2023 REPORT TO THE WATER COMMISSION

Activities of Calendar Year 2022

Water Plan for 2023

CITY OF FLAGSTAFF WATER SERVICES DIVISION

WATER, WASTEWATER, REUSE AND STORMWATER

Annual Report

Schultz Creek Sediment and Flood Detention Basins

REPORT TO THE WATER COMMISSION

INFORMATION YEAR 2022

Water Plan 2023

WATER, WASTEWATER, REUSE
and STORMWATER
ANNUAL REPORT

Including Historical Data &
Graphical Trends
July 11, 2023

CITY OF FLAGSTAFF
WATER SERVICES DIVISION
2323 N. Walgreens Street, Suite 1
Flagstaff, AZ 86004

FLAGSTAFF
WATER SERVICES
We are Water

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2023 Water Commission

Commission Members	Executive Members	Commission Liaisons
Malcolm Alter	Kurt Riegelman Chair	Marie Jones P & Z Representative
Donald Bills	Ben Ruddell Vice Chair	Miranda Sweet Council Representative
Robert Burr Dilday		
Joe Loverich		
John Nauman		

Staff Contributions

To acknowledge those responsible for providing data and assembling the 2022 Annual Report to the Water Commission

Shannon Jones — Water Services Director

Joe Almendarez —
Wastewater Collections Supervisor

MacKenzie Chase —
Communications Aide

Troy Dagenhart —
Operations Section Director-Water Treatment

Lisa Deem —
Management Analyst

Tim Harrington —
SCADA Administrator

Jim Huchel —
Former Operations Section Director-Water Treatment

Brian Huntzinger —
Water Production Manager

Jessica Kittleson —
Customer Service Manager

Tamara Lawless, PhD —
Water Conservation Program Manager

Marion Lee —
Administrative Specialist

Emily Melhorn —
Water Conservation Specialist

Gary Miller —
Water Services Engineering Section Director

Jolene Montoya —
Regulatory Compliance Manager

Patrick O'Connor —
Operations Section Director-Distribution & Collection

Ed Schenk, R.G. —
Stormwater Manager

Corryn Smith —
IT Administrator

Debby Valencia —
Administrative Specialist/Contractor

Lee Williams —
Water Production Supervisor

Erin Young, R.G. —
Water Resources Manager

1 ADMINISTRATION

Water Services is responsible for water production and services, wastewater collection and treatment, reclaimed water distribution, and stormwater management. The division is also responsible for water resource management, water conservation, engineering, and regulatory compliance programming. This report provides an annual summary of operations, planning, and programming and is distributed throughout the year in response to various requests for information on the Water Services Division's programs. Water Services provides Master Planning documents for Water Policies, Water Resources, Infrastructure, SCADA, and Solids Handling. These documents can be found at the Water Services website at *www.flagstaff.az.gov/waterservices.* The Customer Service team, in the Management Services Division, works closely with Water Services staff to identify possible leaks, help customers monitor their usage, and pay their bills.

Mission Statement of the Water Services Division:

"Professionally and cost effectively providing water, wastewater and stormwater services that meet the present and future environmental, health, and safety needs of the community and our co-workers. Committed to a goal of 100% customer satisfaction achieved through dedication to exceed customer expectations by continuously improving our operations."

1-1 Director's Message: Out with the Old, In with the New

Brad Hill Returns as Interim Director (May 2022-Feb 2023)

In June 2022, Brad Hill once again came out of retirement and stepped into the big shoes of Water Services Director until our new director, Shannon Jones, started work in February 2023. Brad's expertise in navigating issues and communicating them to City Council and leadership were critical in the face of operational supply shortages, cost increases, reclamation needs, and flood mitigation. Brad provided much-needed stability in leadership for the division until Shannon was hired and on-boarded.

Working primarily on a part-time remote basis, Brad guided the team through some difficult problem-solving:

- He facilitated transformational discussions on strategic planning, engaging managers to update the vision for the division's future.
- He helped identify needs for increased Stormwater rates to provide the level of services City Council and community members expect.
- He opened conversations on wastewater treatment issues and the subsequent capital project needs, while educating City Council and the community of the needed path to remedy these problems.
- He assisted staff in formulating the concepts around how best to potentially implement advanced treatment of reclaimed water.
- Drawing from his expertise in budgeting, Brad helped to focus on articulating new staffing needs for the FY24 budget to provide the level of services City Council and community members expect.

Brad's impact on Water Services will remain, not only for the good work done, but the many staff members he has mentored along the way. Thanks, Brad!

1-1 Director's Message, continued

Shannon Jones Looks to the Future

As predicted in last year's Report to the Water Commission, 2022 continued to be a taxing year on resources with flood mitigation and response, yet 2022 gave way to a phenomenal winter season in 2023.

As Water Services remains reactive to flooding, freezing, snow, and runoff, staff works to find sustainability though sound operational practices, financial resiliency, and innovation for the future.

Water is a precious and vulnerable resource. Growing demands for water amidst climate change, drought, and regional competition for resources will require us to continue building resiliency, obtaining financial stability, and maintaining regulatory compliance.

I am proud of the wide range of activities currently underway that are vital to our city and region. The challenges we face with water conservation, wastewater treatment, and stormwater management will require us to work across sections and divisions as well as apply new knowledge and be data driven in our decisions as we leverage efficiencies. We will continue to adapt to changing conditions, while maintaining a high level of service. We must execute the plans and projects currently underway and look forward in our planning efforts.

1-2 Strategic Plan 2025 — A Roadmap to the Future

Flagstaff Water Services' 2025 Strategic Plan, released in January of 2020, identified key challenges facing Flagstaff with respect to critical water issues. The plan included a series of strategic objectives that addressed specific areas of concern, including water resources and water service reliability, infrastructure age and reliability, water quality, stormwater management, wastewater treatment, regulatory compliance, workforce challenges, data management, communications, and the risks created by wildfires.

In October of 2022, nearly three years after the plan was implemented, staff met to review the plan. While significant headway has been made toward resolving identified issues, new challenges are facing the division. Some issues affect the entire country and the world, such as impacts of climate change, supply chain shortages and resulting delays and extreme price increases. This update outlines the advancements we've made to the original 10 objectives while the plan undergoes revision.

Objective 1: Use Standards and Data to Drive Decision Making

Accomplishments:

- Staff has been establishing standards and determining consistent data to be collected supporting those standards. For example, variable frequency drive (VFD) pump performance or flow gauge monitoring. Standards are incorporated into the programming language. Using the same language and format, or tags, across the board saves time when analyzing equipment failures.
- A robust asset management system is critical, and the SCADA/IS team utilizes Cityworks to help identify risks and prepare for emergency events. The GIS asset management system was an instrumental tool in flood response efforts during the 2021 and 2022 flood events, including tracking time and material costs for FEMA reimbursement. We are bringing fiber technology into the reclamation plants to implement a software communications system throughout the facilities.
- Cyber security is a big threat. The SCADA team has initiated the steps to separate our Operational Technology (OT) system from the City's IT servers. Two towers have been erected around the city, with one more in planning stages. It is a complex project, requiring a dedicated position, which was approved for the FY23 budget.

1-2 Strategic Plan 2025 — A Roadmap to the Future, continued

Challenges

- The SCADA system is 20 years behind similar water utility technologies. Often, old technology cannot be serviced, resulting in a band-aid approach and increased risk of failures. Technology upgrades require sufficient staffing, beyond the day-to-day management tasks and component failures.
- Staffing is an issue, as this is a very detailed, specific industry. We transferred one of our own electricians to fill a new position and have been approved to hire a Network Administrator to separate out the OT (Operational Technology) from the City IT servers as a cyber security measure. We're looking for interns to "grow our own" talent and create a path for advancement in this section.

Objective 2: Address Wildcat Hill Water Reclamation Plant (WRP) Capacity

Accomplishments

- Much of the accomplishments include improvements to Rio de Flag Water Reclamation Plant (Rio WRP), as improved processes take some load off Wildcat Hill WRP as an end-of-the-line plant. We had a huge boost from a bond measure approved by voters in November 2022. This secondary property tax provided $29 million in needed funding for new equipment, including a digester, co-generation unit, and smaller turbo blowers to improve efficiency.
- Extensive planning efforts resulted in design of two new digesters, one at Wildcat Hill WRP and one at Rio WRP. Construction to begin in FY24. This adds solids capacity to the existing system and allows current digesters to be taken offline for much-needed maintenance.
- The Primary Effluent Pump Station (PEPS) has been designed to bypass stages of the reclamation process, allowing for a stepped process in renovations and the capacity to bring parts of the facility offline for maintenance – something previously not possible.
- Plant risk assessment resulted in repairs and replacement of anoxic mixers, clarifiers, bar screens, and weir supports. The FY24 budget includes replacing the reclaimed weir gate at Wildcat Hill WRP.
- A Wastewater Facility Master Plan to guide future infrastructure improvements is in process.

Challenges

- Wildcat Hill WRP is in need of a complete electrical and fiber replacement. Staff is working with finance to identify funding sources for this critical need.
- The headworks system at Wildcat Hill WRP is still in need of a complete rehabilitation.
- With a focus on plant improvements, the pipeline replacement program for the wastewater collection system has been slowed down. In FY24, a sewer system assessment will be performed to prioritize projects.

1-2 Strategic Plan 2025 — A Roadmap to the Future, continued

Objective 3: Protect the Water System from Wildfire Threat

Accomplishments

- City Council adopted the Water Resources Protection Fee in 2020 which funds the Wildland Fire Management program to work in tandem with USFS and water production efforts.
- High voltage powerlines and electrical equipment in the forest have been cleared of vegetation and will be inspected every five years.
- A radio tower at Lake Mary wellfield and Public Works provides redundancy to communications reliability.
- Backup generators are in ready mode, to provide power for emergency water supply. Backup generators for the Rio de Flag WRP are funded in the recent bond measure.

Challenges

- Future sedimentation ponds for Lake Mary contingent on land purchase from USFS and yield predictions.

Objective 4: Upgrade Stormwater System and Increase Maintenance

Accomplishments

- Stormwater Section received a triple boost this past year after dealing with flooding caused by multiple forest fires in 2019 and 2022. Prop 441, approved by voters in November 2022, provided $26 million toward Spruce Wash infrastructure projects. FEMA and ADEMA agencies supported millions in flood mitigation support, including flood control basins and sandbags. A stormwater rate adjustment in April 2023 provides ongoing maintenance funds. A recent state appropriations bill committed to completion of Schultz Creek/Highway 180 improvements, as well as basin maintenance support.
- The CMMS asset management system for stormwater was put to the test during floods in 2021 and 2022. This streamlined the response and calculated costs for FEMA reimbursement.
- Stormwater added a second vacuum truck and was approved for additional staffing in FY23.
- New surface water flow modeling was conducted, as the old models no longer applied, and used to prioritize projects, with a focus on Spruce Wash. Several projects have been completed, including retention basins near Killip School – a hard-hit flood area.
- The Stormwater Credit Manual was revised and the Stormwater Design Manual is in its final stages.

Challenges

- Maintaining staff levels.

Objective 5: Accelerate Infrastructure Maintenance and Replacement

Accomplishments

- The CMMS asset management system made great strides across the entire division for infrastructure maintenance, including pumps, valves, blowers, and pipe.

1-2 Strategic Plan 2025 — A Roadmap to the Future, continued

- Weir supports, grit lines, manhole work, Continental and Woody Mountain well/pump station rehabs and upgrades were part of these improvements to the asset management system.
- Regular inspection programs included leak detection, arc flash, vibration testing, and electrical equipment. Odor control units were replaced.
- Assessment for Inner Basin pipeline and North Reservoir Plant is underway, to complement the waterline rehabilitation efforts under FEMA emergency declaration for Tunnel Fire damage.
- Lake Mary's raw water pipeline is also undergoing assessment and design as we strategize funding opportunities.

Challenges

- Costs have skyrocketed, requiring delays to budgeted projects until additional funding can be identified. Such is the case with Lake Mary WTP Sedimentation Basins. The possibility for federal funding further adds delays (and costs due to federal procurement requirements) to the project.
- The focus on facility-based infrastructure has taken away available dollars toward water and sewer line projects like the Aging Pipeline Replacement Program. This will need to be ramped up in future years.

Objective 6: Ensure Adequate Water Resources and Plan for Climate Change

Accomplishments

- Added two stream gauge monitoring stations in the Upper Lake Mary watershed.
- Working toward grant proposals to enhance streambed recharge to the C-aquifer.
- Completed a baseline monitoring report for Upper Lake Mary Watershed Monitoring Program through a National Parks Service grant.
- Developed a draft drought contingency plan.
- Staff involved with development of rules through ADEQ to allow for direct potable reuse for any community in Arizona.

Challenges

- Still determining policy for best use of excess reclaimed water.

Objective 7: Maintain Excellent Water Quality

Accomplishments

- Ft. Tuthill #2 well was successfully drilled and design for a well house to augment and provide redundancy with Ft. Tuthill #1 well is underway.
- Continental, Foxglenn, and Woody Mountain wellfields received sand filter replacement, variable frequency drives, and a clear well for finished water.
- ADEQ sample testing of groundwater wells detected no PFAS or PFOS.

Challenges

- Resuming discussions on best use of excess reclaimed water.

1-2 Strategic Plan 2025 — A Roadmap to the Future, continued

Objective 8: Improve Compliance with Environmental Standards and Protections

Accomplishments

- Working with partner agencies to complete the Rio de Flag Watershed Plan through the Watershed Alliance for the Rio de Flag.
- Updated Stormwater Credit Manual to promote responsible water management.
- Completed and published surface water hydrology report based on 10 years of gauge and infiltration data.
- Stormwater Design Manual in final stages, includes Low Impact Development Code requirements.
- Trained city field staff on illicit discharge response. Implementing a public outreach program.

Objective 9: Enhance Communications and Customer Service

Accomplishments

- Monthly blogs and reports shared with public and staff.
- Public outreach on Stormwater and Water Reclamation needs resulted in a voter-approved bond bringing $55.1 million dollars to infrastructure projects.
- Public outreach on Stormwater rate adjustment resulted in a successful rate model passage by City Council.
- Flood outreach campaign assisted residents looking for flood support services.
- Customer Service personnel developed a referral program to provide residents with financial aid for utility bills.

- Created a policy to notify customers of a spike in water use, which could signify possible leaks.

Objective 10: Address Critical Workforce Issues

Accomplishments

- Worked with HR to develop a step plan for Water Maintenance and Operator staff.
- Working with HR to align Supervisors to correct pay scale — completed for some sections.
- Increased staffing in Stormwater, Water Reclamation, and SCADA/IS.
- Continue to cross train staff to fill in where needed in other sections/positions.

Challenges

- Attrition continues to be a problem, with vacancies remaining high and pay levels below industry standards.

1-3 Notable Awards and Events in 2022

Water Resources Economics, a consulting firm based in California, conducted a stormwater rate study for the City of Flagstaff last year to assess the overall financial condition of the stormwater utility and develop appropriate rates to meet increased needs due to increasing materials and construction costs, post-wildfire flood mitigation, and drainage upgrades. Two different funding scenarios were identified – a general obligation bond issuance if Proposition 441 passes, or revenue bonds and higher stormwater fees would cover the costs.

Proposition 441 passed with support from 76% of Flagstaff voters in the November 2022 election, designating $57 million to wildfire suppression, stormwater flood mitigation, and wastewater treatment infrastructure. Of that total, $26 million will be used to fund stormwater infrastructure improvements in the Spruce Wash area and $29.1 million will go toward upgrading and replacing wastewater treatment infrastructure.

Arizona recognizes the important role water professionals play in ensuring reliable access to clean, safe water, with a special recognition during Arizona Water Professionals Appreciation Week. In April 2022, Vice Mayor Miranda Sweet was invited to join Arizona Senator Rosanna Gabaldon to read a proclamation at the State Capitol Rose Garden. Mayor Deasy and City Council read a similar proclamation to recognize the City's water professionals:

"NOW, THEREFORE BE IT RESOLVED that the City of Flagstaff joins the State of Arizona in declaring April 11-17, 2022 Water Professionals Appreciation Week and extends its sincere gratitude and appreciation to the water professionals who are on the front line of the delivery and treatment of the City of Flagstaff's safe and reliable water."

SCADA Recognized for Emergency Flood Response Improvements

The City of Flagstaff was recognized for Excellence in Departmental Practice at Innovate: The Public Asset Management Conference presented by Cityworks and Trimble in Salt Lake City in December. The SCADA/IS team expanded its use of Cityworks, a computer maintenance management system, into the Stormwater section in 2020 to prepare for increased impact on drainages caused by the 2019 Museum Fire.

Cityworks, and the corresponding ESRI Dashboards, provided the Incident Management and Emergency Operations Teams real-time inventory damage assessments during 2021's major storm events, resulting in improved response. This provided decision-makers with first-hand data to better determine stormwater system needs during storm events and was crucial to infrastructure management in the clean-up phase. Staff are pictured above holding the award with Cityworks representatives.

City Manager's Excellence Awards

Water Services staff were recognized during the December 13 City Council meeting by the City Manager's Office for exemplary work through 2022. Staff involved in the Dortha Flood Mitigation projects – Gary Miller, Ed Schenk, Doug Slover, Christine Cameron, Bryce Doty, Adam Miele, Kevin Fincel, Scott Overton, Trevor Henry, and Ben Jones – were honored with the Aspen Award for Teamwork. Meter Technician Scott Klotz earned the Oak Award for Communication.

