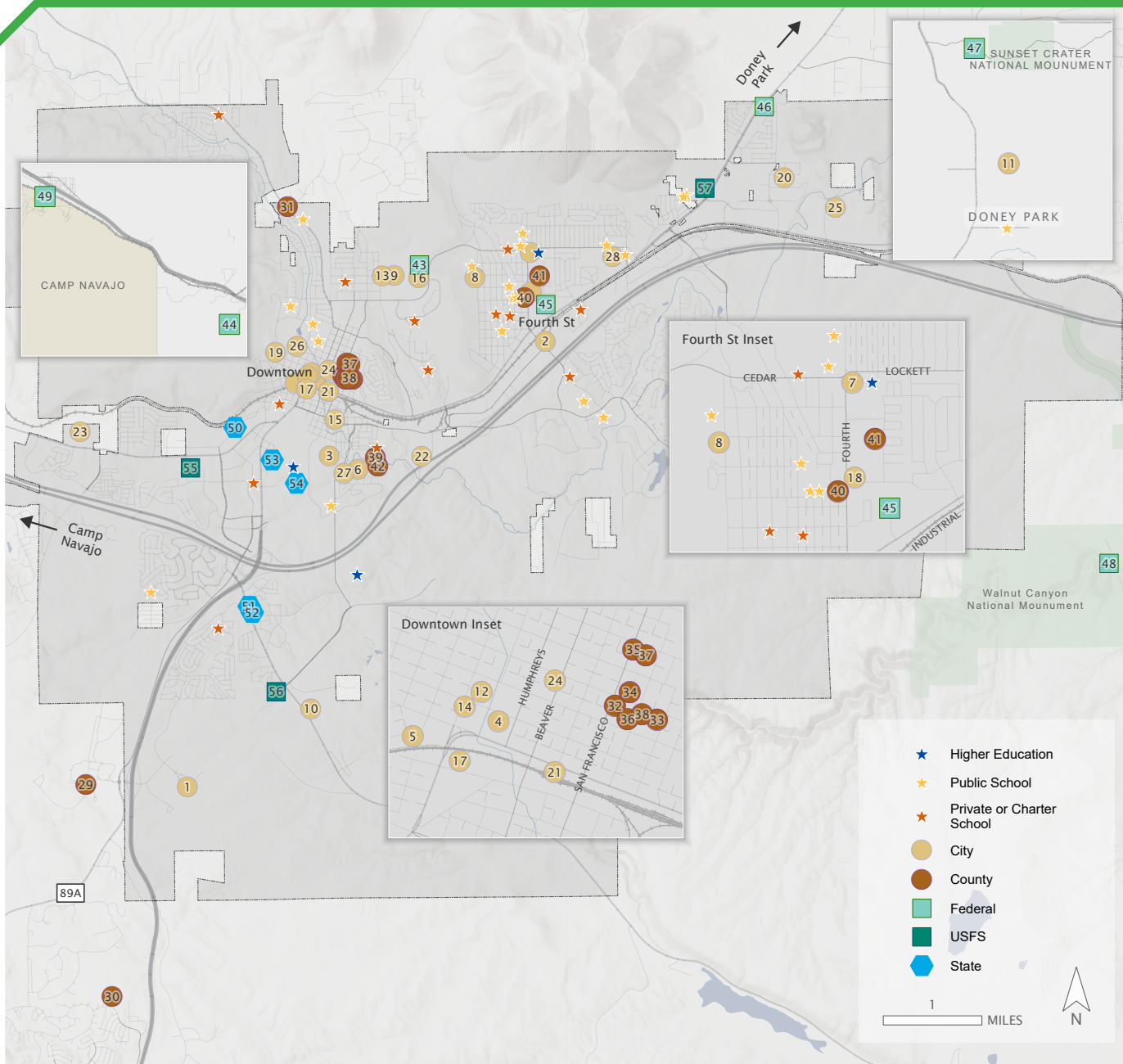
The City and County have several infrastructure and public safety priorities in the coming decades. Protecting the Region from undesirable wildfires and flooding is a critical issue, made more complex as climate change intensifies the need for coordination between multiple agencies and partners. The increasing density within the City’s urban core requires a transition within the realm of public safety as land use evolves to include more [midrise buildings](#), which have different structural risks for firefighting and evacuation. Infrastructure priorities include replacing aging infrastructure, extending the life of the Cinder Lake Landfill, and providing adequate drainage and flood mitigation for a changing climate. Another priority is to address the Region’s broadband infrastructure, which does not adequately serve all residents and requires modification to provide a higher standard of service. For the City, adding additional water and sewer capacity and extending the lifespan of the Cinder Lake Landfill to support new development are critical to keep pace with current and anticipated community growth.

Public Facilities and Services

The federal and state government, City, and County manage over 50 public facilities in the Region, including government building complexes on Camp Navajo and the NOFS. The purposes of these facilities range from publicly accessible community centers, recreation centers, and educational institutions – which provide important services and support community well-being – to research facilities and offices. They also support services such as housing, water and wastewater treatment, public health, and maintenance and operations of the Region’s infrastructure.



Water pumps at Wildcat Hill Water Reclamation Plant



Name	Agency	Name	Agency	Name	Agency
1 Flagstaff Pulliam Airport	City	21 Visitor's Center	City	41 County Health and Community Services	County
2 Flagstaff Aquaplex	City	22 Rio De Flag Water Reclamation Plant	City	42 Coconino County Search and Rescue	County
3 Cemetery Storage Warehouse	City	23 Public Works Corp Yard	City	43 USGS	Federal
4 City Hall	City	24 City Court	City	44 US Naval Observatory	Federal
5 Coconino Warehouse	City	25 Wildcat Water Treatment Plant	City	45 US Post Office - Main	Federal
6 Boys and Girls Clubs of Flagstaff	City	26 Sustainability (Thorpe Shop)	City	46 US National Park Service Office	Federal
7 East Flagstaff Public Library	City	27 Brannen Homes	City	47 Sunset Crater Visitor Center	Federal
8 Hal Jensen Recreation Center	City	28 Siler Homes	City	48 Walnut Canyon Visitor Center	Federal
9 Jay Lively Activity Center	City	29 Fort Tuthill Parks and Recreation	County	49 Camp Navajo Military Reservation Entrance	Federal
10 Lake Mary Water Treatment Plant	City	30 Kachina Village Maintenance Yard	County	50 Department of Public Safety	State
11 Landfill - Administration Bldg	City	31 County Services - Fort Valley	County	51 Arizona Game and Fish Department	State
12 Flagstaff Public Library	City	32 Coconino County Courthouse	County	52 Arizona Department of Forestry and Fire Management	State
13 McPherson Center	City	33 Coconino County GIS	County	53 Riordan Mansion State Historic Park	State
14 Milligan House	City	34 Coconino County 110 Services	County	54 Northern Arizona University	State
15 Murdoch Center	City	35 Coconino County Human Resources	County	55 USFS Supervisor's Office	USFS
16 NACET - Incubator	City	36 County Legal Defender	County	56 USFS Mormon Lake Range Station	USFS
17 Police substation (Downtown Connection Center)	City	37 Coconino County Adult Probation	County	57 USFS Peaks Ranger Station	USFS
18 Police substation (Market of Dreams)	City	38 Coconino County Administration	County		
19 Joe C. Montoya Community & Senior Center	City	39 Coconino County Sheriff's Department	County		
20 Eastside Utilities Shop	City	40 Cooperative Extensive Services	County		

Data Source(s): Esri, NASA, NGA, USGS

Information Map 11-1: Public Facilities in the Region



In 2022, the City updated a Sustainable Building Resolution that requires “all non-Housing Section, occupied, City-owned new construction and major renovation of existing facilities, including building additions over 10,000 square feet, achieve all-electric, emissions-neutral operations while also achieving certification in the most recent version of LEED (Silver) or Green Globes (3 Globes) or Living Building Challenge (full certification).” The Resolution also requires that buildings no longer in use by the City be evaluated for use as [affordable housing](#) before being considered for other uses or disposal.²⁰



Figure 11-1: The Five Phases of Emergency Management. Source: City of St. Louis.