2 2021 SUMMARY

2-1 2022 Notable Capital Investments

Wastewater Operations — Wildcat Hill (WCH) Water Reclamation Plant

1. Replaced secondary effluent flow meter
2. Replacing check valves in primary sludge pumps
3. Calibrated gas detectors
4. Received new dump truck
5. Installed new floor grating in grit room
6. APS moved power poles at septage area
7. Inspected manholes with RH Borden scan technology
8. Poured concrete in roads to fix potholes
9. Screw press demo from Huber – dewatering technology
10. Bisulfite system up and running. Switched from SO2
11. Fixed broken shaft on anoxic mixer #1
12. Hired 3 new employees
13. Repaired dumpsters for headworks
14. Received new carbon and tank for HW odor control project
15. Risk management started safety inspections at facilities
16. Installed and repaired new safety controls around the plant found from safety inspections

Wastewater Operations — Rio de Flag Water Reclamation Plant

1. Installed aux fuel tank into Rio plow truck
2. Replaced carbon on all carbon towers
3. Started ATP and DNA testing for data collection
4. Installed new hot box housing, and replaced backflow diaphragms
5. Installed secondary clarifier sludge indicators x 2
6. Clarifier rehab by copper state x 4
7. Installed new UV AC units
8. BP Mechanical replaced air mover duct fan 606 and ran new conduit for HVAC upgrade
9. Pueblo fixed HVAC board and coils
10. Invent replaced east basin mixers
11. Laid conduit for Rio gate project
12. Installed new gate cameras and FOB locks on administrative building
13. Risk management started safety inspections at facilities
14. Installed and repaired new safety controls around the plant found from safety inspections

Reclaimed Water

1. Minor repairs to reclaim chlorination at WCH and Rio
2. Motor rehab and replaced seals on the reclaim pumps
3. Replaced air relief valve on reclaim line at WCH
4. Installed automatic valve on reclaim line leaving WCH
5. Installed new check valve on reclaim line at Rio
6. Distribution repaired leak in main Reclaim line between WCH and Continental Country Club
7. Installed and repaired new safety controls around the plant found from safety inspections

Stormwater

1. Replaced Phoenix Avenue Bridge
2. Upsized Dortha Inlet and Spruce Wash channel between Cedar and Dortha
3. Killip School Regional Flood Detention Basin construction
4. Schultz Creek Regional Flood Detention Basins construction
5. Completed four drainage spot improvement projects

2-1 2022 Notable Capital Investments, continued

Water Production Operations

1. Excavated/inspected the Upper Lake Mary Dam as recommended by the Arizona Department of Water Resources (ADWR) with local geotech firm Western Technologies
2. Repaired fencing and gates at both the Lake Mary Water Treatment Plant (LMWTP) and North Reservoir Filtration Plant (NRFP) and hung over 100 Federal Offense signs at all the water production locations to deter vandalism and graffiti
3. Added new filtration media (anthracite) to all filters at the LMWTP used in surface water production
4. Replaced 6 valves and 1 actuator within the Filtration Building at the LMWTP
5. Completed a Sanitary Survey with the Arizona Department of Environmental Quality with no major issues cited and carried out all suggested recommendations
6. Made strides in communication upgrades to the Lake Mary Wellfield (erected a new communications tower at Lake Mary Well #2)
7. Replaced vintage propeller type flowmeters with new magnetic flowmeters (mag-meters) at Woody Mountain Wells #2, #4, #5, and #7
8. Replaced chlorine analyzers at the NRFP, Shop Well, Tuthill Well, and Woody Mountain Booster Station
9. Addressed and incorporated previous requests for information (RFIs) and refined the design and specifications of the LMWTP Sed Basin project with design engineers Brown & Caldwell
10. Re-equipped (replaced submersible pump, motor, seal, and column pipe when needed) Rio Well, Woody Mountain Well #3, and Woody Mountain Well #6
11. Upgraded the communications and controls at Woody Mountain Wells #2, #6, #7, and #10, and the Woody Mountain Booster Station
12. Repaired and replaced two sets of booster pumps and motors at Foxglenn and Sinagua Wellhouse. Now stocking a complete set, (both pump and motor, for future use (unsusceptible to supply chain issues)
13. Purchased a spare Tuthill Well booster pump for future use (unsusceptible to supply chain issues)
14. Re-equipped Well #2, Sunshine and Red Sands wildlife/livestock wells at Red Gap Ranch
15. Resumed tours of the LMWTP with NAU and other students (did not occur during pandemic)

Upper Lake Mary Dam excavation.

2-2 2022 Water Management Summary

WATER PRODUCTION

I. C Aquifer Groundwater	**7,447 AF**	*(79% of Total Water Produced)*
Lake Mary wells	1,746 AF	*(94% of Total Water Produced)*
Woody Mountain wells	2,729 AF	
Local wells	2,972 AF	
II. Upper Lake Mary Surface Water	**443 AF**	*(5% of Total Water Produced)*
		(6% of Total Potable Produced)
III. Inner Basin Water	**0 AF**	*(0% of Total Water Produced)*
Inner Basin wells	0 AF	*(0% of Total Potable Produced)*
Inner Basin spring water	0 AF	
2022 TOTAL POTABLE WATER PRODUCED		**7,890 AF**
IV. Reclaimed Water (direct delivered)	**1,547 AF**	*(16% of Total Water Produced)*
Golf courses	667 AF	
Manufacturing	18 AF	
Municipal parks, schools	155 AF	
Commercial, NAU, Snowbowl	657 AF	
Construction	49 AF *(reclaimed hydrant meters and standpipes)*	
Residential	1 AF	
Discharged to Rio de Flag	4,011 AF *(not included in total)*	
2022 TOTAL WATER PRODUCED		**9,437 AF**

POTABLE WATER USED

I. Residential	**4,095 AF (58%)**	
Single-Family	2,402 AF	*(16,253 household meters)*
Multi-Family	1,693 AF	*(3,089 multi-family meters)*
II. Non-Residential	**2,984 AF (42%)**	
Commercial, NAU	2,438 AF	*(1,708 commercial meters)*
Manufacturing	191 AF	*(39 meters)*
Landscape/Lawn	272 AF	*(332 meters)*
Standpipe	83 AF	
2022 TOTAL WATER BILLED		**7,079 AF**

NON-REVENUE WATER [produced — billed/produced]: 811 AF or 10%

Water main flushing and drilling water	7 AF
System leaks detected and repaired	N/A for 2022
Other (i.e., flushing, meter inaccuracy)	804 AF

AVERAGE WATER USE **80 Total GPCD or 133 GPHD**

I. Gallons per capita per day (GPCD) is the potable water used in gallons / 78,664 population
Residential (46 GPCD) + Non-Residential (34 GPCD) = 80 GPCD (does not include Non-Revenue)

Total = 90 GPCD (includes Non-Revenue)

II. Single-family residential water use: 0.15 AF/house/year or 133 gallons/house/day (GPHD)

[2,402 AF/16,253 meters] or [2,402 AF * 325,851 gallons/AF]/16,253 meters

3 WATER SERVICES COMMUNICATIONS

3-1 Outreach Methods

Website

Water Services webpages underwent an extensive redevelopment in 2020 and continued to be a reliable resource for customers, staff, and stakeholders through 2022 as we began cleaning up outdated information and improving the user experience. Website information relies on the public initiating the engagement, resulting in few to no views on some webpages. Direct email and social media campaigns can market some of these pages. Water Services tracks monthly visitation metrics for 51 webpages.

- Average monthly visitation across all Water Services webpages was **10,339 views.**
- Total website visits in 2022 was **124,063,** up 5% from last year.
- **'Paying Your Bill,' 'Flood Information,' and 'Billing and Contact Information' were the most popular webpages.** Customers regularly utilize the website as a convenient resource to learn about billing, flood safety, account information, and more.
- A new **Stormwater Rate Adjustment** page was created in September to provide the public with information about the stormwater section's financial needs given an increase in large capital projects. Resources provided include a rate study, recorded presentations, a breakdown of anticipated project costs through FY28, and FAQs. This page had **738 views** in 2022. Learn more at *www.flagstaff.az.gov/StormwaterRates*
- The **Rio de Flag Flood Control Project** webpage received **1,792 views.** It was created in 2020 as a portal to follow the progress of this city-wide project with periodic updates, maps, videos, virtual meeting rooms, and FAQs. Access these resources at *www.flagstaff.az.gov/4189/Rio-De-Flag-Flood-Control-Project*
- The **Capital Improvement Project (CIP) Map** tracks water projects around the city. Viewers can find details on the cost, location, manager, description, timeline, and contractor of each City project pinned on the map at *www.flagstaff.az.gov/4237/Capital-Improvement-Map*
- **Story Maps** were developed to provide a visual update on active construction of various projects. These maps include photos and captions that users can scroll through to visually learn about the projects at *www.flagstaff.az.gov/4183/Story-Maps*

Water Talk News

This newsletter informs customers about programs and provides updates, tips, and general information related to Water Services. 2022 announcements included:

- **Schools Save Water with Conservation Retrofits –** A brief outline of the ways Flagstaff Junior Academy is saving water and money through a free water audit/ retrofit program.
- **NAU Music: 'The Secret History of Water' –** Water Conservation staff attended this water-themed event to promote consultation and rebate programs to the public.
- **AZ Water Professionals Appreciation Week –** Water Professionals Appreciation Week celebrates the work of water professionals across the state to keep water flowing now and into the future.

3-1 Outreach Methods, continued

- **'Poo in the Park' Campaign –** An overview of the successful Poo in the Park campaign, a collaboration between Water Services and Parks, Recreation, Open Space and Events, which helped reduce pet waste in public spaces.
- **Water Services Provides Resources for the Pipeline Fire –** A write-up describing how crews balanced the City's reclaimed water customer demand with firefighting needs during the Pipeline Fire.
- **Water Services Visits the Scottsdale Water Campus –** Staff, along with members of the Water Commission and City Council, explored advanced water treatment solutions during this summer visit.
- **Water Heroes of Flagstaff –** A brief write-up highlighting our water distribution team's hard work to quickly repair several water main breaks over a short period, minimizing inconvenience to customers.
- **Warding off Winter Woes –** A PSA with tips for homeowners to prevent frozen pipes and expensive repairs.

Water Reliability Today and Tomorrow

The Water Reliability blog provides short updates to keep stakeholders substantively informed of primary capital projects and planning efforts. Topics shared through this platform in CY22 included:

- **Water Services Focuses on Efficiency –** Our January blog highlighted the importance of energy and water loss audits to help conserve water.
- **Wildcat Hill Digester Complex Expansion –** Upgrades to the digester system at Wildcat Hill Water Reclamation Plant support the city's Carbon Neutrality Plan.
- **The Phoenix Avenue Bridge Project is Complete! –** This highly visible downtown project replaced the 1921 stormwater box culvert bridge structure, bringing it up to Arizona Department of Transportation standards.
- **Preparing for Monsoons and Beyond –** Flood mitigation is year-round work. Crews worked through the winter clearing drainages to ensure the infrastructure is prepared to handle monsoon season.
- **Adding a New Waterline Loop Increases Capacity on East Route 66 –** This project expanded crucial infrastructure in both water and technology as part of the City's ongoing effort to meet the future needs of our community.
- **Proposition 441 Supports Water Health and Safety Measures –** An overview of how funds from the GO bond will be used to better Flagstaff if approved in the November general election.
- **Preparing for the Floods –** A notice to the public encouraging participation in community forums to discuss proposed increases for the stormwater rate.
- **Thank You, Flagstaff! –** Voters approved Proposition 441! We are deeply grateful for their support; this blog post outlines a few of the projects that will be funded through this bond.

3-1 Outreach Methods, continued

Social Media

Water Services merged its social media platforms with the City's main accounts to reach a wider audience in 2022. Posts regularly made to Facebook, Instagram, and Twitter promote events, blogs, news items, workshops, Water Commission meetings, and anything else of interest to the public.

The Flagstaff City Government Facebook page has approximately 13,000 followers while its Instagram has 1,000 and Twitter has 7,000. Water Services made 44 posts to Facebook, which received 1,559 post engagements (likes, shares, comments). The posts were duplicated on Instagram and Twitter, receiving a total of 107 and 236 post engagements, respectively.

Presentations

Due to continued limitations of COVID-19, only two community presentations were conducted in 2022. On April 22 and October 14, Communications staff presented to Environmental Science students at Northern Arizona University during a field trip to Frances Short Pond and Upper Lake Mary.

Public Outreach

Point of Contact materials, such as handouts, flyers, and other notices, are dispersed by Communications staff to inform customers of outages, repairs, hazards, or related information. Numerous point of contact materials were put out in CY22, in two main categories: Emergency Outreach and Customer Notices. Of note this past year was the extensive outreach conducted regarding the stormwater rate adjustment.

What's Next

Water Services developed a public opinion survey in partnership with Northern Arizona University researchers to determine the best ways to communicate important information to the public. By better understanding the habits of our customers, we can better distribute news relevant to them and the community.

Staff is also working with the Public Affairs division to produce a video series debunking water myths in Flagstaff. These short videos will educate the public on topics such as where the City draws its drinking water from, how we are planning to maintain water availability with anticipated population growth, and more.

4 2023 WATER PRODUCTION PLAN

This section describes the strategy Water Production will follow in order to meet anticipated water demands for 2023.

Over the last two years, surface water production from Upper Lake Mary and spring/well water harvesting from the Inner Basin has been dismal. At only about 150 million gallons, 2022 had the lowest surface water production in the last 15 years and was the seventh lowest surface water production year in the history of the Lake Mary Water Treatment Plant, or since 1949. Due to infrastructure issues, minimal snowpack, and the Pipeline Fire, no spring/well water was harvested from the Inner Basin the last two years. This has only happened once before in the history of water production in Flagstaff – after the Schultz Fire in 2010.

2023 began on a much more optimistic note with the third snowiest January on record. In February, the City of Flagstaff received approval of 100% funding from the Arizona Department of Forestry and Fire Management to repair both Waterline (FS146) and Schultz Pass (FS420) Roads and the Inner Basin pipeline. During the third week of March, Upper Lake Mary went from 34% full to 90%, an increase of nearly three billion gallons in only seven days. By March 22, Upper Lake Mary was overflowing.

In 2023, Water Production will again maximize surface water production and look forward to the days Inner Basin well and spring water will be available. Current infrastructure rehabilitations will be ongoing, as well as future rehabilitation evaluations and assessments in order to continue increasing resiliency, redundancy, and efficiency in water production.

By dividing supply between available sources, we will optimize capital investments while maximizing surface water production near 35% of the supply in 2023. Optimizing water supplies in this manner will make it possible to respond quickly to unplanned needs, utilize equipment investments, and continue infrastructure rehabilitations, replacements, evaluations, and assessments in water production.

2023 Quarterly Operations Plan

1st Quarter (actual)				2nd Quarter		
	Avg MGD	MG	AF	Avg MGD	MG	AF
Upper Lake	0.2	22	70	3.5	319	1038
LM Wells	1.2	104	340	1.1	100	326
WM Wells	2.1	192	625	1.2	109	356
Local Wells	2.6	230	748	2.4	218	712
IB	0.0	0	0	0.0	0	0
Total	6.1	548	1783	8.2	746	2432
3rd Quarter (estimated)				**4th Quarter (estimated)**		
	Avg MGD	MG	AF	Avg MGD	MG	AF
Upper Lake	3.4	313	1019	2.2	202	660
LM Wells	1.1	101	330	1.1	101	330
WM Wells	1.2	110	360	0.8	74	240
Local Wells	1.9	175	570	2.3	212	690
IB	0.0	0	0	0.0	0	0
Total	7.6	699	2278	6.4	589	1919

Peak Day and Total Annual Operations Plan

	Peak	Annual Estimate	
Source	**Day**	**MG**	**AF**
Upper Lake	6.0	850	2770
Local Wells	5.0	850	2770
Lake Mary	3.2	400	1303
Woody	5.0	500	1629
Inner Basin	0.0	0	0
Total	19.2	2600	8472
Minus 15% Well Redundancy	**16.3**		

MGD = Million gallons per day
MG = Million gallons
AF = Acre Feet

5 2022 PRODUCTION & TREATMENT SUMMARY

5-1 Population

Year	1995	2000	2005	2010	2015	2021	2022
Population	52,701[1]	52,894[2]	61,270[4]	65,870[3]	70,643[4]	76,960[5]	78,664[4]

1. The Census Staff during a special census in 1995 completed the documented population count
2. Disputed census population
3. 2010 Census
4. Population estimate as of July 1 of that year from the Office of Economic Opportunity, as per City of Flagstaff Planning Section; includes NAU
5. State, County, Place Level Population Estimates. Because a decennial census was conducted in 2020, the July 1, 2020 population estimates are provisional. When the Census 2020 results are published mid-year, the Office of Economic Opportunity will revise these provisional estimates and produce final population estimates for July 1, 2021

5-2 Potable Water Production Summary

	Acre-Feet Per Year[1]	Average Day (MGD)[2]	Peak Day (MGD)[2]
2022	7,890	7.0	10.8
2021	8,039	7.2	11.1
2020	8,434	7.5	11.0

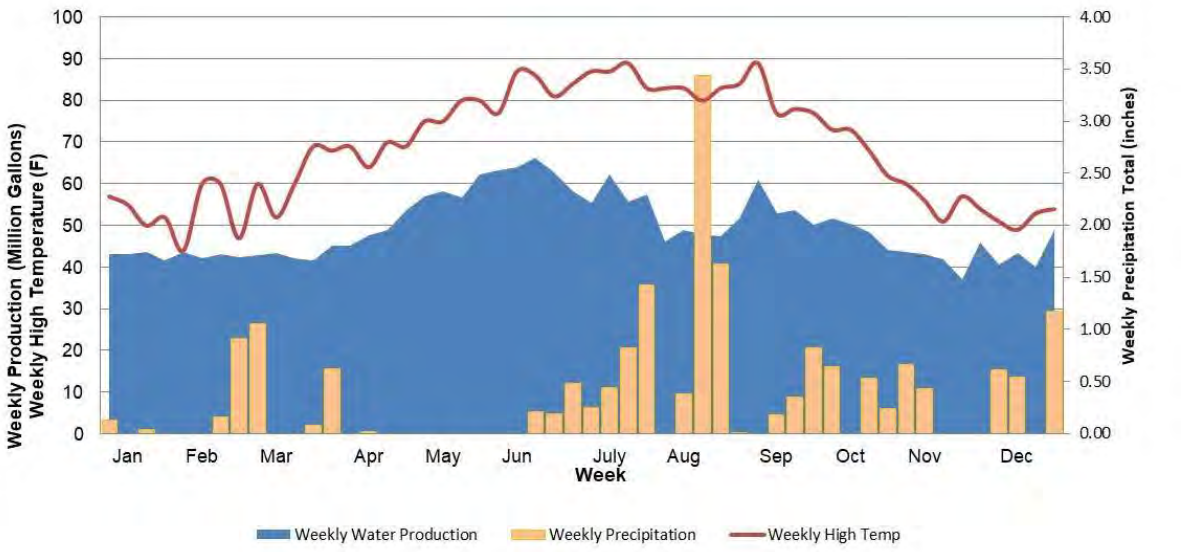
1. An acre-foot of water is equal to 325,851 gallons
2. MGD = million gallons of water per day

The **peak day production** occurred on June 13, 2022 with 10.8 million gallons (MG) produced. The sources of water used to meet peak production came from:

Peak Production Source	6/13/2022
Local Wells	3.57
Woody Mountain Wells	3.24
Lake Mary Surface Water	1.15
Lake Mary Wells	2.86
Inner Basin Water	0
Total Produced	10.82

Without surface water from Upper Lake Mary, or without water from the Inner Basin, Water Services has a peak capacity of ~13.1 MGD (details in **Section 6**). Assuming 15% system redundancy (85% of the firm well capacity) and no surface water sources (Inner Basin and Upper Lake Mary) our peak capacity is 11.1 MGD. Having surface water increases the peak capacity to ~21.1 million gallons per day including the Inner Basin (2 MGD during typical years; 0 MGD was used from this source in 2022) and Upper Lake Mary (6.0 MGD).

Water Production by Week—2022



Water use is traditionally higher from April to October, peaking pre-monsoon, due primarily to outdoor watering. Efforts by the community and Water Services over time have focused on reducing waste and increasing water efficiency in order to delay expensive water resources and infrastructure projects. The chart above shows 2022 monthly water use, weekly high temperature, and weekly total precipitation.

5-3 Wastewater Treatment Summary

Maximum Month & Day[1] Wastewater Volume Treated

Water Reclamation Plants (WRP)

Rio de Flag WRP Peak Month, MG | Peak Day, MGD		**Wildcat Hill WRP** Peak Month, MG | Peak Day, MGD		**Total Peak Day, MGD**
October 2022	56.6 MG | 2.0 MGD 3/01/22	July 2022	122.1 MG | 5.3 MGD 8/24/22	7.3 MGD
July 2021	58.2 MG | 2.0 MGD 10/06/21	July 2021	133.7 MG | 7.9 MGD 7/25/21	9.9 MGD
March 2020	59.7 MG | 2.0 MGD 3/12/20	March 2020	127.1 MG | 6.0 MGD 3/14/20	8.0 MGD

AVERAGE PER CAPITA INFLOW	**1990**	**105**	**GPCD**
	2022	**67[2]**	**GPCD**

1. Maximum day units are in million gallons per day (MGD) and maximum month are in million gallons (MG). Flows are based on the influent metering system.
2. Total influent (1.929 million gallons in 2022) divided by population (78,664) divided by 365 days.

The treatment capacity of the Wildcat Hill Water Reclamation Plant is 6.0 MGD and the Rio de Flag Water Reclamation Plant is 4.0 MGD. The combined treatment capacity of the two plants is 10 MGD with occasional managed exceedance due to inflow and infiltration of stormwater into the sewer system (I&I). While this capacity is projected to serve the City of Flagstaff until 2035 or approximately a population of 100,000 (Sewer Master Plan, 2015 Brown & Caldwell), solids capacity has become the limiting factor, requiring significant financial investment. Citizens voted 76% in favor of Proposition 441 in 2022 to allocate $29,100,000 for wastewater treatment infrastructure improvements.

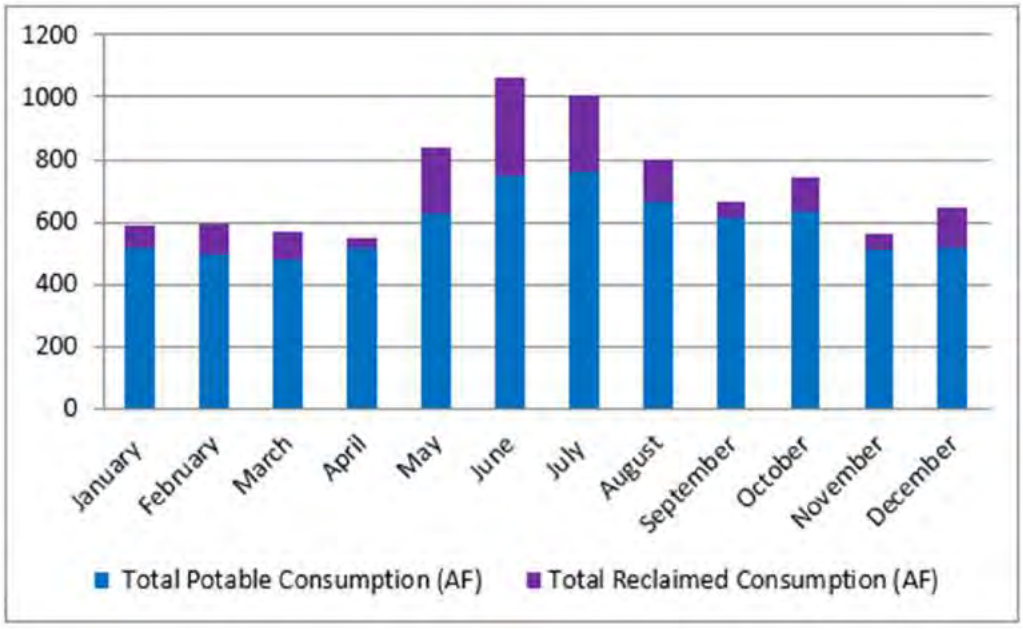
5-4 Reclaimed Water Deliveries Summary

Maximum Month & Day Reclaimed Volume Delivered Water Reclamation Plants (WRP)				
Rio de Flag WRP Peak Month, MG | Peak Day, MGD		**Wildcat Hill WRP** Peak Month, MG | Peak Day, MGD		**Total Peak Day, MGD**
November 2022	35.3 | 1.6 MGD 12/2/22	May 2022	68.6.0 | 1.7 5/11/22	3.3 MGD
May 2021	34.4 | 1.6 MGD 9/29/21	June 2021	60.1 | 1.5 MGD 8/25/21	3.1 MGD
July 2020	37.5 | 1.7 MGD 3/20/20	June 2020	69.2 | 1.5 MGD 5/28/20	3.2 MGD

1. Maximum day units are in million gallons per day (MGD) and maximum month are in million gallons (MG). Direct deliveries to customers only, does not include discharge to Rio de Flag.

Currently, the maximum reclaimed water supply available from the Rio de Flag WRP is 1.8 MGD and 3.4 MGD from the Wildcat Hill WRP. The supply available from the Rio de Flag WRP is limited by the amount of inflow into the plant. The supply available from the Wildcat Hill WRP is limited by the under-sizing of infrastructure between the plant and the Buffalo Park Tank. The Bushmaster Pump Station was completed in 2018 but an increase from an 8-inch to a 20-inch pipe is still necessary to increase flow to Buffalo Park Tank.

Comparison of Reclaimed Water Billed to Potable Water Billed in 2022 (acre-feet)



The monthly production graph above demonstrates the importance of reclaimed water in reducing the demand on potable water. In May through October, reclaimed water averaged for 30% of total water demand. Reclaimed water continues to account for as much as 20% of water supplies delivered to customers on an annual basis.

6 WATER PRODUCTION DATA

6-1 Water Wells Peak Capacity

Woody Mountain Wells #3 and #6 were re-equipped in 2022.

Estimated Wells Peak Capacity 2022						
Local Wells Maximum Production (GPM)		**Lake Mary Wells Maximum Production (GPM)**		**Woody Mountain Wells Maximum Production (GPM)**		
Continental-2	310	LM 1	100	WM 1	125	
Foxglenn	300	LM 2	360	WM 2	230	
Sinagua	275	LM 4	415	WM 3	565	
Shop	920	LM 5	290	WM 4	345	
Ft. Tuthill	1,155	LM 8	610	WM 5	310	
Interchange	190	LM 9	235	WM 6	380	
Rio	210			WM 7	525	
McAllister	265			WM 9	400	
*Foxglenn/Sinagua pumphouse limited to max volume of 600 GPM				WM 10	260	
				WM 11	330	
Total GPM	**3,625 GPM**	**2,010 GPM**		**3,470 GPM**		
Total MGD	**5.2 MGD**	**2.9 MGD**		**5.0 MGD**		
				TOTAL PEAK WELL CAPACITY	**13.1 MGD**	
				WITH ONE HIGH-CAPACITY WELL REDUNDANCY (15%)	**11.1 MGD**	

6-2 Historical Production by Source Data

	Lake Mary Surface		Inner Basin Spring		Inner Basin Wells		Woody Mtn. Wells		Lake Mary Wells		Local Wells		TOTAL		Calendar Precip in inches	Snow (Oct-April) inches
YEAR	AF	MG	AF	MG	AF	MG	AF	MG	AF	MG	AF	MG	AF	MG		
1949	278.75	90.83	1077.98	351.26									1356.72	442.09	26.40	
1950	775.02	252.54	488.81	159.28									1263.83	411.82	10.76	63.30
1951	1131.68	368.76	102.90	33.53									1234.58	402.29	25.79	73.40
1952	210.89	68.72	1219.88	397.50									1430.78	466.22	20.60	105.90
1953	1044.71	340.42	262.08	85.40									1306.79	425.82	12.81	60.00
1954	1182.29	385.25	321.31	104.70									1503.60	489.95	19.55	89.00
1955	1488.75	485.11	190.27	62.00									1679.02	547.11	17.97	67.80
1956	825.35	268.94	114.47	37.30			383.70	125.03					1323.52	431.27	10.37	42.70
1957	1159.67	377.88	476.91	155.40			87.52	28.52					1724.10	561.80	24.59	53.00
1958	616.29	200.82	1191.65	388.30			97.90	31.90					1905.84	621.02	21.24	71.50
1959	1591.95	518.74	301.67	98.30			49.19	16.03					1942.82	633.07	21.46	63.80
1960	1745.37	568.73	547.49	178.40			275.99	89.93					2568.84	837.06	16.60	77.60
1961	1618.62	527.43	352.92	115.00			388.15	126.48					2359.70	768.91	18.95	53.90
1962	1519.44	495.11	890.59	290.20			209.79	68.36					2619.82	853.67	18.11	128.90
1963	1663.37	542.01	118.15	38.50			1145.58	373.29					2927.10	953.80	14.52	47.30
1964	1303.69	424.81	342.18	111.50			1184.19	385.87					2830.07	922.18	19.04	89.40
1965	1713.51	558.35	1164.34	379.40			291.54	95.00					3169.39	1032.75	36.59	166.70
1966	2361.39	769.46	919.13	299.50	2.15	0.70	598.56	195.04					3881.22	1264.70	20.58	83.40
1967	2906.82	947.19	444.99	145.00	3.38	1.10	34.74	11.32					3389.92	1104.61	22.27	63.10
1968	2988.54	973.82	772.75	251.80	165.32	53.87	213.63	69.61					4140.24	1349.10	16.53	150.40
1969	2722.07	886.99	930.18	303.10	324.20	105.64	296.76	96.70	42.41	13.82			4315.62	1406.25	23.41	134.70
1970	3206.56	1044.86	686.51	223.70	477.49	155.59	349.24	113.80	0.00	0.00			4719.80	1537.95	24.02	95.70
1971	2600.39	847.34	188.12	61.30	497.56	162.13	999.87	325.81	477.06	155.45			4763.01	1552.03	21.01	56.60
1972	1953.04	636.40	235.69	76.80	538.56	175.49	1625.50	529.67	459.69	149.79			4812.48	1568.15	24.67	50.30
1973	3594.59	1171.30	1043.42	340.00	366.00	119.26	464.63	151.40	0.00	0.00			5468.63	1781.96	19.71	210.00
1974	3999.44	1303.22	189.26	61.67	411.45	134.07	821.51	267.69	144.79	47.18			5566.44	1813.83	17.41	70.00
1975	2209.84	720.08	711.52	231.85	429.64	140.00	1038.27	338.32	1160.65	378.20			5549.93	1808.45	20.10	141.10
1976	3415.92	1113.08	489.00	159.34	543.19	177.00	942.15	307.00	0.00	0.00			5390.26	1756.42	20.12	131.60
1977	2606.99	849.49	66.66	21.72	518.92	169.09	1755.96	572.18	744.63	242.64			5693.15	1855.12	18.77	70.20
1978	2754.63	897.60	629.12	205.00	480.31	156.51	1197.45	390.19	602.42	196.30			5663.94	1845.60	30.72	116.20
1979	3782.83	1232.64	1049.90	342.11	449.35	146.42	773.42	252.02	288.32	93.95			6343.82	2067.14	19.68	145.50
1980	3863.91	1259.06	1128.12	367.60	652.05	212.47	512.38	166.96	56.19	18.31			6212.66	2024.40	29.30	177.10
1981	3308.75	1078.16	181.77	59.23	740.92	241.43	1041.95	339.52	865.12	281.90			6138.51	2000.24	23.37	92.40
1982	3775.56	1230.27	796.47	259.53	603.65	196.70	741.14	241.50	611.32	199.20			6528.14	2127.20	31.09	96.90
1983	2892.27	942.45	1148.93	374.38	427.22	139.21	1038.05	338.25	858.46	279.73			6364.93	2074.02	29.47	142.60
1984	2770.16	902.66	253.52	82.61	726.25	236.65	1967.28	641.04	717.87	233.92			6435.09	2096.88	20.09	32.00
1985	4540.94	1479.67	721.16	234.99	398.83	129.96	663.86	216.32	934.45	304.49			7259.24	2365.43	26.67	136.00

6-2 Historical Production by Source Data, continued

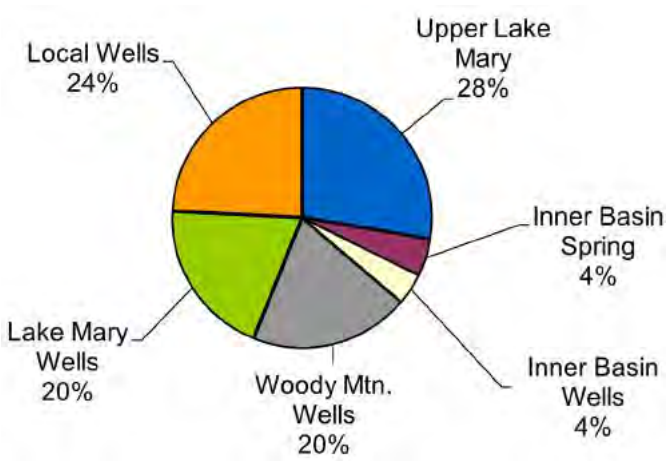
YEAR	Lake Mary Surface		Inner Basin Spring		Inner Basin Wells		Woody Mtn. Wells		Lake Mary Wells		Local Wells		TOTAL		Calendar Precip in inches	Snow (Oct-April) inches
	AF	MG	AF	MG	AF	MG	AF	MG	AF	MG	AF	MG	AF	MG		
1986	4235.89	1380.27	541.35	176.40	715.70	233.21	268.40	87.46	1055.05	343.79			6816.40	2221.13	32.39	105.40
1987	5701.38	1857.80	467.27	152.26	637.16	207.62	7.55	2.46	822.58	268.04			7635.94	2488.18	23.98	121.60
1988	5339.25	1739.80	86.91	28.32	778.52	253.68	125.30	40.83	1731.71	564.28			8061.69	2626.91	21.68	104.50
1989	355.99	116.00	0.00	0.00	839.71	273.62	3371.79	1098.70	4539.10	1479.07			9106.59	2967.39	14.44	77.70
1990	101.89	33.20	35.11	11.44	279.27	91.00	3411.38	1111.60	4713.35	1535.85			8540.99	2783.09	25.67	113.40
1991	3512.34	1144.50	134.69	43.89	38.36	12.50	2313.33	753.80	2217.88	722.70			8216.61	2677.39	21.83	127.90
1992	3012.42	981.60	214.82	70.00	293.69	95.70	1267.14	412.90	2817.55	918.10			7605.62	2478.30	34.71	159.40
1993	4130.42	1345.90	550.56	179.40	194.26	63.30	1624.06	529.20	1718.27	559.90			8217.56	2677.70	35.25	147.10
1994	3428.87	1117.30	236.00	76.90	271.90	88.60	1901.18	619.50	1903.94	620.40			7741.88	2522.70	21.91	149.20
1995	3400.02	1107.90	432.71	141.00	303.51	98.90	1426.73	464.90	2256.55	735.30			7819.52	2548.00	17.79	99.10
1996	1900.41	619.25	0.00	0.00	345.13	112.46	3115.60	1015.22	2849.19	928.41			8210.32	2675.34	11.81	28.50
1997	1784.04	581.33	0.00	0.00	730.52	238.04	2709.37	882.85	2835.01	923.79			8058.93	2626.01	16.40	107.50
1998	3363.19	1095.90	482.15	157.11	129.60	42.23	1510.20	492.10	2393.12	779.80			7878.26	2567.14	27.36	137.00
1999	1186.49	386.62	151.20	49.27	240.11	78.24	3189.77	1039.39	3224.05	1050.56			7991.63	2604.08	15.79	63.00
2000	784.78	255.72	23.07	7.52	681.13	221.95	4013.39	1307.77	3410.12	1111.19			8912.49	2904.14	15.40	74.40
2001	946.75	308.50	162.25	52.87	267.42	87.14	3530.60	1150.45	3690.57	1202.58	206.55	67.30	8804.14	2868.84	17.59	125.10
2002	195.67	63.76	0.00	0.00	24.77	8.07	4779.91	1557.54	3334.68	1086.61	432.90	141.06	8767.93	2857.04	12.88	38.90
2003	615.77	200.65	18.81	6.13	188.71	61.49	4136.09	1347.75	3111.45	1013.87	543.47	177.09	8614.31	2806.98	17.91	54.90
2004	900.96	293.58	0.00	0.00	200.67	65.39	3625.86	1181.49	2213.25	721.19	1308.51	426.38	8249.26	2688.03	23.61	48.10
2005	3670.33	1195.98	302.65	98.62	325.06	105.92	1775.60	578.58	1108.45	361.19	945.46	308.08	8127.55	2648.37	24.01	131.70
2006	1553.51	506.21	73.89	24.08	508.75	165.78	2551.64	831.46	2576.73	839.63	1324.73	431.66	8589.25	2798.82	15.59	44.60
2007	294.70	96.03	38.82	12.65	336.00	109.49	4050.78	1319.95	2591.47	844.43	1573.15	512.61	8884.92	2895.16	17.46	50.40
2008	2929.50	954.58	265.22	86.42	161.01	52.47	2352.76	766.65	1502.99	489.75	1273.19	414.87	8484.67	2764.74	18.85	99.50
2009	3744.16	1220.04	262.09	85.40	0.00	0.00	1662.50	541.73	1412.75	460.35	1317.95	429.45	8399.44	2736.97	11.65	86.00
2010	3987.93	1299.47	198.67	64.74	0.00	0.00	1460.55	475.92	1132.62	369.07	1571.85	512.19	8351.63	2721.39	27.89	140.50
2011	3416.24	1113.19	0.00	0.00	0.00	0.00	1536.10	500.54	1109.53	361.54	2234.85	728.23	8296.72	2703.49	20.67	88.40
2012	934.52	304.51	0.00	0.00	0.00	0.00	3063.61	998.28	1439.86	469.18	3020.44	984.21	8458.42	2756.19	14.89	102.90
2013	1572.73	512.48	99.00	32.26	0.00	0.00	2774.00	903.91	1680.86	547.71	2518.33	820.60	8644.92	2816.96	24.79	69.70
2014	1037.90	338.17	18.00	5.87	237.60	77.42	2574.60	838.87	1726.80	562.64	2752.10	896.70	8347.00	2719.67	20.67	44.40
2015	1854.16	604.18	175.97	57.34	66.99	21.83	2096.88	683.27	1524.47	496.75	2294.61	747.70	8013.08	2611.07	27.25	62.90
2016	1625.08	529.53	90.27	29.41	110.48	36.00	2064.12	672.60	1453.76	473.71	2634.98	858.61	7978.69	2599.86	25.80	78.30
2017	1782.60	580.86	367.74	119.83	0.00	0.00	2126.15	692.81	1101.49	358.92	2613.75	851.69	7991.74	2604.12	18.00	96.50
2018	2131.74	694.63	17.14	5.59	173.70	56.60	1759.25	573.25	1190.58	387.95	2763.33	900.43	8035.75	2618.46	21.57	38.00
2019	2592.77	844.86	257.08	83.77	0.00	0.00	1311.28	427.28	1052.88	343.08	2914.61	949.73	8128.62	2648.72	26.10	118.70
2020	3182.55	1037.04	156.53	51.00	0.00	0.00	1228.03	400.15	1124.97	366.57	2742.30	893.58	8434.37	2748.35	9.59	70.30
2021	1049.69	342.04	0.00	0.00	0.00	0.00	2658.35	866.23	1431.17	466.35	2899.52	944.81	8038.73	2619.43	25.64	56.20
2022	443.00	144.35	0.00	0.00	0.00	0.00	2729.22	889.32	1745.64	568.82	2972.26	968.51	7890.12	2571.00	18.47	163.10
Historic Average (1949-2022)	**2227.35**	**725.78**	**373.11**	**121.58**	**312.91**	**101.96**	**1601.39**	**521.81**	**1587.18**	**517.18**	**1948.13**	**634.80**	**6028.77**	**1964.48**	**21.24**	**94.18**
Percent of total	27.7%		4.6%		3.9%		19.9%		19.7%		24.2%					
Historic Median	1926.72	627.83	255.30	83.19	293.69	95.70	1426.73	464.90	1421.96	463.35	2264.73	737.96	7037.82	2293.28	20.64	89.00
Ave of last 5 yrs	1879.95	612.58	86.15	28.07	34.74	11.32	1937.23	631.25	1309.05	426.55	2858.41	931.41	8105.52	2641.19	20.27	89.26
Percent of total	23.19%	23.19%	1.06%	1.06%	0.43%	0.43%	23.90%	23.90%	16.15%	16.15%	35.26%	34.3%				

6-3 2022 Weekly Production by Source (Million Gallons)