City and County staff, in coordination with local federal agencies, are the first responders during emergencies such as wildfires, floods, or other incidents, depending on the location within the Region. The City and County work together to develop the [Multi-Jurisdictional Hazard Mitigation Plan \(MJHMP\)](#) every five years and uphold jurisdictional Emergency Operations Plans, which delineate the roles and responsibilities of City and County departments in all emergency management phases.

To address emergency management needs in the Region effectively, the City and County utilize the five phases of Emergency Management to create a framework to reduce vulnerability to hazards and cope with large emergencies and disasters. The five phases, as seen in Figure 11-1, guide personnel through the decision-making process to improve the capability to prevent, mitigate against, prepare for, respond to, and recover from large-scale emergencies and disasters.

Hazard Identification

All the top hazards identified in the [MJHMP](#) are at risk of occurring in the Region. The MJHMP identified nine hazards that affected the Region between 1967 and 2020 and assigned each a priority score based on its (1) likelihood to occur, (2) risk of impacts to structures and vulnerable populations, (3) risk of increased frequency, and other relevant factors. The Region’s highest risks are undesirable wildfire (including post-fire flooding), transportation-related incidents (involving rail, air travel, or vehicles, and major road or highway disruptions), drought, and a public health emergency (see Table 11-1). The mitigation, [preparedness](#), and [prevention](#) phases of emergency management are strategically designed to address each of these risks.

Hazard Mitigation refers to the process of minimizing the loss of life and property by reducing the impact of disasters and emergencies. This involves taking measures and actions that can prevent an emergency from occurring, reduce the likelihood of an emergency happening, or minimize the harmful effects of disasters that cannot be avoided.

Table 11-1: State and Federally Declared Disasters that Included Coconino County, 1967-2020. Source: MJHMP 2021 and DEMA Operations Branch¹

Hazard	MJHMP Priority Risk Index	No. Of Declarations	Fatalities	Damage Costs (\$)
Dam Failure	2.5 Moderate	1	0	Not Available
Drought	3.55 - High	4	0	\$303,000,000
Earthquake	2.45 - Moderate	2	0	Not Available
Flooding / Flash Flooding	2.9 - High	12	23	\$3,007,566,000
Public Health Outbreak	3.55 - High			
Severe Wind	3.15 - High	1	0	Not Available
Winter Storm	3.15 - High	7	12	\$14,960,904
Transportation Incident	3.20 - High	2	25	Not Available
Wildfire	4.0 - Severe	25	0	\$35,162,252

Between 2020 and 2024 the following incidents occurred in the City:

- » In 2023, a dam failed at Lower Lake Mary due to heavy precipitation.
- » In 2022, the Pipeline Fire burned portions of Mt. Elden and Schultz Pass.
- » In 2022, flooding unrelated to wildfire conditions occurred in the Swiss Manor and the Upper and Lower Greenlaw neighborhoods.
- » In 2020, wildfire-related flooding occurred on the US 180 corridor.
- » Between 2019 and 2022, post-fire flooding occurred following three wildfires. Multiple widespread residential areas were affected by post-wildfire flooding including the Timberline-Fernwood, Schultz Creek, Coconino Estates, Paradise, Grandview, and Sunnyside neighborhoods.

Since 2021, these events have cost the City \$2,117,916 in flooding-related costs and \$1,092,252 related to wildland fire suppression.

Transportation-related crashes can result in the release of hazardous materials. Every day, trains and commercial vehicles carrying hazardous materials travel on rail lines and highways throughout the County, including through the densely populated area of the City. The transportation of hazardous materials is regulated at the federal and state levels. The [Coconino County Emergency Operations Plan](#), supported by the *Coconino County Local Emergency Planning Committee's Hazardous Materials Plan*, specifies the roles and responsibilities of stakeholders involved in [response](#) and [recovery](#) efforts following an incident.


Public Safety and Emergency Services

The Coconino County Sheriff's Office, Flagstaff Police Department, and Arizona Department of Public Safety (DPS) provide law enforcement throughout the Region. The City and County conduct many joint operational efforts in addition to their individual roles in public safety, including police, fire, and other emergency responses. The Law Enforcement Administration Facility (LEAF) in Flagstaff provides centralized 911 operations and dispatch center, police and sheriff offices, and the youth detention facility and jail in a centralized location.

Addressing: The City and County use addressing processes that are integrated into the postal system and the police and sheriff's office's Enhanced 911 efforts. Both agencies have addressing manuals and standards that are supported by their respective Planning and Development Services and GIS staff. A comprehensive approach to addressing ensures reliable mail delivery and reliable response times for police, fire, and other emergency services.



Flagstaff Fire Department personnel participate in an Airport Emergency Exercise



The County has numerous areas with challenging topography over large landscapes. The Search and Rescue (SAR) Unit responds to between 125 and 175 missions in a typical year. The 911 call center receives even more SAR-related calls each year, but many are handled over the phone or by the responding sheriff's deputy without SAR Unit assistance. The County's SAR Unit services include paid staff and volunteers trained in:

- » Alpine operations.
- » All-terrain vehicles.
- » Four-wheel drive vehicles.
- » Snowmobiles/snowcat operations.
- » Boats.
- » Global Positioning System (GPS) operations.
- » High-angle rescue.
- » Low-angle rescue.
- » Map and compass navigation.
- » Mounted- and helicopter operations to conduct searches and rescues.
- » Personal locator beacons.
- » Tracking.

DPS bases helicopters to support SAR missions at the Flagstaff Pulliam Airport, Kingman Regional Medical Center, Deer Valley Airport (Phoenix), and Tucson International Airport. These helicopters also provide emergency medical transport and law enforcement support across Northern Arizona.