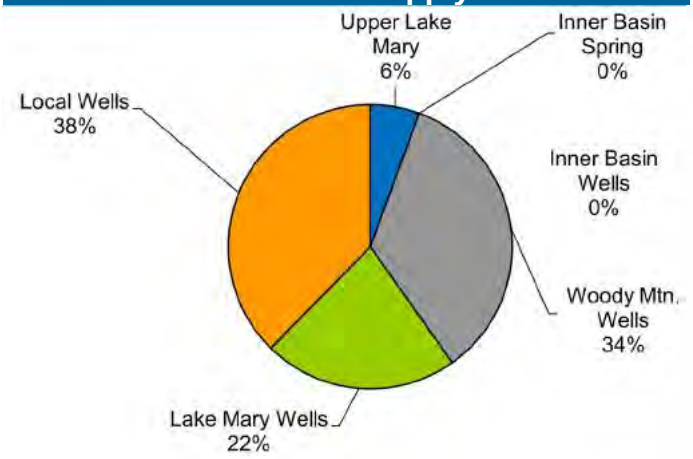
MONTH	WEEK	TOTAL	LM SURFACE	LM WELLS	WM WELLS	R F P	LOC WELLS
January	1	43.20	1.420	10.495	11.250	0.000	20.037
	2	43.04	2.620	9.074	11.007	0.000	20.342
	3	43.65	1.840	8.814	11.027	0.000	21.973
	4	41.60	1.100	8.798	11.071	0.000	20.631
February	1	43.46	1.260	12.498	11.082	0.000	18.623
	2	42.12	0.810	12.074	10.955	0.000	18.280
	3	43.18	1.030	11.384	11.044	0.000	19.725
	4	42.39	0.460	11.245	10.901	0.000	19.784
March	1	42.95	1.060	11.939	10.928	0.000	19.028
	2	43.39	1.120	11.901	10.901	0.000	19.468
	3	42.09	0.540	11.797	10.957	0.000	18.791
	4	41.63	1.260	11.112	10.615	0.000	18.644
	5	45.09	1.013	12.581	10.819	0.000	20.675
April	1	45.15	1.714	10.942	14.581	0.000	17.915
	2	47.64	1.698	12.061	16.776	0.000	17.106
	3	48.85	3.106	12.687	16.789	0.000	16.267
	4	53.75	1.804	14.964	19.821	0.000	17.160
May	1	56.97	2.180	14.743	19.772	0.000	20.277
	2	58.29	2.323	14.010	23.156	0.000	18.803
	3	56.77	3.288	13.917	22.624	0.000	16.945
	4	62.28	2.891	17.066	22.296	0.000	20.024
June	1	63.18	3.847	17.112	21.199	0.000	21.023
	2	63.88	3.834	17.236	19.734	0.000	23.072
	3	66.16	2.804	18.585	20.049	0.000	24.725
	4	62.58	2.582	17.540	21.659	0.000	20.795
	5	58.21	1.675	15.329	21.170	0.000	20.031
July	1	55.48	4.144	12.207	20.552	0.000	18.579
	2	62.08	2.862	13.121	21.097	0.000	25.000
	3	55.72	2.848	12.038	20.698	0.000	20.139
	4	57.50	3.543	12.286	18.810	0.000	22.859
August	1	46.19	3.346	7.171	17.270	0.000	18.407
	2	48.92	3.743	4.127	17.142	0.000	23.911
	3	47.93	3.178	9.257	15.080	0.000	20.420
	4	47.24	3.238	9.019	14.485	0.000	20.501
September	1	51.74	8.720	9.650	13.345	0.000	20.021
	2	60.85	13.062	10.139	17.104	0.000	20.547
	3	52.83	2.909	8.136	23.180	0.000	18.603
	4	53.66	3.878	8.207	23.475	0.000	18.097
	5	50.22	3.904	8.241	20.737	0.000	17.338
October	1	51.63	3.584	8.671	21.087	0.000	18.292
	2	50.49	4.373	7.787	20.992	0.000	17.340
	3	48.46	3.365	8.205	20.366	0.000	16.525
	4	44.15	2.875	8.221	20.469	0.000	12.588
November	1	43.53	3.583	8.017	18.952	0.000	12.980
	2	43.15	2.490	7.853	18.579	0.000	14.229
	3	41.86	2.026	7.852	19.328	0.000	12.657
	4	37.13	2.406	6.717	15.853	0.000	12.156
	5	45.92	1.524	8.922	21.168	0.000	14.311
December	1	40.65	2.834	7.782	16.599	0.000	13.431
	2	43.31	2.688	7.986	16.554	0.000	16.085
	3	40.08	1.970	8.003	16.037	0.000	14.073
	4	48.75	1.979	9.300	18.180	0.000	19.289
Total year, 2022 (MG)		**2571.00**	**144.35**	**568.82**	**889.32**	**0.00**	**968.51**
	Acre-Feet	**7890.12**	**443.00**	**1745.64**	**2729.22**	**0.00**	**2972.26**
Total year, 2021 (MG)		**2619.43**	**342.06**	**466.35**	**866.23**	**0.00**	**944.81**
		TOTAL	**LM SURFACE**	**LM WELLS**	**WM WELLS**	**RFP**	**LOC WELLS**
2022 % of 2021		**98%**	**42%**	**122%**	**103%**	**0%**	**103%**
2022 % By Source			**6%**	**22%**	**35%**	**0%**	**38%**
AVG DAILY (mgd)		**7.04**	**0.40**	**1.56**	**2.44**	**0.00**	**2.65**

RFP = Reservoir Filtration Plant
The difference between the total per source and the sum of individual wells in Table 8-2 is due to individual meter inaccuracies compared to the master source meter.

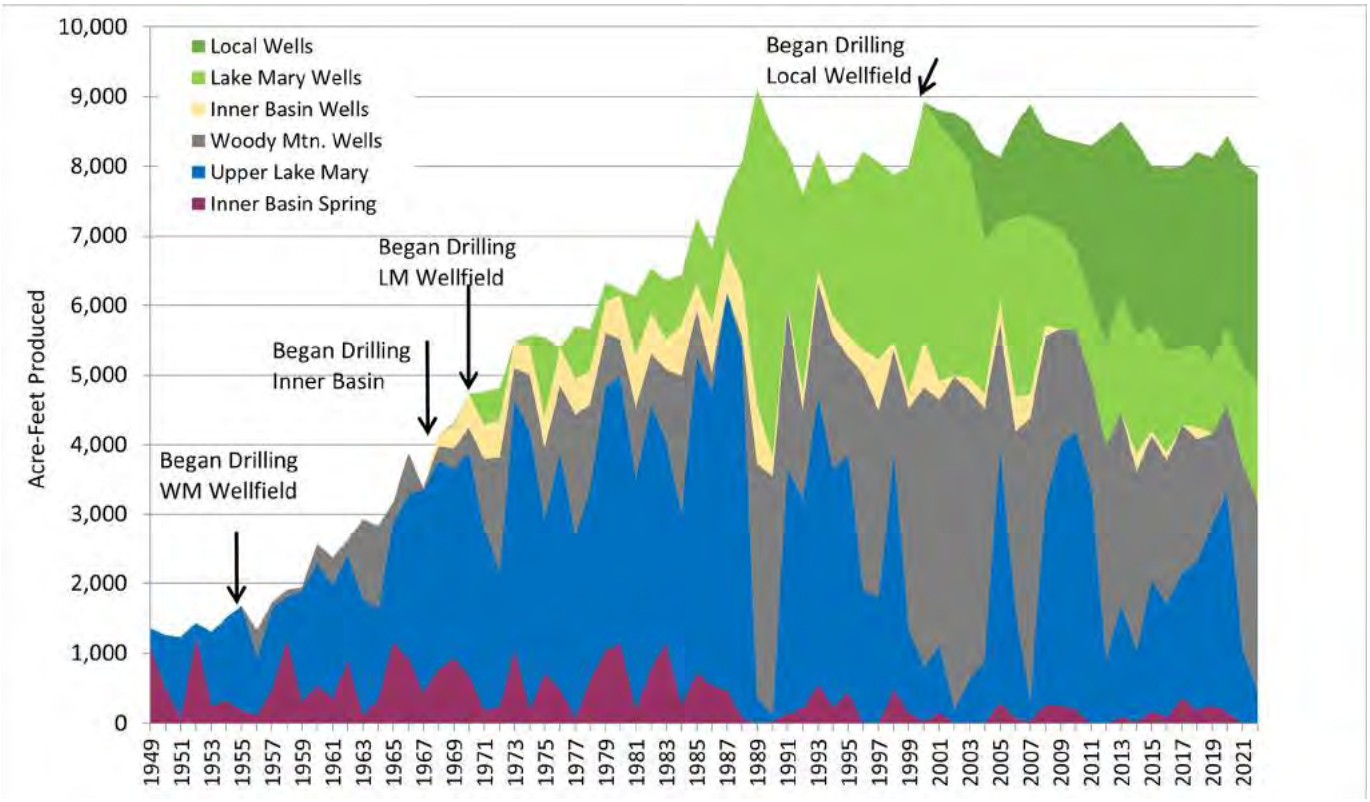
Historic Average (1949-2022)



Potable Water Supply 2022



Production by Source (1949-2022)



6-4 Most Recent Distribution System Water Quality at Each EPDS (Entry Point to the Distribution System)

	unit	MCL	Year	Woody Mtn.	Year	N. Res. Plant	Year	003 Lake Mary	Year	EPDS 004 Foxglenn	Year	Continental	Year	EPDS 006 Interchange	Year	EPDS 007 Shop	Year	EPDS 008 Rio	Year	EPDS 009 Ft.Tuthill	Year	EPDS 010 McAlister
Arsenic	mg/L	0.01	2017	0.0075	2017	<0.001	2015	0.0026	2015	0.003	2015	0.0017	2015	0.0021	2017	0.0017	2015	0.001	2020	0.0057	2022	0.0082
Barium	mg/L	2	2017	0.64	2017	0.007	2015	0.18	2015	0.18	2015	0.52	2015	0.28	2017	1.1	2015	0.14	2020	0.47	2022	0.180
Cadmium	mg/L	0.005	2017	<0.0005	2017	<0.0005	2015	<0.0005	2015	<0.0005	2015	<0.0005	2015	<0.0005	2017	<0.0005	2015	<0.0005	2020	<0.0005	2022	<0.0005
Chromium	mg/L	0.1	2017	0.0013	2017	<0.001	2015	<0.001	2015	0.0023	2015	0.0029	2015	0.0023	2017	0.0014	2015	0.001	2020	0.0015	2022	<0.001
Fluoride	mg/L	4	2017	0.09	2017	0.097	2015	0.087	2015	0.056	2015	0.12	2015	0.093	2017	0.1	2015	0.1	2020	0.082		NA
Mercury	mg/L	0.002	2017	<0.0002	2017	<0.0002	2015	<0.0002	2015	<0.0002	2015	<0.0002	2015	<0.0002	2017	<0.0002	2015	<0.0002	2020	<0.0002	2022	<0.0002
Nitrate	mg/L	5	2022	0.16	2020	<0.1	2022	0.23	2022	0.32	2022	1.8	2022	0.6	2022	0.94	2022	0.84	2022	0.15	2022	0.55
Nitrite	mg/L	0.5	2018	<0.05	2018	<0.05	2019	<0.05	2018	<0.05	2018	<0.05	2018	<0.05	2018	<0.05	2018	<0.05	2020	<0.05	2021	<0.05
Selenium	mg/L	0.05	2017	<0.005	2017	<0.005	2015	<0.005	2015	<0.005	2015	<0.005	2015	<0.005	2017	<0.005	2015	<0.005	2020	<0.005	2022	<0.005
Antimony	mg/L	0.006	2017	<0.001	2017	< 0.001	2015	<0.001	2015	<0.001	2015	<0.001	2015	<0.001	2017	<0.001	2015	<0.001	2020	<0.001	2022	<0.001
Beryllium	mg/L	0.004	2017	<0.001	2017	<0.001	2015	<0.001	2015	<0.001	2015	<0.001	2015	<0.001	2017	<0.001	2015	<0.001	2020	<0.001	2022	<0.001
Cyanide	mg/L	0.2	2017	<0.005	2017	<0.005	2015	<0.005	2015	<0.005	2015	<0.005	2015	<0.005	2017	<0.005	2015	<0.005	2020	<0.005	2022	<0.005
Nickel	mg/L	0.1	2017	<0.005	2017	<0.005	2013	<0.005	2012	<0.005	2015	<0.005	2015	<0.005	2017	<0.005	2015	<0.005	2020	<0.005	2022	<0.005
Thallium	mg/L	0.002	2017	<0.001	2017	<0.001	2015	<0.001	2015	<0.001	2015	<0.001	2015	<0.001	2017	<0.001	2015	<0.001	2020	<0.001	2022	<0.001
Sodium	mg/L	na	2022	5.5	2020	2.1	2022	3.8	2022	6.9	2022	8.4	2022	4.9	2022	5.1	2022	4.2	2022	4.3	2022	8.2
Asbestos	MFL	7	2021	<0.2	2018	<0.2	2018	<0.2	2021	<0.2	2021	<0.2	2015	<0.2	2020	<0.2	2015	<0.2	2021	<0.2		NA
Adjusted Gross Alpha	pCi/L	15	2017	3.0 ± 0.7	2016	0.6 ± 0.5	2020	<0.5	2021	0.7 ± 0.6	2021	0.6 ±0.4	2015	1.0 ± 0.7	2017	1.7 ± 0.6	2021	1.8 ±0.3	2022	6.0	2022	4.7
Combined Uranium	µg/L	30	2017	0.9 ± 0.4	2016	< 0.5	2020	<0.8	2021	1.7 ± 0.6	2021	0.9 ± 0.5	2015	0.8 ± 0.5	2017	1.0 ± 0.5	2021	1.4 ± 0.5	2021	<0.8	2021	<0.8
Combined Radium	pCi/L	5	2017	0.6 ± 0.2	2016	<0.3	2020	<0.7	2021	<0.8	2021	< 0.8	2015	0.4	2017	< 0.6	2021	<0.6	2021	<0.7	2022	<1

mg/L = milligrams per liter
MFL = million fibres per liter
pCi/L = picocuries per liter. Picocuries per liter is a measure of the radioactivity in water.
µg/L = micrograms per Liter
Drinking water regulations only call for sampling every couple of years depending on the EPDS.

6-5 City Supply Wells & ADWR Registration Information

CADASTRAL	NAME	ADWR REGISTRATION NUMBER	DATE OF COMPLETION
A (21-06) 35 cbd	Woody Mtn Well #1	55-606201	Dec-54
A (21-06) 35 ccb	Woody Mtn Well #2	55-606202	Jul-56
A (21-06) 35 bcc	Woody Mtn Well #3	55-606203	Oct-57
A (21-06) 35 ccc	Woody Mtn Well #4	55-606204	Nov-57
A (20-06) 02 bbc	Woody Mtn Well #5	55-606205	Jun-63
A (20-06) 02 bdb	Woody Mtn Well #6	55-606206	Mar-68
A (20-06) 11 bab	Woody Mtn Well #7	55-606207	Apr-78
A (20-06) 11 cab	Woody Mtn Well #9	55-509026	Nov-85
A (20-06) 02 bcb	Woody Mtn Well #10	55-548560	Mar-96
A (20-06) 11 baa	Woody Mtn Well #11	55-559574	Jun-98
A (20-08) 18 bbb	Lake Mary Well #1	55-606195	Oct-62
A (20-08) 18 ccb	Lake Mary Well #2	55-606196	Dec-64
A (20-07) 12 dda	Lake Mary Well #3	55-606197	Sep-65
A (20-08) 19 aba	Lake Mary Well #4	55-606198	Jan-72
A (20-08) 20 dbc	Lake Mary Well #5	55-606199	Dec-75
A (20-08) 27 bdc	Lake Mary Well #7	55-606200	Dec-78
A (20-08) 20 cca	Lake Mary WTP #8	55-501228	Mar-82
A (20-08) 30 cdb	Lake Mary Well #9	55-532282	Sep-91
A (23-07) 33 aab	Inner Basin Well #9	55-606209	Aug-68
A (23-07) 27 cca	Inner Basin Well #11	55-606210	Aug-71
A (23-07) 28 ddb	Inner Basin Well #14	55-606211	Aug-70
A (21-07) 24 aac	Foxglenn Well (EPDS 4)	55-559572	Jan-97
A (21-08) 17 bca	Continental Well-2 (EPDS 5)	55-560805	Feb-97
A (21-08) 07 dbb	Interchange Well (EPDS 6)	55-588998	Nov-02
A (21-08) 05 dca	Shop Well (EPDS 7)	55-588257	Dec-02
A (21-07) 23 cbb	Rio Well (EPDS 8)	55-599535	Nov-03
A (20-07) 06 adc	Ft. Tuthill Well (EPDS 9)	55-907084	Jan-08
A (21-07) 24 acd	Sinagua Well (EPDS 4)	55-907085	May-08
A (21-07) 19 bbd	McAllister Well	55-908260	Apr-09
A (20-07) 06 dca	Ft. Tuthill Well #2	55-233492	Jul-21

* EPDS – Wells that are tested as an entry point to the distribution system (EPDS). See Table 7-4 for drinking water quality data regulated by the Arizona Department of Environmental Quality. Other EPDS points include the Woody Mountain booster site (EPDS 001), Inner Basin water at the North Reservoir Plant (EPDS 002), and water from Upper Lake Mary (EPDS 003).

6-6 Potable Production and Delivery Power Cost—CY 2022

POTABLE Water Source	Electricity $/Kgal Source	Raw Pump	Booster	Final Cost	Total Power Cost	Water Produced (MG)	Total Megawatt	Cost Per Acre-foot
Lake Mary Plant	$1.02	$0.10		$1.11	$160,662.06	144.35	1468.11	$362.67
Lake Mary Wells	$0.51	$0.10		$0.61	$345,440.21	568.82	3194.44	$197.89
Local Wells	$0.91		$0.03	$0.94	$910,476.89	968.52	9858.96	$306.32
Woody Mountain Wells	$0.74		$0.03	$0.77	$688,852.65	889.32	7340.69	$252.40
Inner Basin Wells & Springs	$0.00		$0.04	$0.04	$0.00	0.00	0.00	$0.00
Weighted Avg				**$0.82**				**$267**
Total					**$2,105,432**	**2,571.00**	**21,862.20**	

- Total electricity cost = Electricity Cost Data from Sustainability Division + Booster Station Cost Data from Water Production
- Costs do not include operation and maintenance, staffing, or chemical treatment.
- Electrical charges to boost the water to homes in Flagstaff were distributed across WM, IB, and Local Wells only.
- No well or spring water was produced from the Inner Basin in 2022.

Reclaimed Power Cost—CY 2022

Water Reclamation Plant	2022 Electricity Used to Treat Influent to Plants (kWh) APS	Solar	AZ Power Auth	Co-Gen	Volume Treated (gallons)	Electricity Used to Deliver Reclaimed Water (kWh)	Total Reclaimed Delivered (gallons) (not including Continental)
Wildcat Hill	5,241,382	1,483,401	N/A	0	1,302,072,000	106,689	96,990,000
Rio de Flag	2,565,275	467,859	N/A	N/A	627,266,000	306,265	278,423,000
Totals	7,806,657	1,951,260	N/A	0	1,929,338,000	412,954	375,413,000
Cost to Utility	$856,199	$108,850	N/A	$0	$965,049	$86,993	$86,993
Acft	-	-	-	-	5,921	-	1,152
Cost / acre-foot					$162.99		$75.51

- Data from Water Services Division, Wastewater Treatment Section
- Note that the energy cost above for reclaimed water is only the cost to pump reclaimed water into the reclaimed water system and does not include water delivered to Continental Country Club.