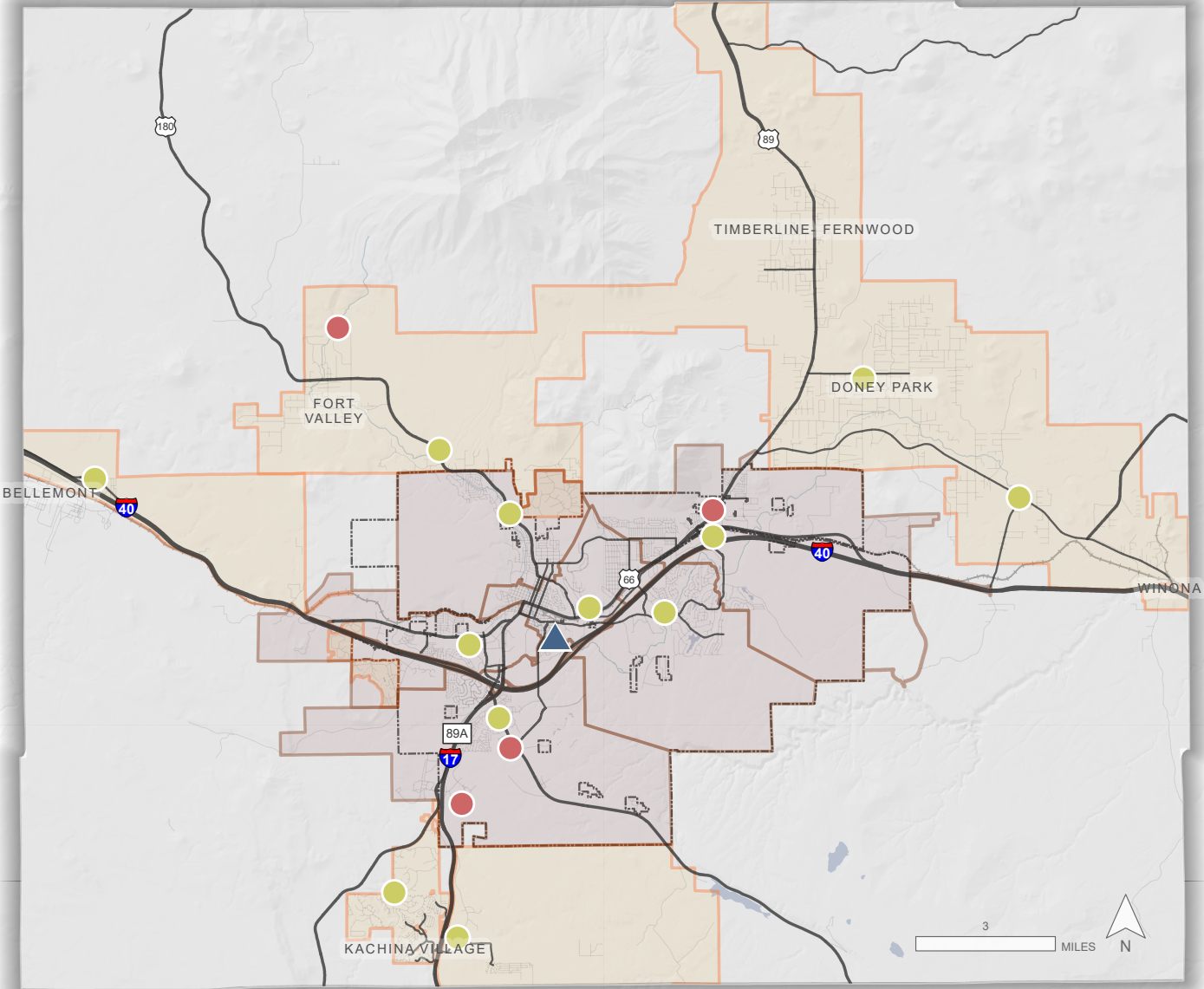
The City and portions of the County are protected by Fire and Emergency Service Organizations (FESO), including the Flagstaff Fire Department and 17 Fire Districts throughout the County. These FESOs range in size and complexity from all paid staff in urban areas to combination staffing (paid and part-time) in more rural areas. When considering ways to reduce risks to and improve safety for the public, FESOs consider at least one of the “five Es” of the Community Risk Reduction mitigation model: Engineering, Education, Enforcement, [Emergency Response](#), and Economic Incentives. Most FESOs engage in the emergency response portion of the model while others may apply efforts in multiple or all parts of the mitigation model.








The Region is the medical hub of Northern Arizona. Flagstaff Medical Center (Northern Arizona Healthcare) is the only Level One Trauma Center in Northern Arizona, which provides emergency room services for Coconino, Navajo, Apache, and portions of Gila and Yavapai counties. Guardian Medical Transport provides air and ground emergency medical transportation in the Region and operates from bases at the Flagstaff Pulliam Airport, McMillan Mesa, and Woodlands Village.

Coordinated Response

Emergency Management and local fire and law enforcement agencies utilize the National Incident Management System and the [Incident Command System](#) principles as a framework for an all-hazard response structure. The system is standardized for managing and coordinating resources during emergency response. It is based on a national and regional hierarchy that considers all available resources and covers the command, operations, logistics, planning, and administration of emergencies. This system is used for the entire duration of any emergency response.

For major incidents, the Region enlists assistance from several national centers which are operated by federal agencies and collaborative organizations that specialize in science, training, and information on different hazards (e.g., the National Interagency Fire Center in Boise, Idaho). For incidents that do not rise to the level of requesting a Regional Incident Management Team that specializes in Wildland incidents, mutual aid agreements between jurisdictions are signed to move resources quickly to the area of most need.



-  Flagstaff Police/Coconino County Sheriff Department
-  Fire Station: Staffed (All Hazard)
-  Fire Station: Staffed Year-Round with Seasonal Capacity Increases (Wildland)
-  Major Roadways for Evacuation
-  Flagstaff Fire District (FFD)
-  County Fire District
-  CoF Boundary



Information Map 11-2: Public Facilities for Fire, Safety, and Emergency Evacuation

Airbus, USGS, NGA, NASA, CGIAR, NCEAS, NLS, OS, NMA, Geodatastyrelsen, GSA, GSI and the GIS User Community



Emergency Communications and Evacuation Routes

The County employs an emergency notification system to deliver official, real-time alerts to the public, providing crucial information on potentially life-saving actions residents should take. The County and City have collaborated to establish all-hazard evacuation zones, focusing on densely populated residential areas. These zones complement the Ready, Set, Go Program² and the County emergency notification system³ by providing targeted evacuation messaging tailored to specific neighborhoods and communities. The County keeps information about evacuation routes and other important communications on its website at www.coconino.az.gov/ready. Developed in partnership with local stakeholders, this initiative aims to optimize pre-evacuation and evacuation procedures, ensuring swift and effective responses to emergencies.

Wildland Fire

Since 2010, there have been nine wildfires resulting in 255,344 acres burned and 63 homes lost in the County. Ninety-three percent of properties in the County are at risk of wildfire in the next 30 years.⁴ Seventy-six percent of the City's water supply is imported from [infrastructure](#) located on heavily forested USDA Forest Service lands at high risk of wildfire. This ongoing and increasing risk has impacts to public health, the local economy, public safety, and environmental and [cultural resources](#).

Mitigation is fundamental in managing undesirable wildfire impacts and reducing the cost of maintaining community safety. In fact, every dollar spent on mitigation practices for undesirable wildfires saves at least seven dollars on [emergency response](#) activities when an undesirable wildfire does occur.⁵

Wildfire risk reduction has been the focus of many collaborative efforts in the Region for decades. Regional partnerships, large-scale efforts, and market solutions are required to tackle the immense challenge of restoring the forests and reducing the community's fire risk in the following ways:

- » **Federal Partnerships:** The USDA Forest Service included the landscapes of the Four Forest Restoration Initiative in the [2022 Wildfire Crisis Strategy](#). The Strategy outlines investments in fuels reduction and efforts to step up "the pace and scale of our fuels and forest health treatments to match the actual scale of wildfire risk."⁶
- » **Large-scale Efforts:** The City has increased its investments in reducing the risk of wildfire to key watersheds through the [Flagstaff Watershed Protection Project \(FWPP\)](#), approved in 2012. This project was initiated with a \$10 million bond for fuels planning and treatment on Observatory Mesa, Dry Lake Hills, and Mormon Mountain. As of July 2024, over 15,000 acres of ecological thinning has been completed within the FWPP footprint with more than 40,000 acres identified for future thinning. This project is unique in that it applies City funding to projects on federal land.
- » **Market Solutions:** In addition to its investments in wildfire risk reduction through forest restoration projects, Coconino County's Forest Restoration Initiative has invested in developing business/industry and job opportunities to support forest restoration work and reduce the economic impacts of wildfire. These investments include receiving an "A" rating as a Bioeconomy Development Opportunity Zone⁷ and completing a [Regional Transportation & Market Feasibility Study](#). County staff has assisted multiple local companies in receiving grants through the US Forest Service to grow their forest industry businesses. For the investments of the federal, state, and local agencies involved to be effective, however, industry interest, capacity, and a supply chain bottleneck need to be addressed.⁸

Collaborative fire management efforts between federal, state, and local fire staff have proven effective at implementing beneficial wildfires and prescribed fires in and around the Region. However, an increase in the pace and scale of both thinning and burning is needed.

The Flagstaff Fire Department's Wildland Fire Management program has multiple staff committed to supporting wildfire risk reduction activities in the [built environment](#). Qualified staff provide fire risk reduction and home-hardening-based assessments, support National Fire Protection Association Firewise USA® Communities, and have consistently offered private land hazardous fuel reduction funding since 2017. As wildland fire treatments

are necessary to reduce the community’s fire risk, programs are also expanding to protect community members from the health impacts of smoke. Since 2020, the fire department’s Wildland Fire Management program and City Sustainability staff have distributed hundreds of High Efficiency Particulate Air Filter-rated air purifiers to smoke-sensitive households. The City is supporting community-led [Resilience Hubs](#) that will serve neighbors daily as gathering spaces and function as safe locations with healthy air and power during smoke events and other incidents.