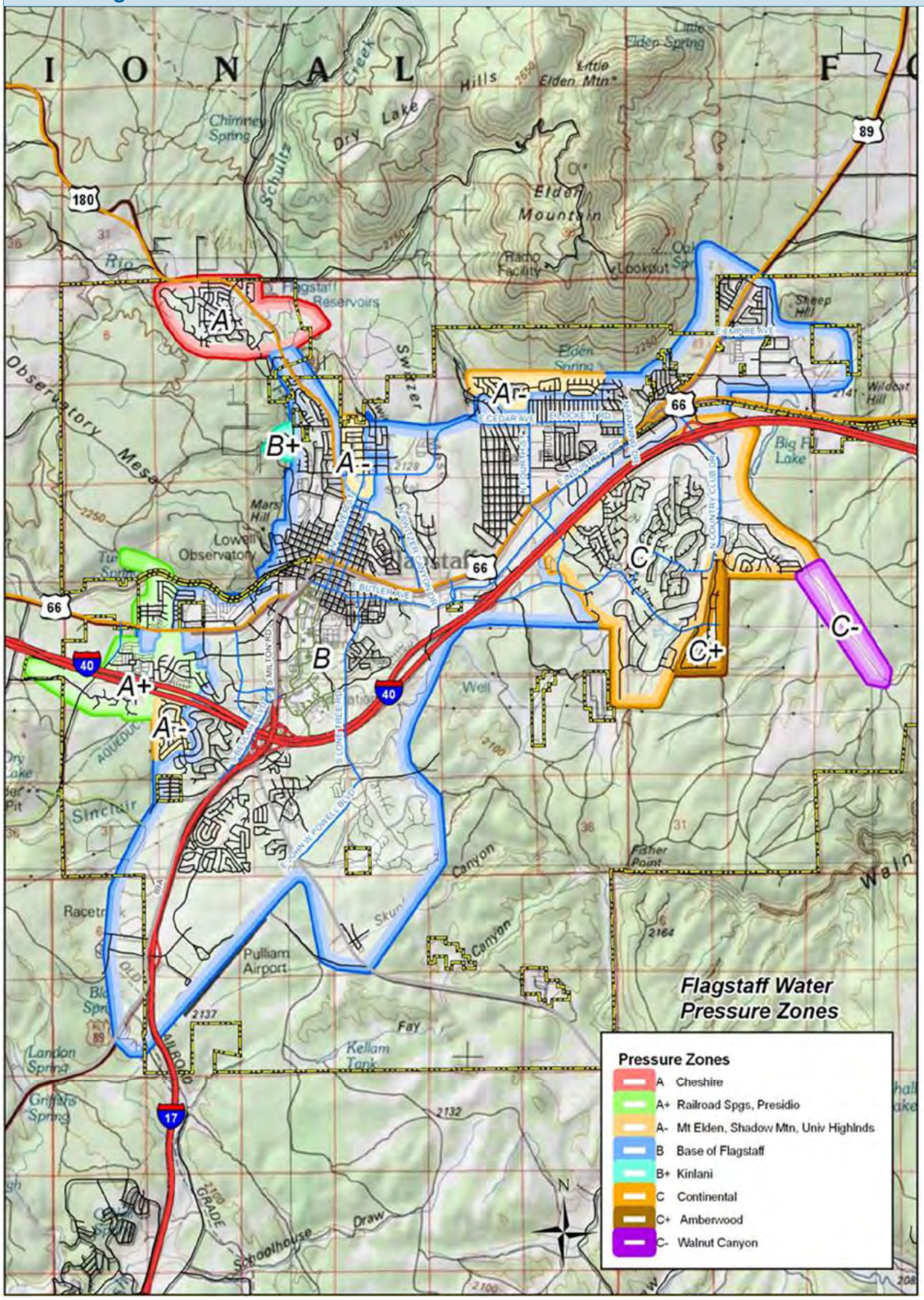
7 WATER STORAGE & DISTRIBUTION

7-1 Water Storage Reservoirs

WATER STORAGE RESERVOIRS

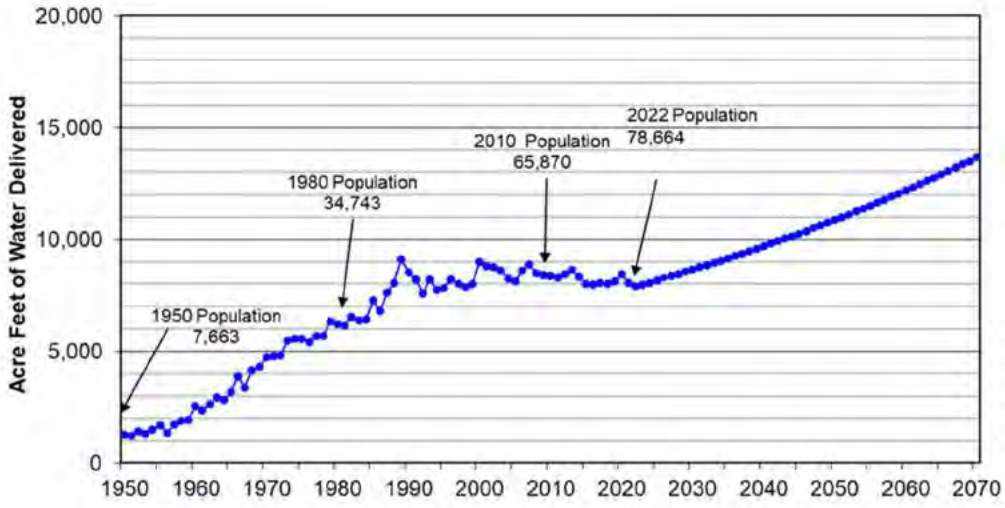
Name	Type	Dimensions	Tank Capacity	Floor Elv	HWL	Range
Main	circular, concrete	260d x 30h	12 MG	7106.00	7136.14	30.14
Christmas Tree	circular, concrete	210d x 20h	5.0 MG	7120.33	7139.11	18.78
Airport	circular, steel	48d x 24h	300 KG	6989.00	7012.17	23.17
Railroad Springs	circular, steel	86d x 24h	1.0 MG	7301.00	7324.00	23.00
Railroad Springs #2	circular, steel	86d x 24h	1.0 MG	7301.00	7324.00	23.00
Cheshire	circular, steel	90d x 24h	1.3 MG	7235.00	7260.00	25.00
Paradise	circular, concrete	132dx 25h	2.5 MG	7235.75	7260.33	24.58
Kinlani	circular, steel	34d x 24h	156 KG	7220.00	7243.00	23.00
Other Storage						
University Highlands	circular, steel	60d x 24h	500 KG	7057.50	7081.10	23.60
Raw Water Pump Station.	square, concrete	35w x 18h	140 KG	6791.83	6806.00	14.17
LMWTP Clearwell	circular, concrete	130d x 16h	1.2 MG	6952.00	6967.00	15.00
LMWTP Backwash Tank	sphere, steel	36d x 30h	200 KG	7000.50	7030.50	30.00
LMWTP Filter Wetwell	rectangle, concrete	17w x 24L x 9h	32 KG	6952.45	6964.93	12.48
Woody Mtn. Clarifier	circular, concrete	70d x 16h	304KG	7173.25	7192.00	18.75
Woody Mtn. Forbay	circular, steel	21d x 24h	60 KG	7165.00	7189.50	24.50
Reservoir Filtration Plant, Clearwell	rectangle, concrete	47w x 70L x 10h	240 KG	7103.50	7115.67	12.17
Sinagua/Foxglenn	circular, steel	25w x 10h	33 KG	6804.00	6993.00	7.00
Ft. Tuthill	circular, steel	25	33 KG	6984.00	6993.00	7.00
Shop Well	rectangle, concrete	12w x 27L x 8h	19.5 KG	6791.00	6799.25	8.25
Interchange Well	rectangle, concrete	12w x 27L x 8h	19.5 KG	6784.66	6793.00	8.34
Rio Well	rectangle, concrete	12w x 27L x 8h	19.5 KG	6852.17	6860.50	8.33
McAllister	rectangle, concrete	13w x 38L x 8h	30 KG	7062.50	7069.75	7.25

7-2 Flagstaff Water Pressure Zones



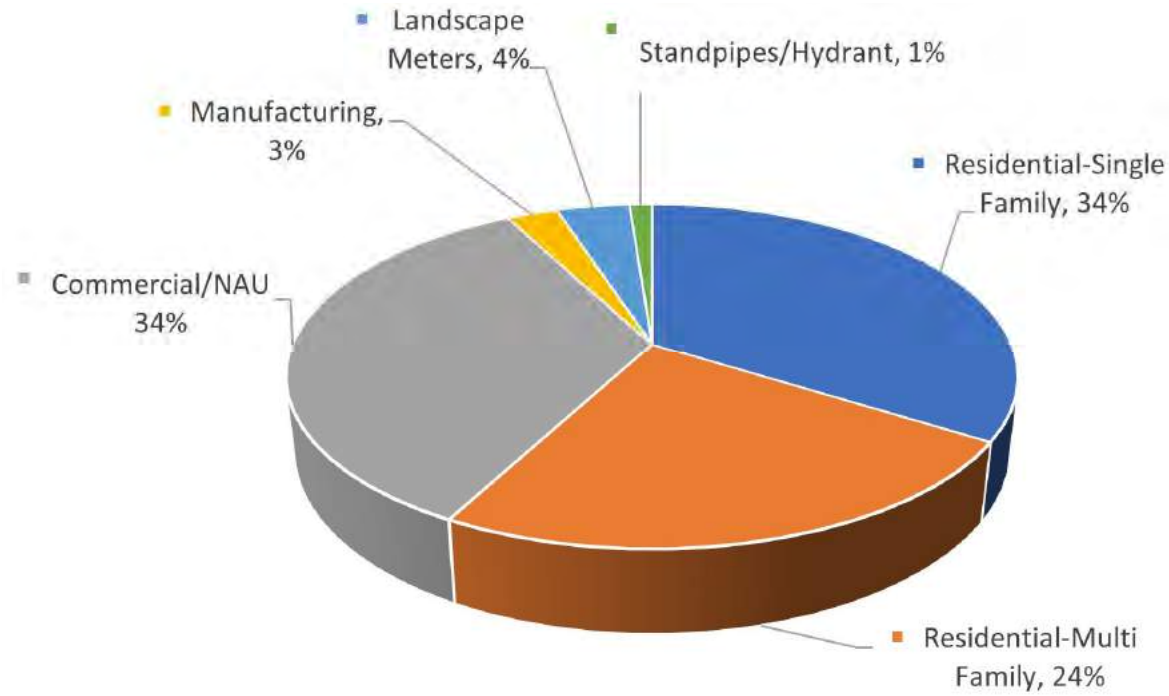
8 WATER CONSUMPTION & PROJECTED NEEDS

8-1 Projected Potable Water Demand from 2022 to 2070



The graph above illustrates water production (in acre-feet per year) and population for Flagstaff from 1950 through 2022. The annual percentage increase in population over the 73 year period has averaged 1.24% per year while water production has increased 1.15% per year over the same time period. Projected water demand assumes population growth and water use will continue at these same rates although water production trends have been flattening since the early 2000s.

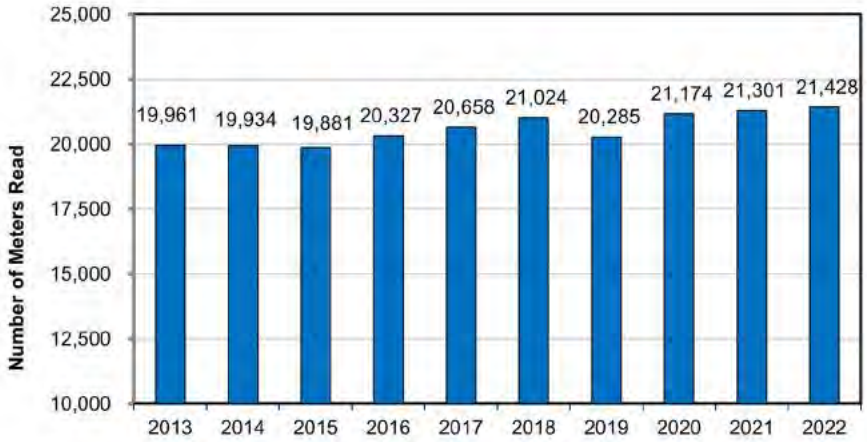
8-2 2022 Potable Water Use by Customer Class



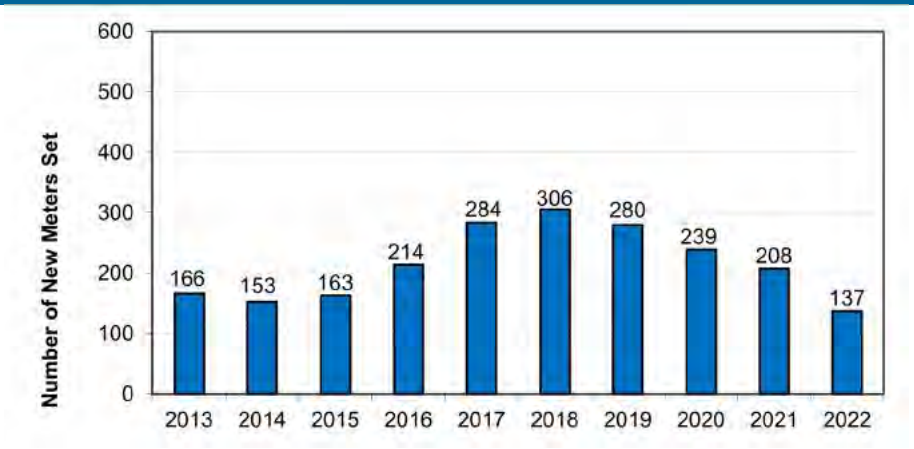
System flushing volume was included in the total water used in 2022 but comprised less than 1% of the total.

8-3 Water Meters

Meters Read—Highest Month Each Year for Last 10 Years



New Meter Sets in Last 10 Years



Water Services staff

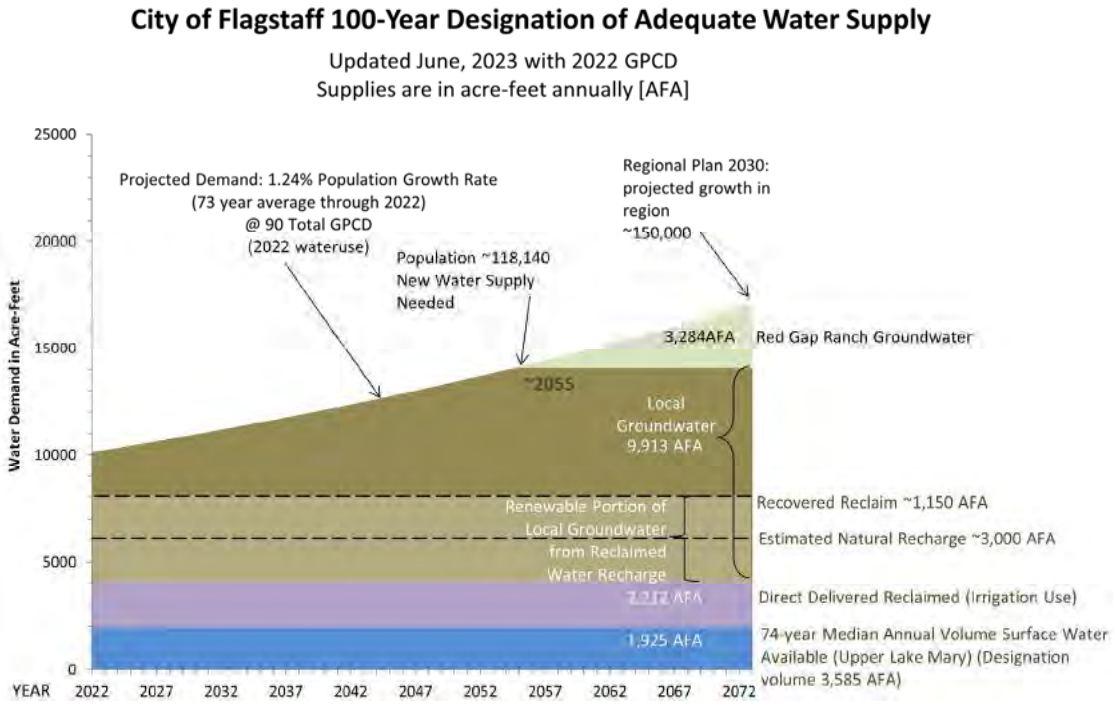
8-4 Designation of Adequate Water Supply

The Arizona Department of Water Resources (ADWR) issued the City a Designation of Adequate Water Supply in 2013. ADWR permitted 9,913 AF/YR (acre-feet per year) of local groundwater (Lake Mary, Woody Mountain and Local well fields), 3,585 AF/YR from Upper Lake Mary, 16,500 AF/YR from Red Gap Ranch, and 2,212 AF/YR of reclaimed water as available supplies to meet 100 years of projected water demand. The supply from Red Gap Ranch is limited to 8,000 AF/YR within 6 miles of the ranch after the City entered into an agreement with the Navajo Nation in 2011.

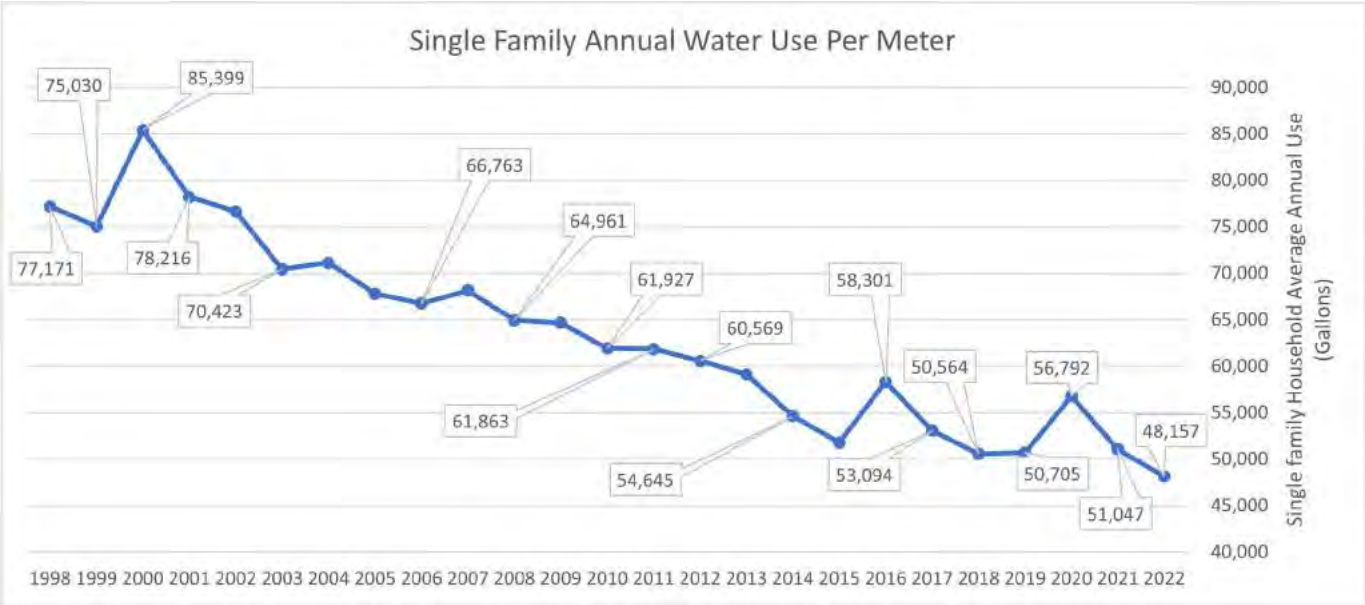
Total water demand is based on current water demand, committed water demand and projected water demand. Current demand is actual production each year. Committed demand represents all building permits for previously undeveloped properties under construction. Projected demand is based on population and current total water usage rates. Flagstaff shall submit an application to increase the term of the designation when the sum of Flagstaff's current demand, committed demand and two-year projected demand exceeds 14,839.54 acre-feet per year, or by December 31, 2031, whichever is earlier.