Another vital piece of the wildfire prevention process is the enforcement of the [Wildland Urban Interface \(WUI\) Code](#). The City’s WUI code—which applies only to areas within City limits—is an amended version of the 2006 International WUI Code. The WUI code provides a set of guidelines for the management of both the natural and [built environment](#) in areas where unoccupied forest land meets urban development. Every neighborhood in the City is considered to be in the WUI boundary. Some examples of specifications detailed in the WUI Code, and in the National Fire Adapted Communities model, include ensuring that properties have “[defensible spaces](#),” providing guidance on what qualifies as hazardous vegetation, and clarifying acceptable materials for new structures and development. These mechanisms allow City officials to use scientific knowledge of fire behavior to develop a [resilient](#) transition zone between the natural and built environments.

In the County, the voluntary National Fire Adapted Communities Model or the National Fire Protection Association Firewise USA® Communities programs are promoted.

The Fire Adapted Communities Learning Network provides a national framework built around 10 components and many locally generated strategies to illustrate how to create plans for adaptation and resilience to wildland fires. The framework is not a one-size-fits-all solution. It involves a collaborative, multijurisdictional process to be applied community-wide. A Community Wildfire Protection Plan (CWPP) is the typical tool for implementing this framework. The County and City are working to update their plans in the coming years. The Flagstaff Fire Department has been a Core Member of the Fire Adapted Communities Learning Network since 2019.

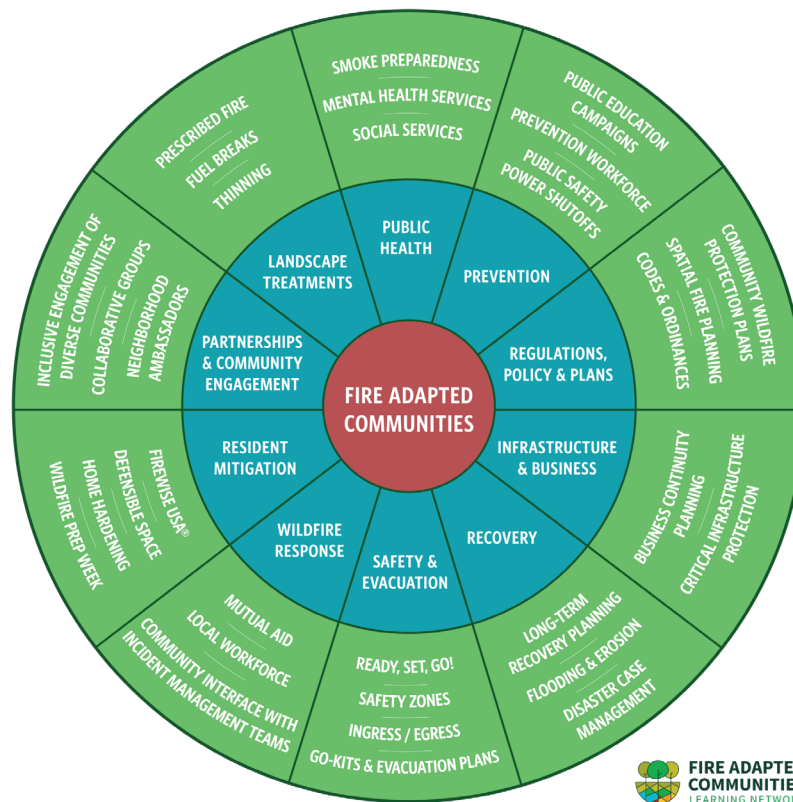


Figure 11-2: Fire Adapted Communities Graphic, Facilitator’s Guide. Source: Fire Adapted Communities

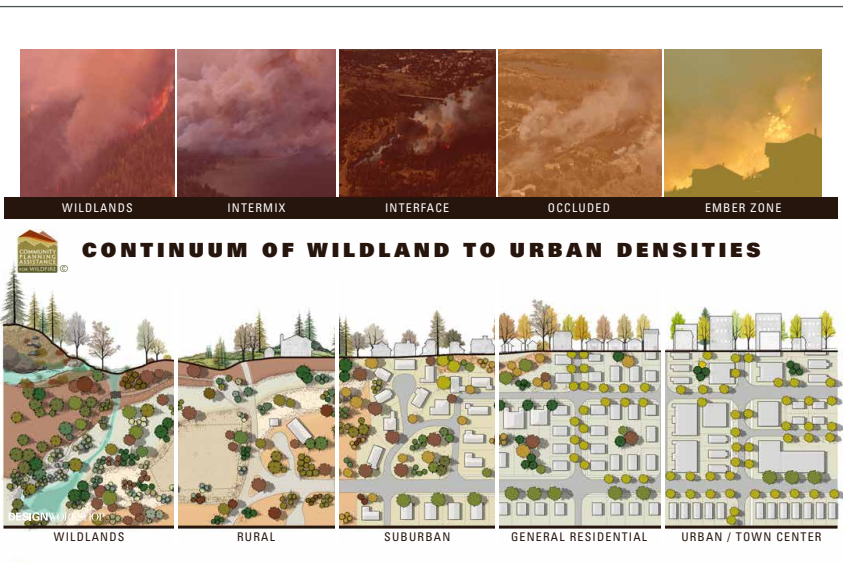


Figure 11-3: Wildland Urban Interface Transition. Source: Community Planning Assistance for Wildfire.

Fire preparedness planning includes a broad range of different preparations that better orient fire personnel and the public to the risks associated with wildfires. It involves working in coordination at the local, state, tribal, and federal levels. Planning for different aspects of wildfire resilience is an extremely important part of ensuring that the community can effectively address hazards as they arise. Several planning documents, from the federal to community level, affect how the Region approaches wildfire. Some of the wildfire planning documents that are relevant to the Region are listed below.

To provide guidance and planning, federal, state, County, City, and volunteer partners are involved in updating the

[Greater Flagstaff Area Community Wildfire Protection Plan](#). This plan provides local direction for public involvement, integration of [Firewise USA® practices](#), and guidance on how to implement and monitor wildfire risk reduction efforts effectively across boundaries.

Regional Wildfire Preparedness Planning

[USDA Forest Service 10-Year Strategy](#)

“Confronting the Wildfire Crisis” is the USDA Forest Service’s 10-year strategy to confront the increasing quantity of fires occurring in the western US. The plan emphasizes the need for multijurisdictional collaborations and partnerships to reduce fuel quantities in hazardous areas as a means of reducing overall risk of catastrophic fire events.

[Arizona Hazard Mitigation Plan](#)

Arizona’s Hazard Mitigation Plan is an important wildfire preparedness planning tool that focuses heavily on assessing wildfire susceptibility across the state and determining levels of vulnerability for Arizona communities. This allows fire personnel to identify areas of interest and effectively focus wildfire prevention efforts in the Region.

[Flagstaff Community Wildfire Protection Plan](#)

The CWPP focuses on public involvement, incorporation of Firewise USA® practices, and implementation of landscape treatments to continue to transform the Region into a resilient fire community.

[City of Flagstaff Fire Strategic Plan](#)

The City of Flagstaff Fire Strategic Plan considers necessary goals for providing exceptional customer service in the Region. The plan emphasizes the need to foster partnerships within the community, acquire funding to carry out fire-based services, and bolster staffing to provide excellent service to the community.



Wildland Fire Response

For fire response in the western US, most regions adhere to the National Incident Management System, and operations are typically conducted collaboratively across federal, state, and local agencies. In general, personnel and equipment are distributed through national systems based on wildfire severity and need.⁹

Firefighters throughout the Region train and collaborate to ensure they can respond to all areas in a timely manner if a fire hazard arises. All City fire department and County fire district firefighting personnel receive National Wildland Coordinating Group training, greatly enhancing the Region's ability to coordinate fire response. The USDA Forest Service also staffs a significant amount of wildland firefighting personnel in multiple locations, with severity staffing (additional staff and equipment capacity that is provided during times of high fire danger) often available to respond to fires as they occur. The USDA Forest Service also contracts with companies to provide aerial support for firefighting activities. These aircraft and their support equipment can be deployed to forward locations as needed. The Flagstaff Pulliam Airport provides facilities for wildland firefighting aircraft to support firefighting efforts in the Region.

The Ponderosa Fire Advisory Council (PFAC) is a partnership of fire-response organizations and emergency service providers in the Greater Flagstaff Area. The members of PFAC maintain an *Initial and Extended Attack Wildland Fire Operations Plan*. The purpose of this document is to prepare an *Operations Plan* that will be in place in the event of any initial attack fires within the PFAC response area. PFAC members strive to protect the [WUI](#) and those identified values-at-risk, such as homes, businesses, historic sites, and water sources. The *Operations Plan* includes the area that encompasses agencies with PFAC membership and state and federal lands. While not intended for wildland fires that do not exceed Type 3 incidents, the *Operations Plan* builds on the current [National Cohesive Wildland Strategy](#) and the Greater Flagstaff Area Mutual Aid Intergovernmental Agreement. With agreement among all PFAC members, the plan is designed to maximize effectiveness and efficiency in providing safe and professional responses to wildland fire incidents throughout the Region.

Understanding that fires do not adhere to jurisdictional boundaries, fire districts in the Region incorporate a robust response system known as "automatic aid." This means that when a 911 call about a fire emergency is received, multiple partner districts will respond if additional assistance is required. Multijurisdictional collaboration is a crucial aspect of how fire personnel in the Region protect the community.

Structure Fire Response

The Flagstaff Fire Department maintains a five-minute single unit response time to 90 percent of the City and an eight-minute response time for an "Effective Firefighting Force" (which is the convergence of resources required to conduct initial fire suppression and/or rescue operations at an emergency incident scene efficiently and safely). In the future – given the existing and predicted impacts of population growth and the expansion of multi-story structures to address the City's housing and climate emergencies – the City will require additional staff and specialized equipment to provide services. A new fire station will be needed along JW Powell Boulevard, while Station 1 in west Flagstaff and Station 3 in east Flagstaff will require upgrades. In addition, the Fire Department anticipates the relocation or rebuild of Station 4 along Butler Avenue and the replacement of the Fire Department Training Facility in the coming decades.

Ensuring that adequate [fire flow](#) is available from hydrants is an important component of fire suppression. The City maintains minimum fire flow requirements of 1,000 gallons per minute for hydrants located near single-family residential developments and 1,500 gallons per minute for hydrants located near multifamily, commercial, and industrial developments. The number of hours that the required fire flow must be available varies between two and 10 hours, depending on the land use. In the areas in the City where hydrants are not available, the 911 system will automatically dispatch a water tender. The International Fire Code sets fire flow requirements for buildings, which differ based on building construction type, building use, square footage, built-in fire protection, and location (refer to [Appendix B of the International Fire Code](#) for details).

Firefighting water supplies throughout most of the County are scarce to non-existent. This creates challenges for homeowners in securing insurance policies, as well as operationally, if there is a fire at a home.

Flooding and Stormwater

Flooding is a long-standing and increasing problem in the Region. In recent years, several City neighborhoods and County areas have dealt with flooding.

As [climate change](#) impacts become more widespread and severe, there will be an increase in severe flooding events, and an increase in the number of neighborhoods at risk of severe flooding.¹⁰ Climate change modeling projects intense monsoons, more rain-on-snow events, large storms with wet snow, and an increasing risk of wildfires for the Region. Storms that were previously designated as 100-year (one percent annual exceedance probability) or 500-year (0.2-percent annual exceedance probability) events now occur more regularly. Flooding can be particularly acute downstream of recent high-severity wildfires, as burned areas “can cause a ten-fold increase in stormwater flows.”¹¹ Older [infrastructure](#) contributes to a heightened potential for damage. In the Region’s older neighborhoods, many buildings and infrastructure were constructed decades ago, using different engineering design standards and based on different assumptions about the weather and climate.¹² These conditions present challenges for the City and County in managing stormwater.

The Coconino County Flood Control District (District) is charged with minimizing the impact of floods on human safety, health, and welfare, and restoring and preserving the natural and beneficial values served by County floodplains. The District regulates development within Special Flood Hazard Areas (SFHAs) under its jurisdiction, which are areas identified by FEMA as having a higher risk of flooding. These areas fall under the District’s regulatory jurisdiction to ensure that new construction or land disturbance does not increase flood risk to the community.



Sandbag removals from Coconino Estates

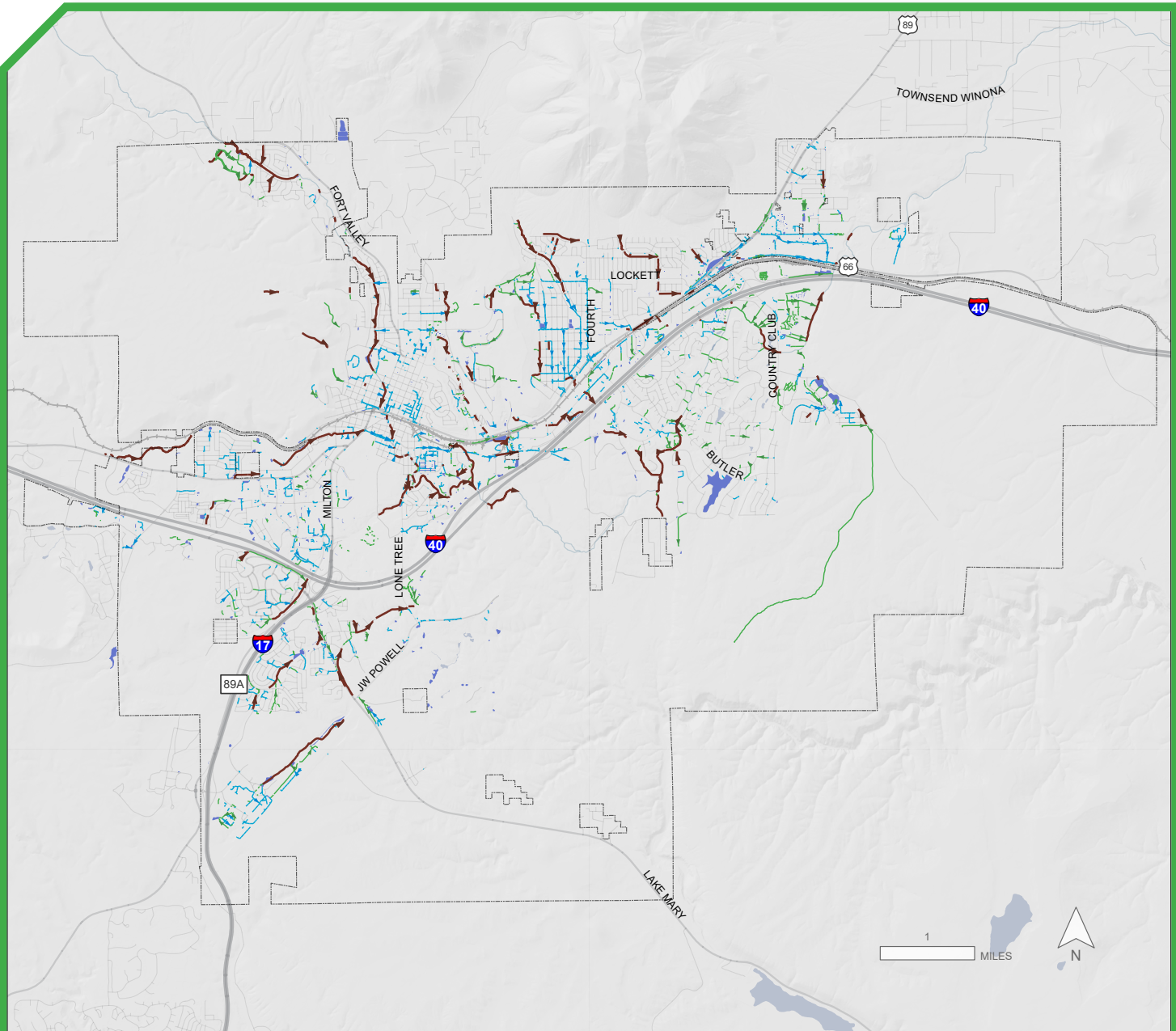






Placement of the Schultz Creek culvert at Highway 180

Since 1984, the District has completed two flood control projects in the Region: the Mountain Dell and Kachina projects. In addition to its core responsibilities related to floodplain management, the District also engages in forest restoration and post-wildfire recovery efforts, including those outside of SFHAs, which are essential to reducing flood risk, protecting watersheds, and enhancing long-term community [resilience](#).