Reporting Year	Current Demand Potable (AFA)	Current Demand Reclaimed (AFA)	Total Current[1] Demand (AFA)	Committed Demand[2] (AFA)	Remaining Designation Volume Before DADE Modification[3] (AFA)
2022	7,890	1,547	9,437	325	5,078
2021	8,039	1,912	9,951	472	4,417
2020	8,435	2,085	10,520	675	3,645
2019	8,129	1,740	9,869	1,412	3,559
2018	8,036	1,870	9,906	1,118	3,816
2017	8,065	2,189	10,254	1,263	3,323
2016	7,979	1,817	9,795	686	4,358
2015	8,013	1,921	9,934	833	4,073
2014	8,347	1,934	10,281	1,058	3,501
2013	8,565	2,252	10,817	819	3,204
2012	8,384	2,050	10,434	707	3,699

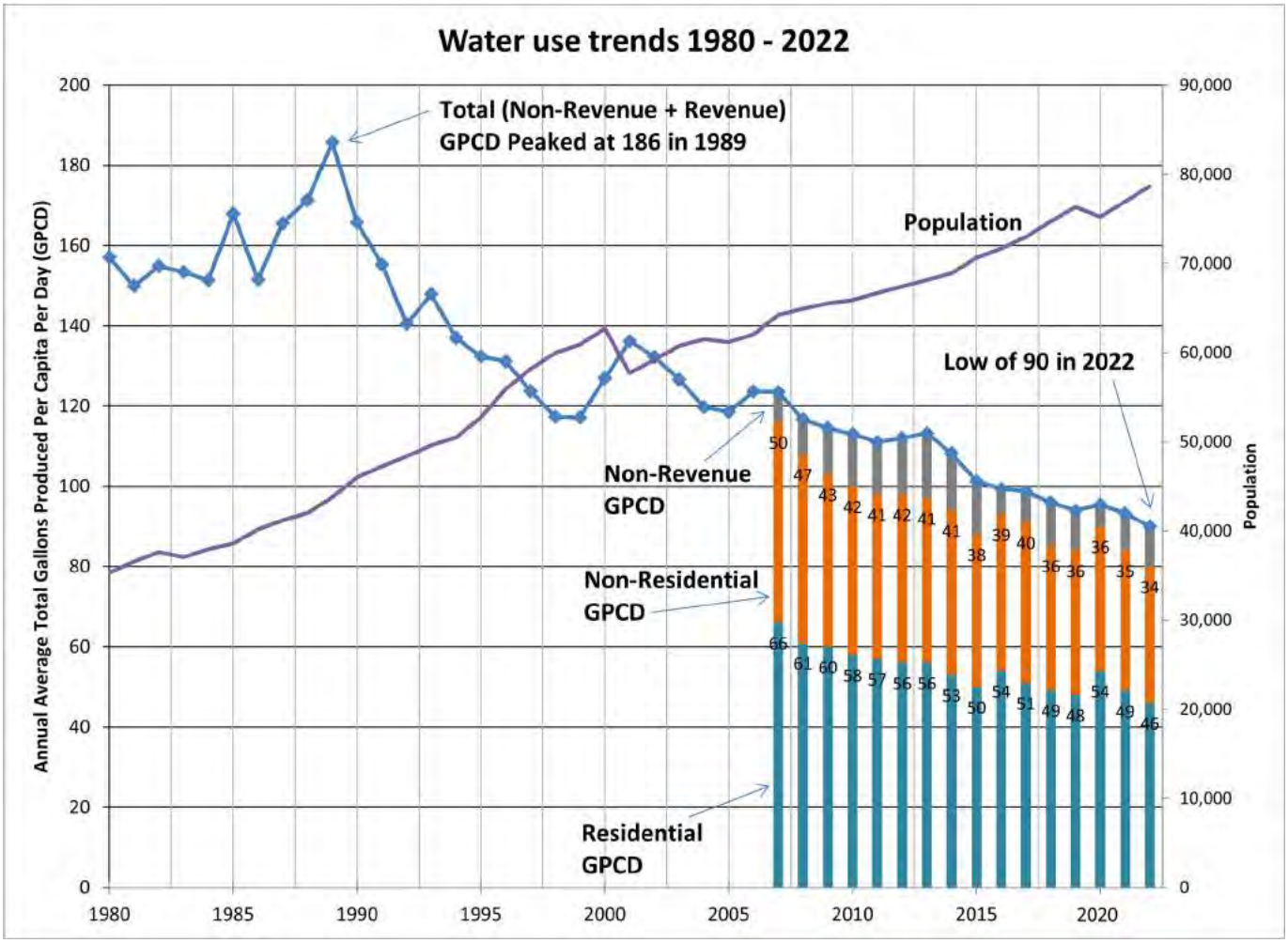
1. Total current demand reported to ADWR is the sum of potable production and reclaimed water delivered in that calendar year.
2. Committed demand is Council-approved plats, building permits and rezones approved but not served.
3. 2033 Annual Estimated Water Demand from 2011 (14,840 AF) - Total Current Demand - Committed Demand.

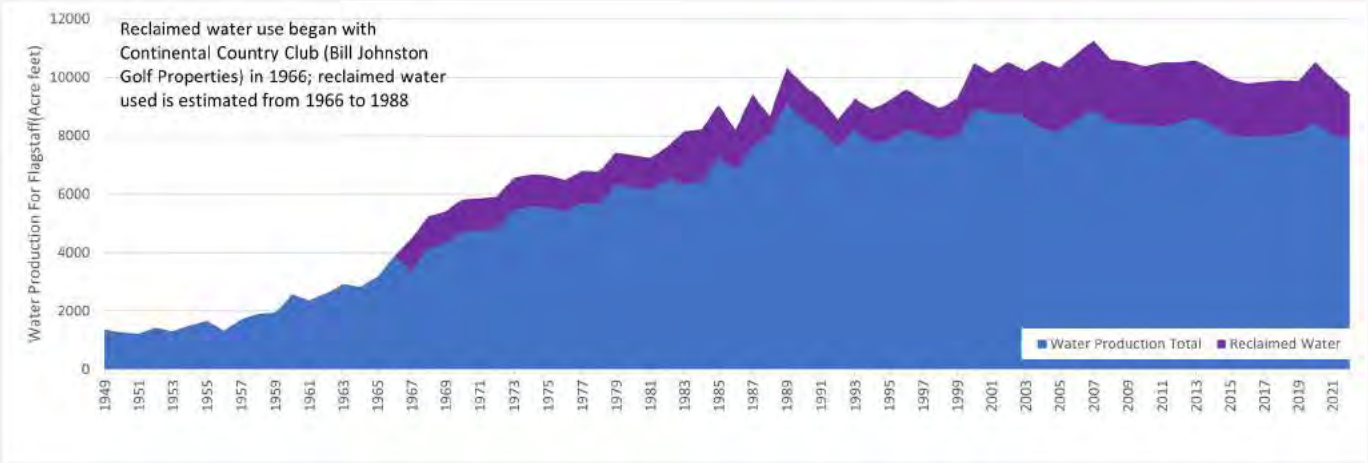


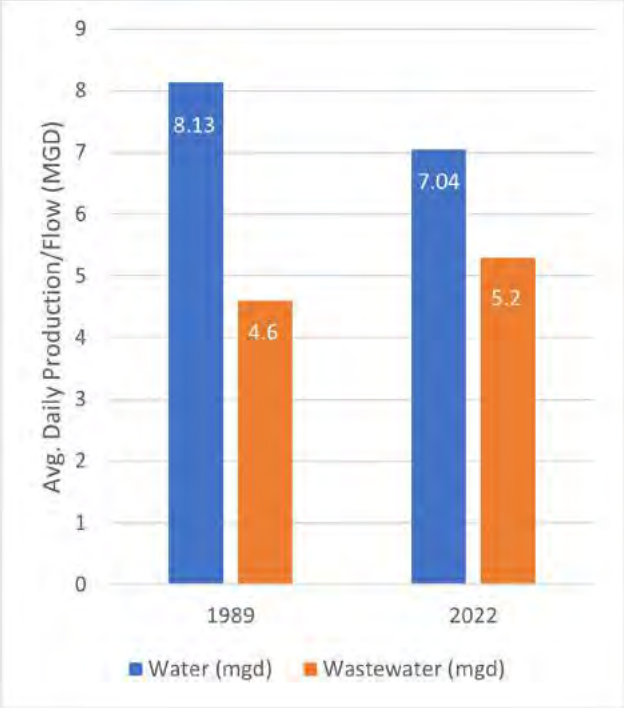
8-5 Water Resources Planning Data Trends



Above: Annual average water use in the single-family residential sector has dropped by 37,000 gallons, or 1,700 gallons per year per account, since 2000.

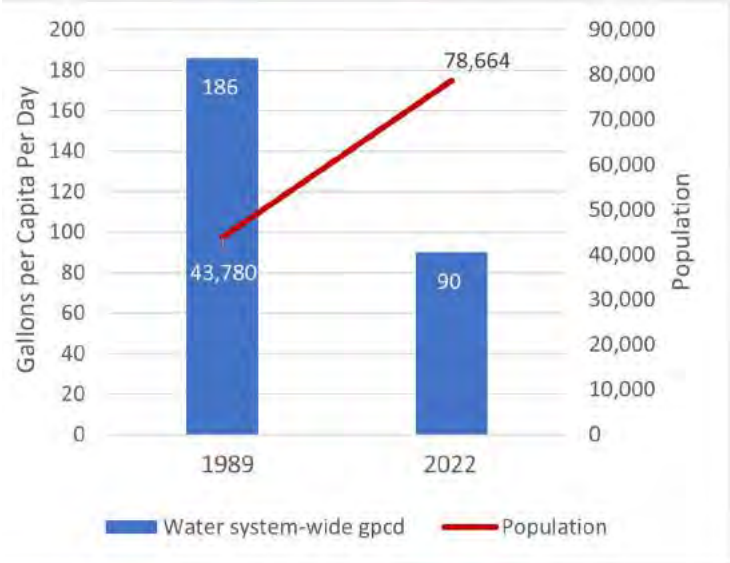


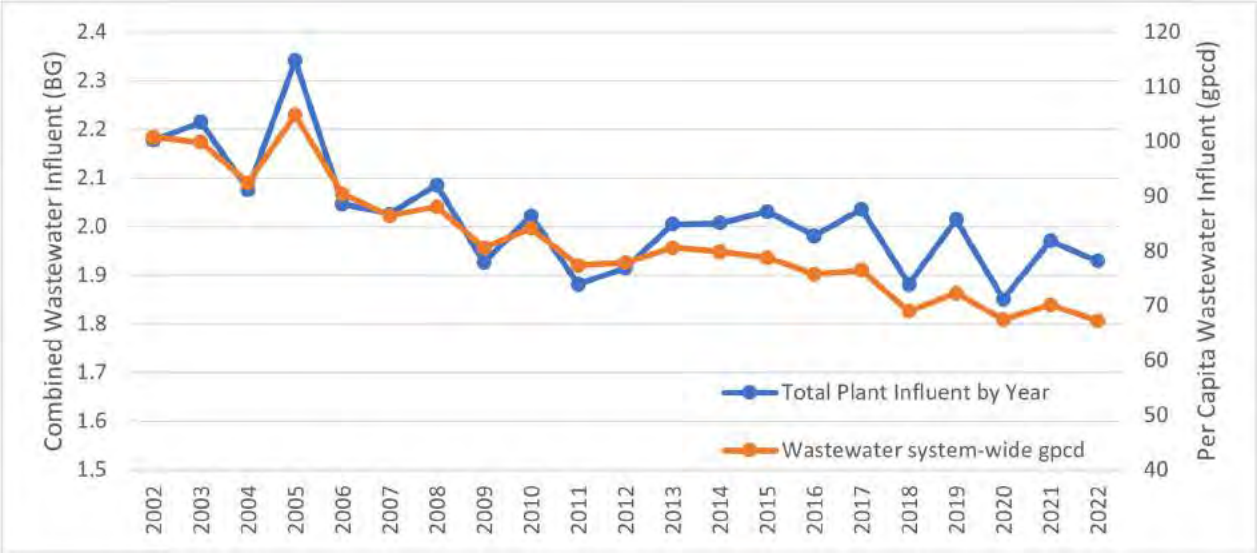




Left: The average daily production for water was less in 2022 than in 1989, while average daily inflow on the wastewater side has gone up.

Below: Population has increased since 1989 while community water consumption per-capita has decreased by over 50%.





One issue facing Water Services and wastewater treatment is a shift in wastewater inflow from per capita contribution. Inflow is relatively consistent each year even with a growing population. Gallons per capita per day of inflow has been dropping. This relationship demonstrates that sewage concentration is increasing. Concentration is a growing concern for the industry as it becomes more difficult to process with conventional treatment.

Regional Water Resource Planning Collaboration

Northern Arizona Municipal Water Users Association

The Northern Arizona Municipal Water User's Association (NAMWUA) represents a group of northern Arizona municipalities and private water providers that cooperate as a collective voice for water policy. The goal of the membership is to work together to develop a sustainable regional water supply. Created in 2002, NAMWUA is managed by an Executive Board of officials from seven northern Arizona municipalities and one private water company. Flagstaff Councilmember Miranda Sweet serves on the NAMWUA Board. The Water Resources Manager, Erin Young, serves on the Technical Advisory Committee (TAC). NAMWUA is very active in the legislative process each year, informing its members of legislative activity on water topics, taking positions, writing letters, or providing comment at the state legislature. The TAC meets on the third Thursday of each month, with the Board meeting quarterly. Meetings are open to the public. More information can be found at: https://namwua.org/

Coconino Plateau Watershed Partnership and Coconino Plateau Water Advisory Council

The Coconino Plateau Water Advisory Council (CPWAC) and Coconino Plateau Watershed Partnership (CPWP) were formed to facilitate and implement sound water resource management and conservation strategies on the Coconino Plateau. The Council coordinates and cooperates in the identification, prioritization, and implementation of comprehensive policies, projects, and programs to assist in meeting the water needs of the Coconino Plateau. Flagstaff Vice Mayor Austin Aslan serves as Chair of the CPWP/CPWAC. Flagstaff City Manager Greg Clifton is the Chair of the Government Affairs Committee, and Emily Melhorn, Water Conservation Specialist, is the Chair of the Public Outreach Committee. The Water Resources Manager, Erin Young, serves on the Technical Advisory Committee (TAC). In 2022 the TAC completed a WaterSMART grant to conduct an Ecosystems Services Assessment and a groundwater modeling project to explore criteria for safe yield from the C aquifer to inform the Arizona Department of Water Resources. Board meetings are held on the last Friday of each month and are open to the public. More information can be found at https://cpwac.org/

9 RED GAP RANCH

9-1 Red Gap Ranch Updates

Red Gap Ranch was identified and purchased as a future City water resource in 2005. The City owns 8,500 deeded acres with another 7,000 acres owned by the Arizona State Land Department and some private property.

Even though the timing is at least a decade out before needing a new water source, history is a good indication that water projects take decades of planning. The City commissioned a pipeline feasibility study by Jacobs Engineering in June of 2008 to analyze alternative pipeline alignments to convey water from the ranch to the City. This feasibility study was delayed for many years due to right-of-way and access negotiations with the Arizona Department of Transportation. The feasibility study is currently in Phase 2, scheduled for completion in Fall 2023.

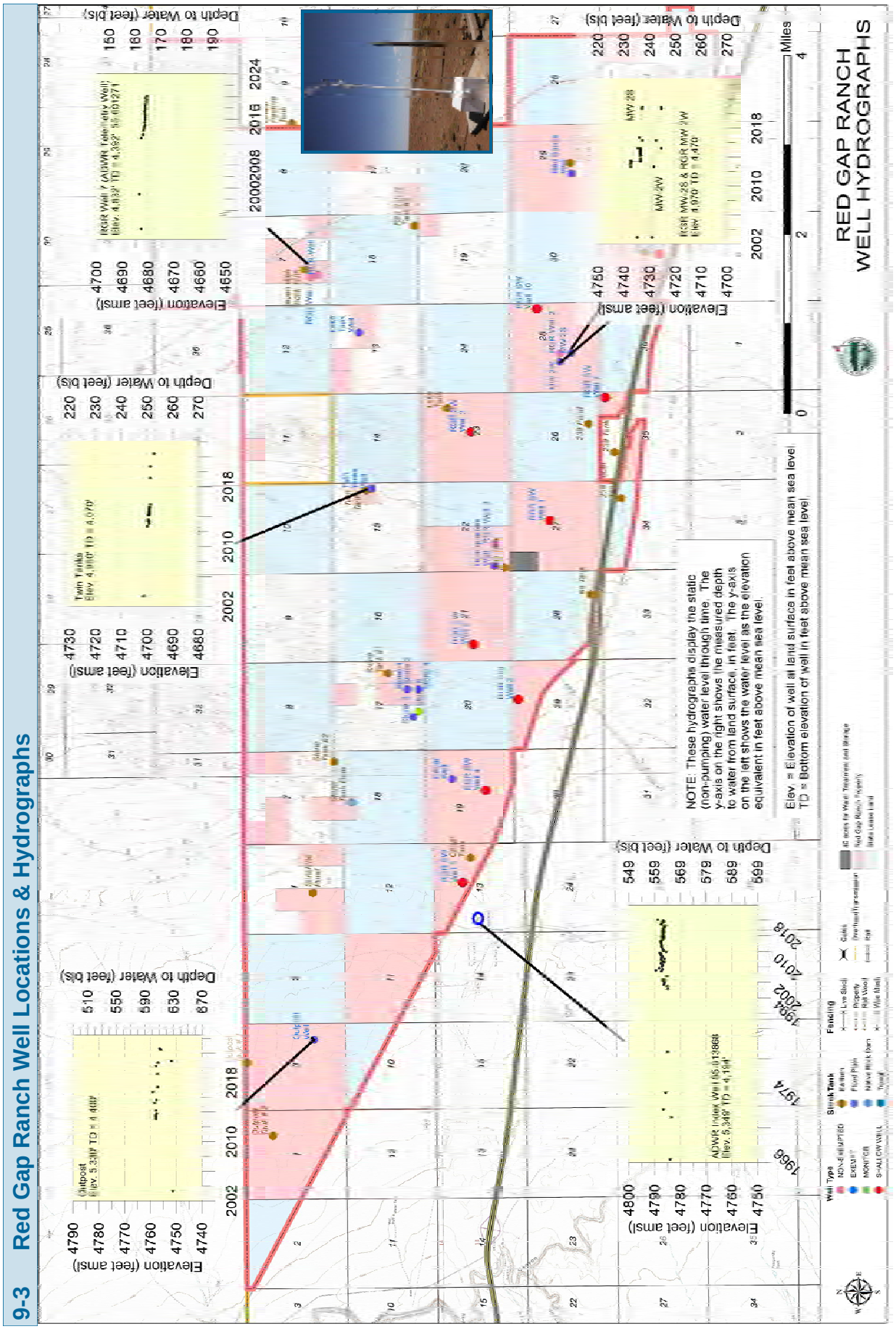
9-2 Red Gap Ranch Well Data

Local Name	Reg. Number	Surf. Elevation (feet amsl)	Most Recent Depth to Water (feet)	Most Recent Water Elevation (feet amsl)	Data[1] Source	Date Measured (mm/dd/yyyy)	Well Depth (feet)	Diameter (inches)	Perf. Interval (feet)	Date Well Complete
Sunshine Well	601277	5230								
Outpost Well	597831	5330	573.59	4756	COF	8/8/2022	930	5	690-890	2003
Lake Tank Well	590957	4870	171.24	4699	H.S.I.	11/19/2002	570	6		2002
Twin Tanks Well	597832	4950	252.6	4697	COF	6/7/2022	880	5	660-860	2003
Red Sands Well	601276	4951	240.53	4710	H.S.I.	11/18/2002				
Stone-1	601273	5045	N/A							
Stone-2	601274	5065	N/A							
Stone-3	601275	5055	316.44	4739	H.S.I.	5/15/2003				
Stone-4	601272	5045	N/A							
Stone-5	809401	5055	342.4	4713	COF	9/13/2012				
Cedar Well	597833	5180	441.33	4739	COF	5/10/2019	910	5	590-690, 790-890	2003
Headquarters Well	601278	5030	131.48	4899	COF	5/10/2019				
RGR - Well-1	590153	4835	N/A				180	12	OPEN	Incomplete
RGR - Well -2	590823	4970	220.00	4750	COF	4/1/2015	695	12	380-460, 540-600, 640-660	2002
MW-2W	590821	4970	244.76	4725	COF	6/7/2022	500	5	380-480	2002
MW-2S[4]	590822	4970	237.00	4733	COF	12/7/2020	500	5	380-480	2002
RGR - Well -3	590338	5030	278.5	4752	COF	5/11/2016	840	12	460-520, 660-720, 760-800	2002
RGR - Well -7[2]	601271	4832	168.49	4664	ADWR	10/12/2022	440	4.5	OPEN	Deepened in 2002
RGR SW Well 1[3]	912928	5037	288.15	4749	COF	6/7/2022	435	16	OPEN	2011
RGR SW Well 2	912929	4948	236.38	4712	COF	6/6/2022	420	16	OPEN	2011
RGR SW Well 3	912930	5173	423.02	4750	COF	8/22/2022	475	16	OPEN	2011
RGR SW Well 4	912931	5314	485.74	4828	COF	8/22/2022	640	16	OPEN	2011
RGR SW Well 5	912932	5314	544.91	4769	COF	8/8/2022	700	16	OPEN	2011
RGR SW Well 6	912933	5063	319.64	4743	COF	8/22/2022	445	16	OPEN	2011
RGR SW Well 7	913556	4995	N/A				38	24		Incomplete
RGR SW Well 8	913557	4996	N/A				38	24		Incomplete
RGR SW Well 9	913560	5012	N/A				38	24		Incomplete
RGR SW Well 10	913561	4964	N/A				38	24		Incomplete

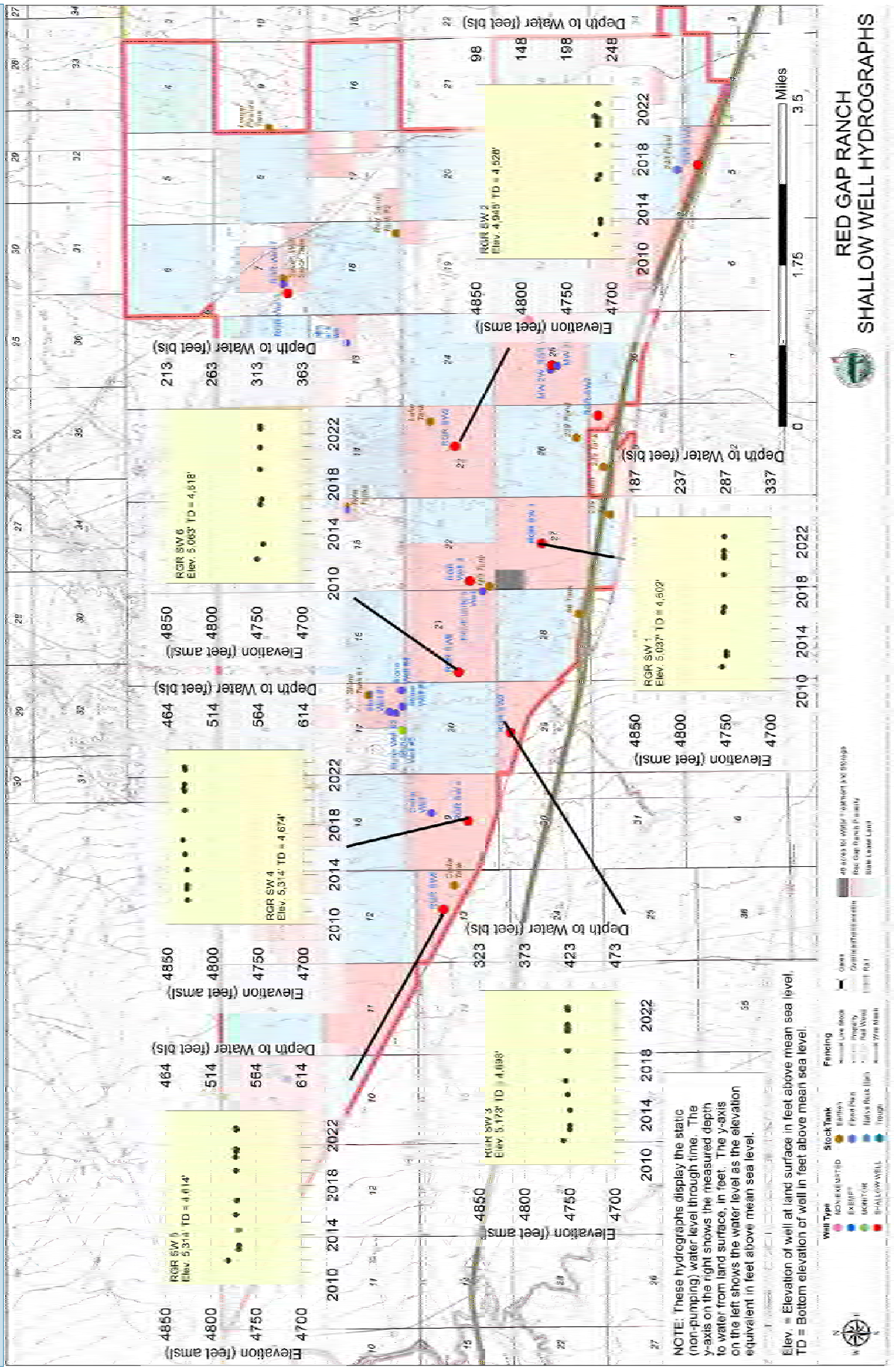
1. COF = City of Flagstaff, H.S.I=HydroSystems Inc.
2. Pursuant to agreement with ADWR dated 2013, continuously monitoring water level
3. Red Gap Shallow Wells (SW)

*AMSL = Above mean sea level

9-3 Red Gap Ranch Well Locations & Hydrographs

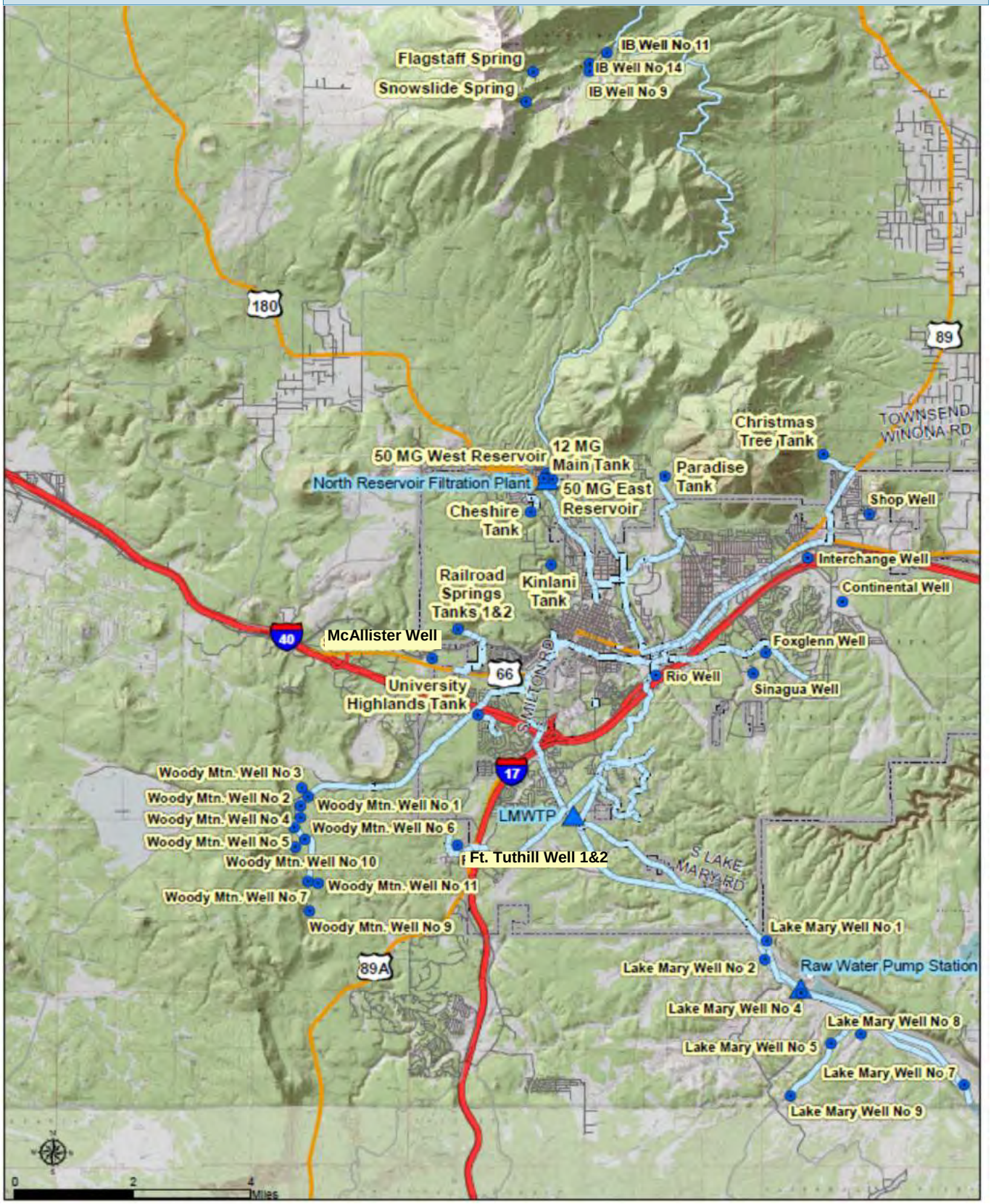


9-3 Red Gap Ranch Well Locations & Hydrographs, continued



10 2022 WELL FIELDS & STORAGE TANKS

10-1 Well Fields & Infrastructure



10-2 City of Flagstaff Well Production History 2000-Present (million gallons)

YEAR	FOXGLN	CONTL	SHOP	INTRCH	RIO	SINAGUA	TUTHILL	MCALLISTER	TUTHILL #2			LOCAL
2000	0.000	29.565										29.565
2001	66.149	1.560										67.709
2002	56.860	77.748										134.608
2003	72.821	67.674	17.909	18.683								177.087
2004	35.972	49.939	243.317	97.148								426.376
2005	34.637	23.189	196.500	53.758								308.084
2006	47.892	87.574	195.908	100.290								431.664
2007	126.331	63.106	217.610	69.060	45.310							521.417
2008	1.507	26.311	283.149	40.980	62.926							414.873
2009	0.000	0.000	400.700	6.860	28.494							436.054
2010	0.916	3.530	332.100	13.360	33.151	9.816	119.317					512.190
2011	29.726	8.138	339.660	7.360	16.680	18.389	308.334					728.287
2012	46.527	22.945	341.300	6.820	8.999	81.859	475.765					984.215
2013	20.172	16.327	270.500	3.800	16.848	65.110	427.843					820.600
2014	40.430	53.900	271.510	12.170	8.960	44.330	465.440					896.740
2015	20.840	21.580	273.880	16.720	34.730	20.200	359.740					747.690
2016	30.280	29.235	240.546	23.215	13.567	76.801	444.966					858.609
2017	16.100	20.043	299.298	4.391	6.334	100.669	404.856					851.691
2018	15.202	0.616	384.364	1.470	0.867	44.839	448.373					895.731
2019	36.853	0.000	374.468	2.390	18.990	101.526	422.365					956.592
2020	58.743	1.031	373.764	4.826	9.500	39.636	406.080					893.580
2021	87.121	0.000	374.685	2.754	16.386	0.000	453.254	10.612				944.812
2022	11.320	0.000	350.435	1.739	73.655	38.699	460.763	31.903				968.514

YEAR	LM1	LM2	LM4	LM5	LM7	LM8	LM9	LM TOTAL	IB9	IB11	IB14	IB TOTAL
2000	18.049	171.246	256.658	95.156		548.086	109.017	1198.212	77.189	90.945	46.294	214.428
2001	31.236	193.036	331.506	48.201		533.297	110.915	1248.191	0.000	31.323	55.815	87.138
2002	18.043	141.507	303.165	100.531	3.155	532.376	65.262	1164.039	0.000	3.004	2.145	5.149
2003	18.062	124.797	259.479	92.900	0.000	453.701	100.860	1049.799	0.000	51.057	10.435	61.492
2004	5.457	124.023	79.160	130.041	0.000	338.451	176.190	853.322	0.000	35.240	27.951	63.191
2005	11.002	44.665	63.565	24.370	0.000	200.544	40.717	384.863	64.602	39.444	1.870	105.916
2006	10.895	80.049	189.037	89.718	0.000	334.613	117.689	822.001	32.675	78.434	54.667	165.776
2007	33.275	91.488	233.631	100.913	16.447	305.751	72.482	853.988	0.000	45.476	64.011	109.487
2008	3.977	26.072	103.224	109.768	6.941	249.638	8.788	508.408	0.000	16.209	36.257	52.466
2009	4.103	35.694	112.210	3.526	0.000	252.675	49.133	457.341	0.000	0.000	0.000	0.000
2010	0.000	0.000	103.180	31.535	0.000	186.186	38.731	359.632	0.000	0.000	0.000	0.000
2011	0.000	0.000	134.570	22.095	0.000	133.152	65.001	354.818	0.000	0.000	0.000	0.000
2012	0.000	0.000	217.764	121.153	0.000	58.394	73.206	470.517	0.000	0.000	0.000	0.000
2013	0.000	0.000	149.343	59.407	0.000	251.275	83.193	543.218	8.163	24.695	0.000	32.858
2014	0.000	0.630	224.490	18.930	0.000	245.160	73.450	562.660	0.000	33.914	43.493	77.407
2015	0.000	61.929	128.494	55.409	0.000	186.722	63.372	495.926	21.835	0.000	0.000	21.835
2016	0.000	72.512	139.961	33.554	0.000	154.823	70.649	471.499	0.000	19.744	16.257	36.001
2017	0.000	30.883	46.956	22.451	0.000	206.451	49.245	355.986	0.000	0.000	0.000	0.000
2018	0.000	55.633	77.443	8.411	0.000	199.578	34.959	376.024	56.601	0.000	0.000	56.601
2019	0.000	43.684	41.464	16.537	0.000	198.787	33.223	333.695	0.000	0.000	0.000	0.000
2020	0.000	55.966	67.542	10.526	0.000	166.536	51.079	351.649	0.000	0.000	0.000	0.000
2021	0.000	38.317	124.343	10.821	0.000	211.584	68.046	453.111	0.000	0.000	0.000	0.000
2022	0.000	79.545	188.126	30.320	0.000	212.016	32.240	542.247	0.000	0.000	0.000	0.000

YEAR	WM1	WM2	WM3	WM4	WM5	WM6	WM7	WM9	WM10	WM11		WM TOTAL
2000	108.875	98.554	222.164	106.091	145.106	212.489	181.241	111.777	138.465			1324.762
2001	79.803	139.872	283.900	109.490	70.137	187.515	91.275	57.525	125.001	101.162		1245.680
2002	107.903	101.841	288.102	153.620	88.919	154.482	223.042	153.087	122.189	166.234		1559.419
2003	54.234	48.651	48.651	62.113	14.955	98.042	286.197	322.218	140.888	147.873		1223.822
2004	70.978	55.726	293.108	108.986	38.876	124.902	164.845	116.272	114.012	78.764		1166.469
2005	28.143	10.887	117.863	77.798	20.303	49.420	119.721	141.219	24.155	16.429		605.938
2006	65.498	80.910	142.982	25.047	55.920	128.174	74.025	125.994	79.033	37.299		814.882
2007	31.433	118.277	285.269	103.927	62.540	113.881	170.067	150.048	113.680	137.164		1286.285
2008	1.197	46.644	149.636	34.252	8.789	61.866	151.793	114.561	13.991	160.537		743.266
2009	3.199	3.249	100.105	7.054	1.615	123.519	147.408	120.969	1.788	19.648		528.554
2010	0.379	12.449	78.100	2.430	0.509	50.999	116.248	132.377	11.759	11.759		417.009
2011	4.499	2.902	120.155	6.948	2.975	65.582	178.185	70.566	0.000	39.779		491.591
2012	0.000	29.521	301.868	8.292	45.413	144.554	146.182	111.161	34.845	150.802		972.638
2013	0.000	18.430	169.470	31.094	11.720	158.563	272.729	94.067	34.211	91.083		881.367
2014	0.000	52.290	170.170	38.250	31.940	101.290	119.240	137.980	22.400	165.310		838.870
2015	0.000	59.110	93.718	11.118	20.983	155.571	89.978	120.278	17.909	109.322		677.987
2016	0.000	4.723	231.889	0.000	0.000	158.761	144.885	86.199	13.086	43.066		682.608
2017	0.000	4.428	242.207	0.000	14.277	83.479	84.253	129.472	51.962	69.683		679.762
2018	0.000	3.059	145.656	16.158	14.190	40.612	109.338	121.629	35.846	81.836		568.324
2019	0.000	24.108	37.223	9.683	18.642	127.584	20.513	90.079	30.043	62.169		420.044
2020	0.000	18.933	68.060	7.461	2.635	82.448	45.422	65.576	41.670	69.778		401.984
2021	0.000	16.374	210.818	19.513	19.935	192.390	195.546	80.032	81.624	74.298		890.530
2022	0.000	68.813	130.237	30.090	59.458	84.594	219.325	104.627	121.209	94.223		912.576

TOTAL ALL SOURCES

YEAR	MG	YEAR	MG	YEAR	MG	YEAR	MG	YEAR	MG	YEAR	MG
2000	2766.967	2004	2509.358	2008	1719.013	2012	2427.370	2016	2048.717	2020	1647.212
2001	2648.718	2005	1404.801	2009	1421.949	2013	2278.043	2017	1887.439	2021	2288.452
2002	2863.215	2006	2234.322	2010	1288.831	2014	2375.677	2018	1896.679	2022	2423.337
2003	2512.200	2007	2771.177	2011	1574.696	2015	1943.438	2019	1710.331		