Since 2010, the District's energy and expenditures have been invested almost entirely in addressing post-wildfire flooding, beginning with the Schultz Fire in 2010, and continuing with the Slide Fire in 2014, Museum Fire in 2019, and the Pipeline Fire in 2022. In total, the District has invested over \$150 million to reduce the threat to lives, public [infrastructure](#), and private property created by devastating flash flooding resulting from catastrophic wildfires. The District continues to address these threats and has another \$30 million in federal funding remaining to invest in the Pipeline Fire flood area. The District has been successful in securing significant federal funding as well as some state funding to address post-wildfire flooding. However, and importantly, nearly the entire District budget, in addition to a \$15.5 million loan from the County's General Fund, has been spent on response to and mitigation of post-wildfire flooding. This has been detrimental to addressing flooding in FEMA's SFHAs that fall under the District's jurisdiction.

With the dramatic impact of post-wildfire flooding on the District and County's financial stability and community wellbeing during the last 15 years, the Coconino County Board of Supervisors, which also serves as the District's Board of Directors, advanced through the District a proactive Forest Restoration Initiative in 2018. The Forest Restoration Initiative aims to reduce the wildfire and post-wildfire flooding cycle by improving forest health in key areas at high risk for catastrophic wildfire, likely resulting in a post-wildfire flooding disaster. The current high priority watershed is the Upper Rio de Flag Watershed on the western slopes of the San Francisco Peaks that flows through Fort Valley and Flagstaff. To date, the District has invested over \$8 million in the Upper Rio de Flag watershed. The Board of Supervisors continues to strongly support investing in forest restoration, particularly given an updated J.E. Fuller




-  Open Channel Maintenance
-  Storm Channels
-  Storm Pipe
-  Detention Basin



Information Map 11-3: City of Flagstaff Stormwater System

Airbus, USGS, NGA, NASA, CGIAR, NCEAS, NLS, OS, NMA, Geodatastyrelsen, GSA, GSI and the GIS User Community



Hydrology study. Within the Region, an analysis of the Upper Rio de Flag watershed shows that a 21,000-acre high intensity wildfire could result in severe flooding through Fort Valley and the City creating between \$535 million and \$2.8 billion in impacts to homes, businesses, and public buildings.¹³ The Board of Supervisors is strongly supportive of continued investment in forest restoration across all areas of the District.

Within the City, the Stormwater Section provides urban drainage mitigation. Information Map 11-3 shows the City's stormwater system, comprised of open channels, culverts, pipes, and catch basins. Typically, the City has approached flood mitigation through development review and floodplain development restrictions. City flood control work is secondary to proper development standards and is typically addressed through a five-year [CIP](#) and coordinated, when possible, with the County Flood Control District. The City has pursued some "total system" projects, most notably the multi-decade Rio de Flag Flood Control Project in cooperation with the Army Corps of Engineers, the Spruce Wash suite of projects pursued after the 2019 Museum Fire, and the Schultz Creek suite of projects pursued after the 2022 Pipeline Fire.

New development in the City is regulated by the City's stormwater codes and standards. They require new development to manage some portion of storm water onsite so it does not increase stormwater risk in the area. When these codes are followed, the amount of impervious surface and hardscape can increase while the flood risk holds steady.¹⁴ See [Chapter 9, Water Resource Management](#), for more information on stormwater management, water quality, and watershed health.

Rio de Flag Flood Control Project

The Rio de Flag is a central seasonal waterway that runs through Downtown Flagstaff and neighborhoods from the northwest US 180 corridor to the east neighborhood of Fox Glenn. Since the early development of central Flagstaff, flooding in the north and central reaches has been frequent and costly. With today's development patterns, a large flood, caused either by weather or post-wildfire conditions, could damage over 1,500 structures valued at more than \$916 million, and cause an estimated \$93 million in economic damages.¹⁵ Since the 1990s, the City and the Army Corps of Engineers have been working with partners including ADOT and BNSF Railway to carry out a comprehensive flood control project that would reduce the risk of a catastrophic and disruptive flooding, reduce the burden of floodplain management regulations, and eliminate mandatory flood insurance on Downtown and Southside properties. Completing this project is the top priority of the *Southside Community Specific Plan*. The scope of this project includes extensively modifying the channel to reroute it out of Southside, replacing bridges, adding detention basins, and taking other flood control measures. These projects would also provide community benefits on the transportation system for [pedestrians](#), bicycles, buses, and others. This Regional Plan identifies the Rio de Flag Flood Control Project as an essential element for the City's growth and for becoming [resilient](#) to post-wildfire flooding.

Local Utilities

The City and several companies provide utility services for the Region. Within the City, most urban and suburban locations have water, sewer, stormwater, and solid waste infrastructure and services. Coconino County does not provide utilities but does ensure coordination among utility providers when reviewing new development proposals. Within the County portion of the Region, water and/or wastewater services are provided to some communities such as Bellemont, Doney Park, and Kachina Village by private utilities or a special improvement district. There are wells, private water and waste haulers, and septic services in even more rural areas. In the Region, APS provides electricity and Unisource Energy Services provides natural gas. [Chapter 10, Energy and Climate Action](#) discusses electricity and natural gas in greater detail. There are two providers for [broadband internet](#) infrastructure and service, telephone service, and cable television: Optimum and Lumen Technologies, the latter formerly known as CenturyLink. APS, Unisource, and Optimum are franchise utilities, meaning they have agreements with the City to locate their infrastructure in the City's [rights-of-way](#), both underground and aboveground. Lumen is not a franchise utility, so an individual license agreement is required for every project involving use of the City's rights-of-way. The City and County have an important role in coordinating with utility entities in the planning for future [public facilities](#) and services.

How do City rights-of-way Work?

The City manages all public [rights-of-way](#) and easements within its limits except for the designated highway routes such as Milton Road, Route 66, West Route 66, and Humphreys Street/Highway 180, which are under ADOT's jurisdiction. The City's Public Works Division is responsible for operation and maintenance of roadways, traffic signals, streetlights, and medians. The Water Services Division is responsible for the operation and maintenance of public water and sewer services. The Engineering and Capital Improvements Division is responsible for management, design review, inspections, and permitting of all design and construction within the rights-of-way, as well as establishing traffic regulations. Public utility companies operate and maintain utility infrastructure within these rights-of-way under franchise or license agreements and must obtain permits from the City's Development Engineering Section for any work within the rights-of-way. All new and renewal public utility franchise or license agreements are prepared by the City Attorney's Office and managed by the Management Services Division.

Broadband Internet

Since the early 2000s, [broadband](#) has become an essential utility for most households and local businesses, particularly as remote work and school have become more common. Broadband capacity is a factor in recruiting businesses and industries to the City and ensuring that a variety of high-paying job opportunities are available throughout the Region. Broadband service is available in most locations in the City, while some areas of the County are underserved.¹⁶ The limited number of broadband provider options in the County leads to higher prices, creating an additional barrier to accessing the internet for low-income residents. A lack of internet service can impede a person's access to education, employment, healthcare, and social services. Broadband infrastructure, particularly high-speed internet access, also forms the backbone of the digital ecosystem required by "smart cities" and autonomous vehicle systems. To support digital equity, action from service providers and governments is required.¹⁷

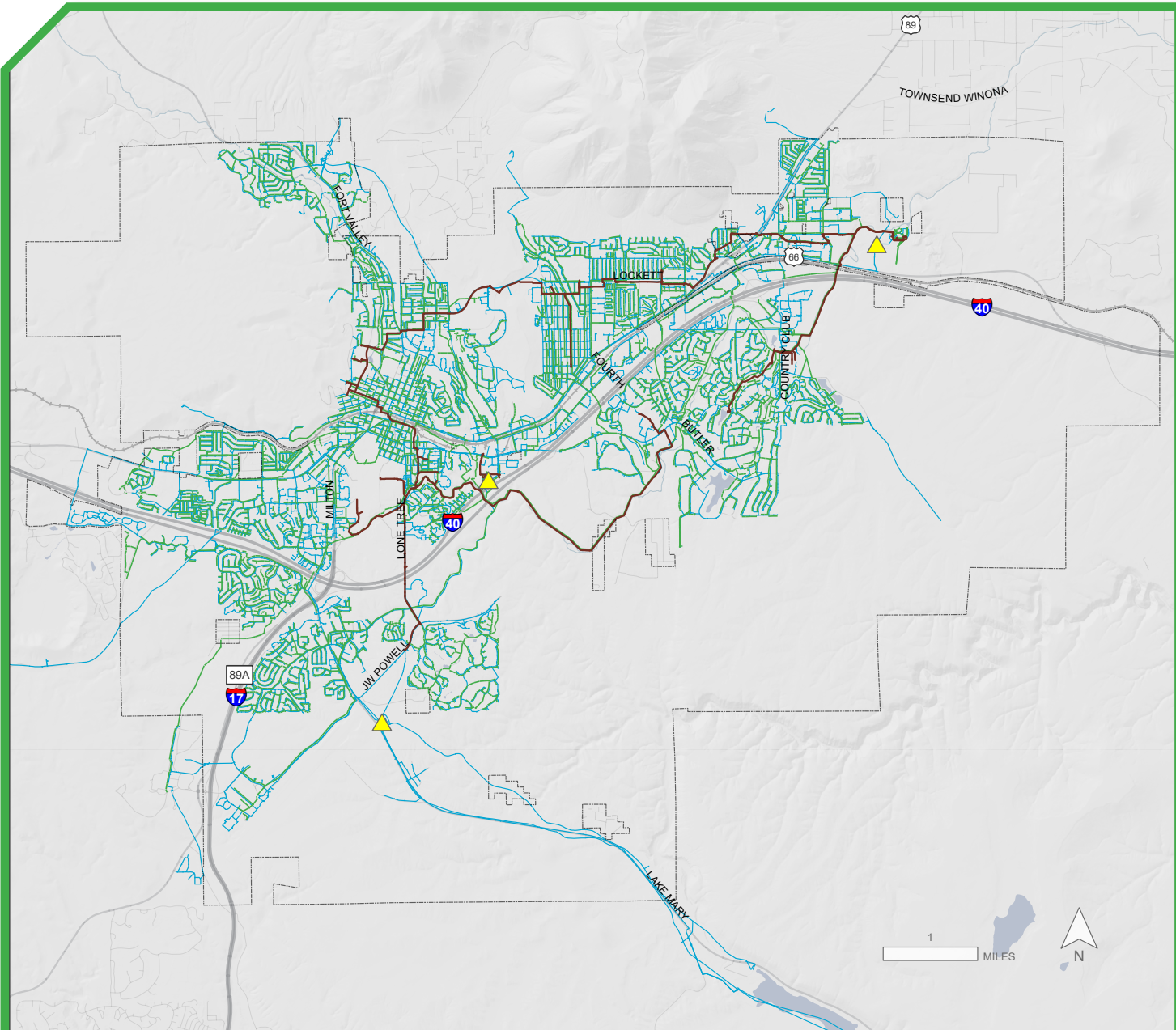
With the guiding principle of connecting every broadband serviceable location, the County is working to increase rural broadband service by engaging with local and tribal governments and public and private organizations, and by leveraging funding available through state and federal broadband programs. Wireless, microwave, and satellite technologies are being explored to provide service in remote areas. Addressing the lack of [infrastructure](#) and the high cost of connectivity is a priority. Ensuring that every community member has access to reliable and fast internet includes expanding broadband coverage and prioritizing remote and underserved areas.¹⁸

Water and Sewer Treatment and Distribution

Information Map 11-4 illustrates the City's water, sewer, and reclaimed water infrastructure. The City's Water Services Division is responsible for maintaining water and sewer infrastructure and completing [CIPs](#). The City's 2014 *Utilities Integrated Master Plan* is the guiding document for these efforts and is in the process of being updated. For further discussion of water, see [Chapter 9, Water Resource Management](#).

The City's wastewater collection system consists of two treatment plants, the Wildcat Hill Wastewater Reclamation Plant and the Rio de Flag Water Reclamation Plant; 7,822 manholes; and 277 miles of sanitary sewers. Of the estimated 18,500 service connections, 90 percent are residential, and 10 percent are commercial, industrial, manufacturing, or at NAU. Approximately 10 percent of the system was constructed before 1960.¹⁹ The City's wastewater infrastructure has two primary needs in the next 20 years:

1. The rehabilitation, replacement, and upsizing of the current collection system, which includes sewer mains, interceptors, and manholes. Each year, City staff replaces several thousand feet of sewer mains, which involves replacing pipe material and upsizing pipes to accommodate future growth. This work is guided by the City's [Sewer Master Plan](#) and the *Capital Improvement Plan*.
2. The Rio de Flag and Wildcat Hill Reclamation Plants have a backlog of improvement and expansion needs. The City's Water Services Division is planning for a new wastewater plant at the Wildcat property.



- ▲ Water and Waste Treatment Plants
- Reclaimed Water Lines
- Sewer Lines
- Water Lines
- CoF Boundary



Information Map 11-4: City of Flagstaff Water and Sewer Infrastructure

Airbus, USGS, NGA, NASA, CGIAR, NCEAS, NLS, OS, NMA, Geodatastyrelsen, GSA, GSI and the GIS User Community

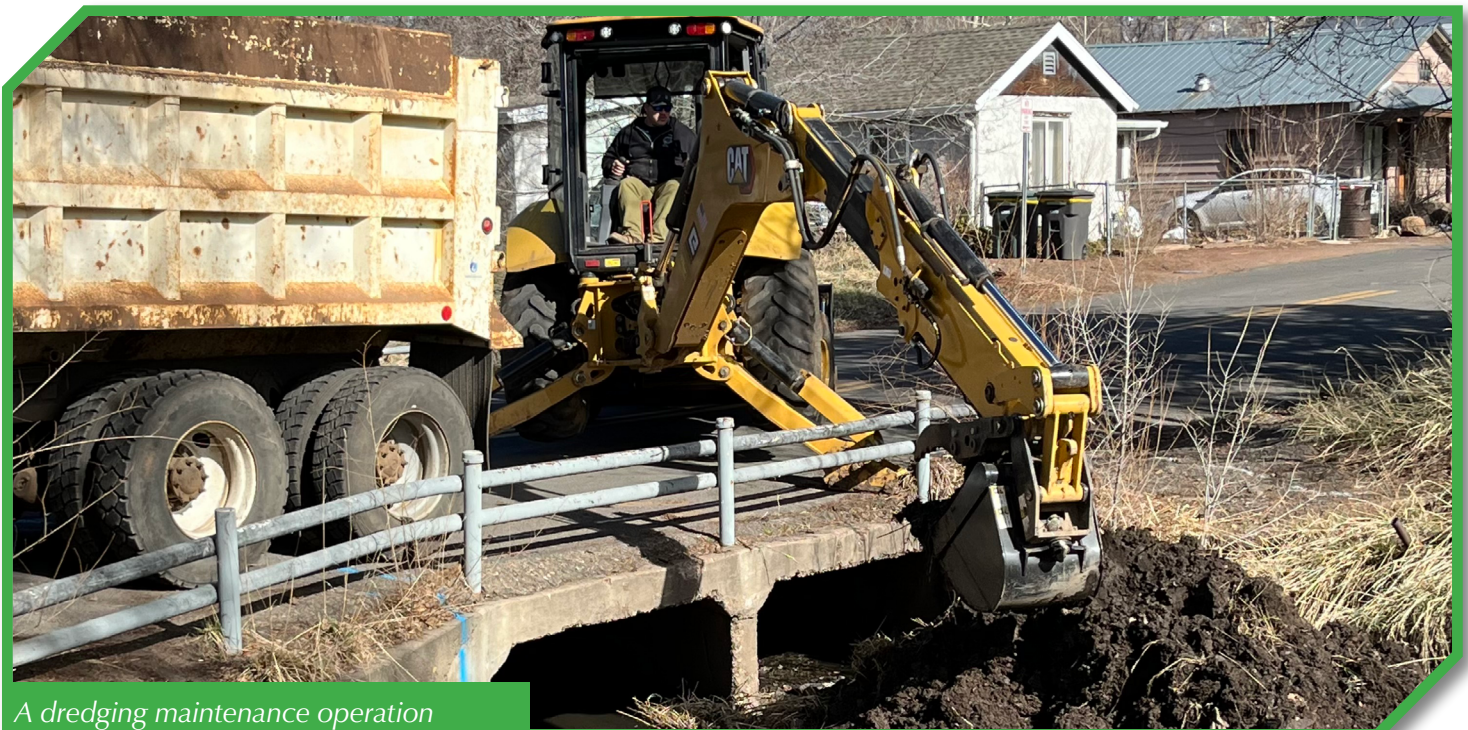
The County does not provide water or wastewater treatment services. Residents in the unincorporated County portions of the Region receive water by one of three means: by private wells, by hauling water to their property, or by water systems operated by private companies, non-profit companies, or Domestic Water Improvement Districts. These systems serve the communities of Doney Park, Timberline, Fernwood, Bellemont, Forest Highlands, the Majestic View subdivision in the Fort Valley area, Mountaineer, and Kachina Village. Likewise, wastewater is treated either by on-site wastewater treatment systems, or by privately owned and operated companies that provide centralized services to the communities of Bellemont, Forest Highlands, and Kachina Village.

Solid Waste

The City collects trash and recycling weekly for eligible residential and commercial customers within City limits. Solid waste is delivered to the Cinder Lake Landfill and to the recycling transfer center. The Cinder Lake Landfill is located just north of the City, and current calculations demonstrate capacity to at least 2088. Multiple undeveloped cells of the landfill within the permitted area may be opened; and, the City is exploring other strategies for extending the life of the landfill through physical site plans. To extend the life of the landfill even further, efforts to improve waste prevention and diversion in the Region continue.

In areas outside the City limits, solid waste and recycling are privately contracted services provided to individual property owners. The County requires new subdivisions to secure waste management services.

While increasing waste diversion is a priority for the City and County, complications to this goal have arisen in recent years. In 2015, the state passed a law preventing municipalities from requiring recycling for commercial and multifamily properties by allowing them to use private waste haulers who do not require recycling. In 2019, shifts in the global recycling and waste markets sent the US recycling industry in flux. At the local level, the City assumed operations at Flagstaff's Municipal Recycling Facility in 2023. The City has been contracting the processing and transportation to a third-party recycling facility outside the Region, where materials are sorted and recycled. The City is actively seeking solutions to the processing and transport of recyclable materials. The City has also set an ambitious goal to be a 90 percent Zero Waste City by 2050.



A dredging maintenance operation

Action Items

High Priority Action Items. See [Appendix C](#) for additional information.

Type of Action	Item	Timing
Educate	Educate homeowners about how best to reduce wildfire risk to their properties through parcel-level Firewise USA® and home hardening assessment programs and use the data collected to support community-wide risk reduction measures, including in parks.	Continuous
Fund	Develop resources to support fire management innovations that align with community risk reduction initiatives.	Long term
Fund/Partner	In coordination with wildland fire and forestry partners, continue to support and implement the FWPP thinning plans across the Rio de Flag and Lake Mary watersheds and City limits, the Four Forest Restoration Initiative, and other landscape-scale forest treatment projects.	Continuous

Other Action Items: While important, these projects may be prioritized as opportunities and funding arise.

Type of Action	Item	Timing
Partner	Pursue cooperative and coordinated planning of infrastructure between government jurisdictions, agencies, educational institutions, non-profits, and private service providers.	Continuous
Fund	Build a Flagstaff Fire Department Wildland Fire Management station that creates enabling conditions for expanded capabilities.	Continuous
Plan	Update the Multi-Jurisdictional Hazard Mitigation Plan .	Continuous
Code	Continue to expand and support risk reduction in the WUI through collaboration and regulations to promote forest restoration. Promote the adoption of the WUI Code within the entire Region.	Continuous
Plan	Update the Community Wildfire Protection Plan every five years.	Short term
Fund	Create and support Resilience Hubs in civic and community buildings to support resident preparedness , coordinate communication, distribute resources, respond to emergencies, and reduce carbon pollution, while enhancing quality of life before, during, and after disruptions.	Short term
Fund	Expand waste reduction strategies in construction and solid waste disposal to extend the life of the landfill and meet the programmatic goal of being a 90-percent Zero Waste City by 2050.	Mid term
Educate	Provide information on how neighborhoods without secondary access can negotiate and create shared-use agreements and improvement districts to achieve secondary access in support of safe evacuation for all residents.	Mid term
Plan	Support efforts to create and update community-level evacuation plans for rural areas.	Long term
Educate	Update preparedness educational materials to ensure that the ongoing renewable energy transition is adequately reflected in instructions for sheltering in place, particularly for all-electric homes and other green building changes.	Short term
Fund/Partner	Develop policies, programs, and partnerships to support residents in home hardening and flood prevention.	Short term
Fund	Prioritize the ability to retrofit City facilities and operations to achieve carbon neutrality as technology and availability of resources allow.	Continuous

Type of Action	Item	Timing
Fund	Appropriately retrofit critical facilities located within the 500-year floodplain to ensure they can remain operational during a flood event.	Mid term
Fund	Address the capacity and adequacy of critical infrastructure systems, and upgrade them as practicable, according to the risks identified.	Mid term
Educate	Contact Neighborhood Associations, Homeowners’ Associations, and neighborhood based community organizations to help identify vulnerable residents and connect them with emergency preparedness services, especially in the 500-year floodplain.	Continuous

Endnotes

1. In this table, costs for “Flooding/Flash Flooding” and “Wildfire” have been updated to reflect additional costs from 2020-2023 based on internal City financial data.
2. At coconino.az.gov/ready, residents can also find information about the national Ready, Set, Go! program utilized by both the City and the County. This nationwide program empowers and educates residents on preemptive actions to undertake before emergencies and protocols to follow when communities face imminent threats.
3. This comprehensive system utilizes two platforms for alert dissemination: a registered notification system, and the Integrated Public Alert and Warning System (IPAWS).
4. Coconino County, “The Wildfire Crisis,” 2024.
5. Coconino County, “The Wildfire Crisis,” 2024.
6. USDA, *Confronting the Wildfire Crisis*, 2022.
7. Coconino County, *Bioeconomy Development Opportunity Zone Rating*, 2024.
8. Coconino County, “Forest Restoration Industry.”
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