10-2 City of Flagstaff Well Production History 2000-Present (acre-feet)

YEAR	FOXGLN	CONTL	SHOP	INTRCH	RIO	SINAGUA	TUTHILL	MCALLISTER	TUTHILL #2			LOCAL
2000	0	90.73										90.73
2001	203.00	4.79										207.79
2002	174.50	238.60										413.10
2003	223.48	207.68	54.96	57.34								543.46
2004	110.39	153.26	746.71	298.14								1308.50
2005	106.30	71.16	603.04	164.98								945.48
2006	146.98	268.75	601.22	307.78								1324.73
2007	387.70	193.66	667.82	211.94	139.05							1600.17
2008	4.62	80.75	868.95	125.76	193.11							1273.20
2009	0	0	1229.70	21.05	87.44							1338.20
2010	2.81	10.83	1019.18	41.00	101.74	30.12	366.17					1571.85
2011	91.23	24.97	1042.38	22.59	51.19	56.43	946.24					2235.03
2012	142.79	70.42	1047.41	20.93	27.62	251.22	1460.07					3020.44
2013	61.91	50.11	830.13	11.66	51.70	199.81	1313.00					2518.33
2014	124.08	165.41	833.23	37.35	27.50	136.04	1428.38					2751.99
2015	63.96	66.23	840.51	51.31	106.58	61.99	1104.00					2294.58
2016	92.93	89.72	738.21	71.24	41.64	235.69	1365.55					2634.98
2017	49.41	61.51	918.51	13.48	19.44	308.94	1242.46					2613.74
2018	46.65	1.89	1179.57	4.51	2.66	137.61	1376.01					2748.90
2019	113.10	0	1149.20	7.33	58.28	311.57	1296.19					2935.67
2020	180.28	3.16	1147.04	14.81	29.15	39.64	1246.21					2742.30
2021	267.36	0	1149.86	8.45	50.29	0	1390.99	32.57				2899.52
2022	34.74	0	1075.45	5.34	226.04	118.76	1414.03	97.91	0			2972.26
YEAR	LM1	LM2	LM4	LM5	LM7	LM8	LM9	LM TOTAL	IB9	IB11	IB14	IB TOTAL
2000	55.39	525.53	787.65	292.02		1682.01	334.56	3677.18	236.88	279.10	142.07	658.06
2001	95.86	592.41	1017.35	147.92		1636.63	340.39	3830.56	0	96.13	171.29	267.42
2002	55.37	434.27	930.38	308.52	9.68	1633.80	200.28	3572.30	0	9.22	6.58	15.80
2003	55.43	382.99	796.31	285.10	0	1392.36	309.53	3221.71	0	156.69	32.02	188.71
2004	16.75	380.61	242.93	399.08	0	1038.67	540.71	2618.75	0	108.15	85.78	193.93
2005	33.76	137.07	195.07	74.79	0	615.45	124.96	1181.10	198.26	121.05	5.74	325.04
2006	33.44	245.66	580.13	275.33	0	1026.89	361.17	2522.63	100.28	240.71	167.77	508.75
2007	102.12	280.77	716.99	309.69	50.47	938.32	222.44	2620.79	0	139.56	196.44	336.00
2008	12.20	80.01	316.78	336.87	21.30	766.11	26.97	1560.25	0	49.74	111.27	161.01
2009	12.59	109.54	344.36	10.82	0	775.43	150.78	1403.53	0	0	0	0
2010	0	0	316.65	96.78	0	571.38	118.86	1103.67	0	0	0	0
2011	0	0	412.98	67.81	0	408.63	199.48	1088.90	0	0	0	0
2012	0	0	668.29	371.80	0	179.20	224.66	1443.96	0	0	0	0
2013	0	0	458.32	182.31	1.00	771.13	255.31	1668.07	25.05	75.79	0	100.84
2014	0	1.93	688.93	58.09	0	752.37	225.41	1726.74	0	104.08	133.48	237.55
2015	0	190.05	394.33	170.04	0	573.03	194.48	1521.94	67.01	0	0	67.01
2016	0	222.53	429.52	102.97	0	475.13	216.81	1446.98	0	60.59	49.89	110.48
2017	0	94.78	144.10	68.90	0	633.57	151.13	1092.48	0	0	0	0
2018	0	170.73	237.66	25.81	0	612.48	107.29	1153.97	173.70	0	0	173.70
2019	0	134.06	127.25	50.75	0	610.05	101.96	1024.07	0	0	0	0
2020	0	171.75	207.28	32.30	0	511.08	156.76	1079.17	0	0	0	0
2021	0	117.59	381.59	33.21	0	649.33	208.83	1390.55	0	0	0	0
2022	0	244.11	577.34	93.05	0	650.65	98.94	1664.10	0	0	0	0
YEAR	WM1	WM2	WM3	WM4	WM5	WM6	WM7	WM9	WM10	WM11		WM TOTAL
2000	334.13	302.45	681.80	325.58	445.31	652.10	556.21	343.03	424.93			4065.55
2001	244.91	429.25	871.26	336.01	215.24	575.46	280.11	176.54	383.61	310.45		3822.85
2002	331.14	312.54	884.15	471.44	272.88	474.09	684.49	469.81	374.98	510.15		4785.68
2003	166.44	149.31	149.31	190.62	45.90	300.88	878.31	988.85	432.37	453.81		3755.77
2004	217.82	171.02	899.52	334.47	119.31	383.31	505.89	356.83	349.89	241.72		3579.76
2005	86.37	33.41	361.71	238.75	62.31	151.66	367.41	433.39	74.13	50.42		1859.56
2006	201.01	248.30	438.80	76.87	171.61	393.35	227.17	386.66	242.54	114.47		2500.78
2007	96.46	362.98	875.46	318.94	191.93	349.49	521.92	460.48	348.87	420.94		3947.46
2008	3.67	143.15	459.22	105.12	26.97	189.86	465.84	351.57	42.94	492.67		2281.00
2009	9.82	9.97	307.21	21.65	4.96	379.07	452.38	371.24	5.49	60.30		1622.07
2010	1.16	38.20	239.68	7.46	1.56	156.51	356.75	406.25	36.09	36.09		1279.75
2011	13.81	8.91	368.74	21.32	9.13	201.26	546.83	216.56	0	122.08		1508.64
2012	0	90.60	926.40	25.45	139.37	443.62	448.62	341.14	106.94	462.79		2984.92
2013	0	56.56	520.08	95.42	35.97	486.61	836.97	288.68	104.99	279.52		2704.82
2014	0	160.47	522.23	117.38	98.02	310.85	365.93	423.45	68.74	507.32		2574.40
2015	0	181.40	287.61	34.12	64.39	477.43	276.13	369.12	54.96	335.50		2080.67
2016	0	14.49	711.64	0	0	487.22	444.64	264.54	40.16	132.16		2094.85
2017	0	13.59	743.31	0	43.82	256.19	258.56	397.33	159.47	213.85		2086.11
2018	0	9.39	447.00	50	43.55	43.55	335.55	373.27	110.01	251.15		1663.03
2019	0	73.98	114.23	30	57.21	391.54	62.95	276.44	92.20	190.79		1289.07
2020	0	58.10	68.06	23	8.09	253.02	139.39	201.25	127.88	214.14		1092.83
2021	0	50.25	646.98	60	61.18	590.42	600.11	245.61	250.50	228.01		2732.94
2022	0	211.18	399.68	92.34	182.47	259.61	673.08	321.09	371.98	289.16		2800.59

TOTAL ALL SOURCES (ACRE-FEET)

YEAR	AF	YEAR	AF	YEAR	AF	YEAR	AF	YEAR	AF	YEAR	AF
2000	8491.51	2004	7700.94	2008	5275.46	2012	7449.32	2016	6287.28	2020	5055.11
2001	8128.62	2005	4311.18	2009	4363.80	2013	6991.06	2017	5792.34	2021	7023.00
2002	8786.88	2006	6856.88	2010	3955.28	2014	7290.69	2018	5820.69	2022	7436.95
2003	7709.66	2007	8504.43	2011	4832.56	2015	5964.19	2019	5248.81		

Quantites are in ACRE FEET from individual well meters. Totals will not necessarily match well field master meters due to meter inaccuracies.

10-3 Water Supply Sources & Specific Capacity

LAKE MARY SURFACE WATER PRODUCTION DESIGN CAPACITY	8.0 MGD						
RESERVIOR FILTRATION PLANT (INNER BASIN WATER) CAPACITY	2.0 MGD	2022					
LAKE MARY WELLS (year last modified)	Surface Elevation (feet)	Static Level (feet bls)	Pumping Level (feet bls)	Current yield (gpm)	Current yield (MGD)	Drawdown (feet)	Specific Capacity (gpm/ft)
LM #1, 2002 Pump & Motor	6838	672	DNR	DNR	DNR	DNR	DNR
LM #2, 2008 Pump & Motor	6837	616	899	340	0.49	283	1.2
LM #4, 2009 Pump & Motor	6809	558	845	400	0.58	287	1.4
LM #5, 2011 Pump & Motor	6816	534	665	285	0.41	131	2.2
LM #8, 2016 Pump & Motor	6818	584*	855	590	0.85	271	2.2
LM #9, 2009 Pump & Motor	6875	369	720	235	0.34	351	0.7
MAXIMUM YIELD FOR WELLFIELD (MGD)		**2.67**					
WOODY MTN. WELLS (year last modified)	Surface Elevation	Static Level	Pumping Level	Current yield	Current yield	Drawdown (feet)	Specific Capacity
WM #1, 2005 Pump & Motor	7137	DNR	DNR	DNR	DNR	DNR	DNR
WM #2, 2020 Pump & Motor	7167	1275	1317	220	0.32	42	5.2
WM #3, 2022 Pump & Motor	7129	1218	1308	565	0.81	90	6.3
WM #4, 2018 Pump & Motor	7163	NA	NA	345	0.50	NA	NA
WM #5, 2019 Pump & Motor	7186	1103	1302	310	0.45	199	1.6
WM #6, 2022 Pump & Motor	7201	1100	1386*	360	0.52	286	1.3
WM #7, 2009 Pump & Motor	7171	1124	1310	505	0.73	186	2.7
WM #9, 2021 Pump & Motor	7088	997	1289	400	0.58	292	1.4
WM #10, 2017 Pump & Motor	7240	1161	1340	260	0.37	179	1.5
WM #11, 2011 Pump & Motor	7170	1124	1398	330	0.48	274	1.2
MAXIMUM YIELD FOR WELLFIELD (MGD)		**4.75**					
LOCAL WELLS (year last modified)	Surface Elevation	Static Level	Pumping Level	Current yield	Current yield	Drawdown (feet)	Specific Capacity
Continental, 2006 Pump & Motor	6751	1315	DNR	310	0.45	DNR	DNR
Foxglenn, 2018 Pump & Motor	6775	1341	1405	300	0.43	64	4.69
Shop, 2017 Pump, 2016 Motor	6799	1467*	1626**	666**	0.96	159	4.19
Sinagua, 2020 Pump & Motor	6770	1294	DNR	248	0.36	DNR	DNR
Ft. Tuthill, 2015 Pump & Motor	7000	1131*	1212**	863**	1.24	81	10.65
McAllister, 2020 Pump & Motor	7060	1256	1736	266	0.38	480	0.55
Interchange, 2003 Pump & Motor	6790	NA	DNR	193	0.28	DNR	DNR
Rio, 2022 Pump & Motor	6858	1114	NA	209	0.30	NA	NA
MAXIMUM YIELD FOR WELLFIELD (MGD)		**4.40**					

DNR-Well Did Not Run

NA-Transducer or Airline Not Working

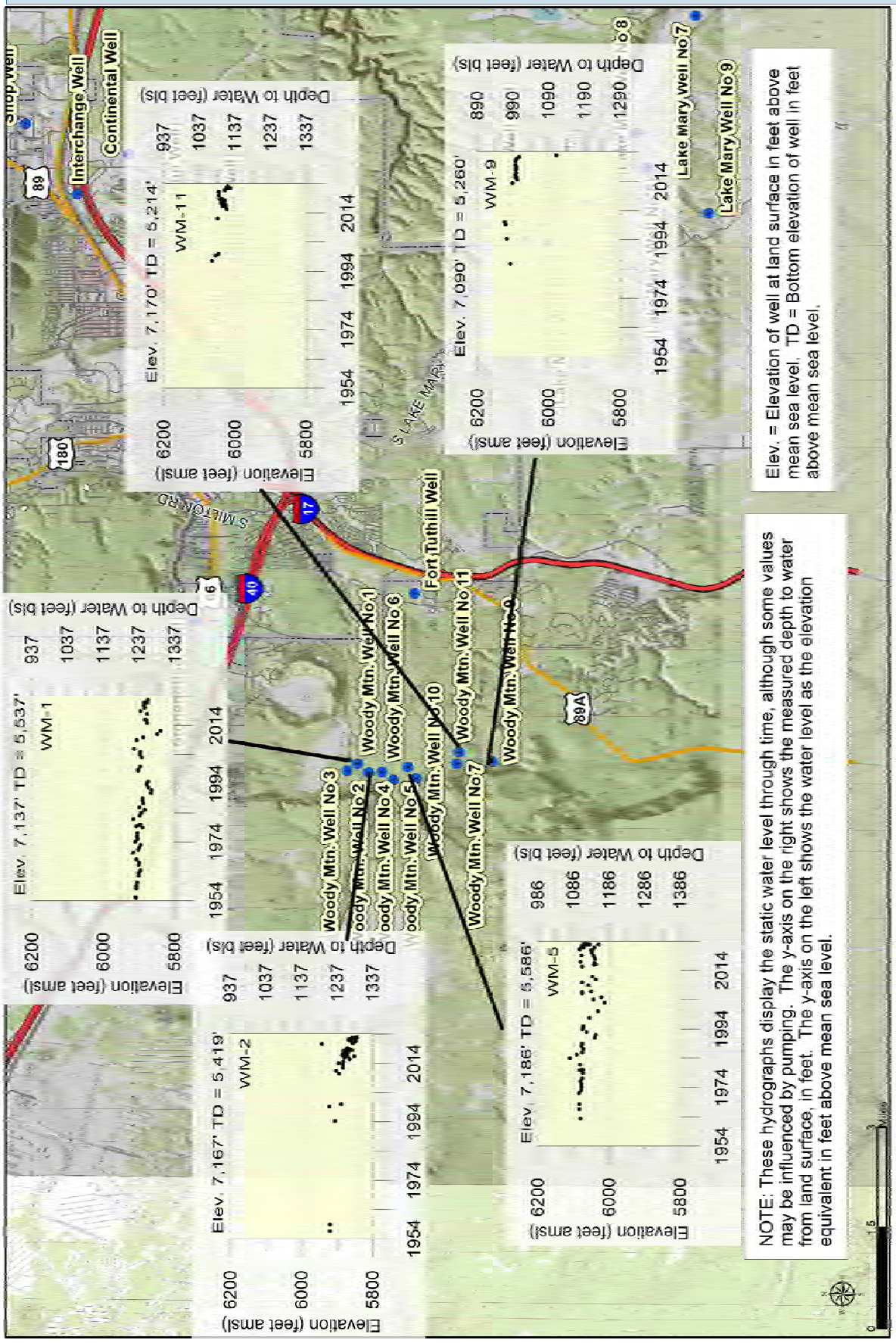
All VFD dynamic levels taken on the last day that the VFD was at 100%

Sum of current yield may be different maximum yield for wellfield reported

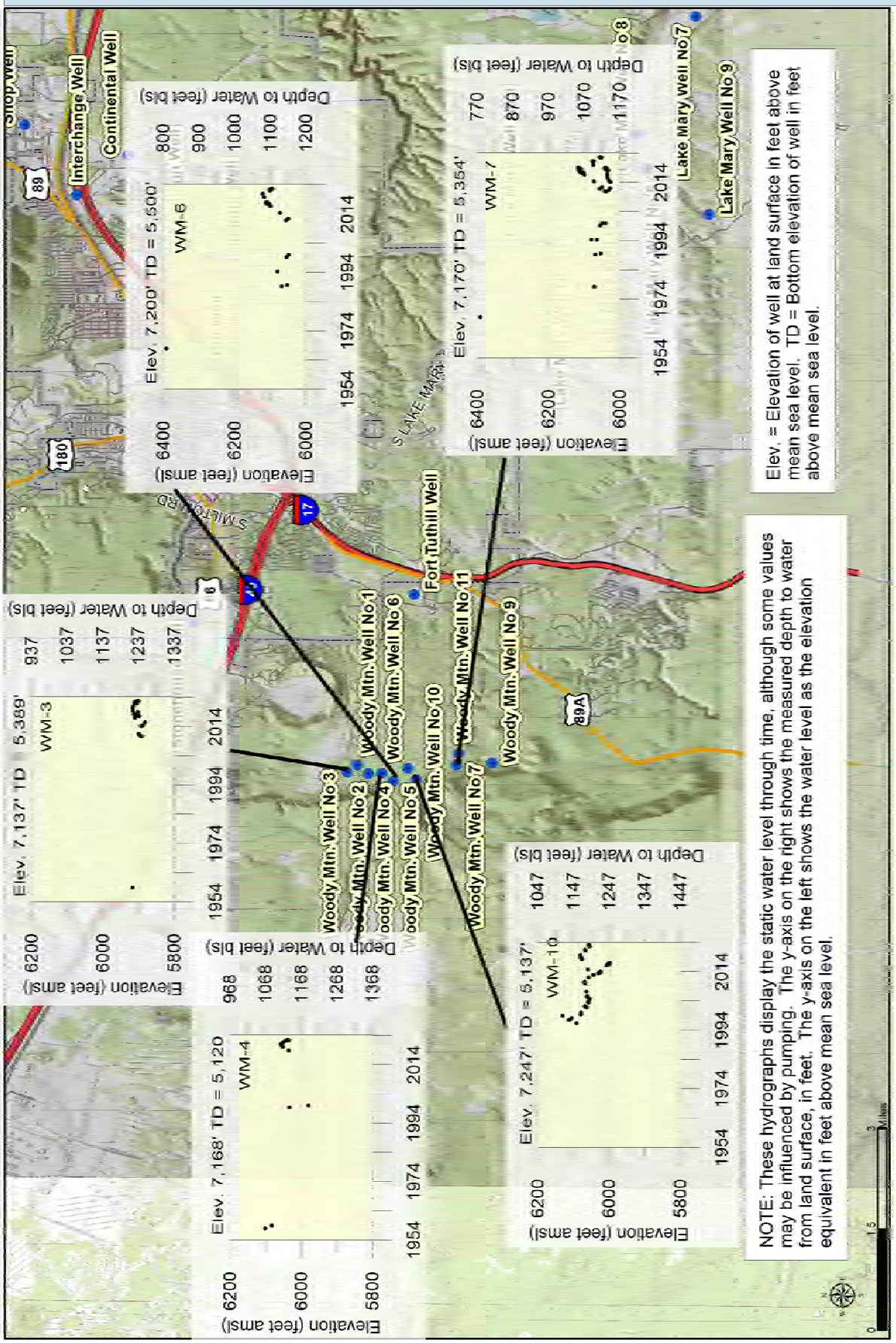
* value from a previous year - well not turned off in 2022

**averages from 2022 in SCADA exported data

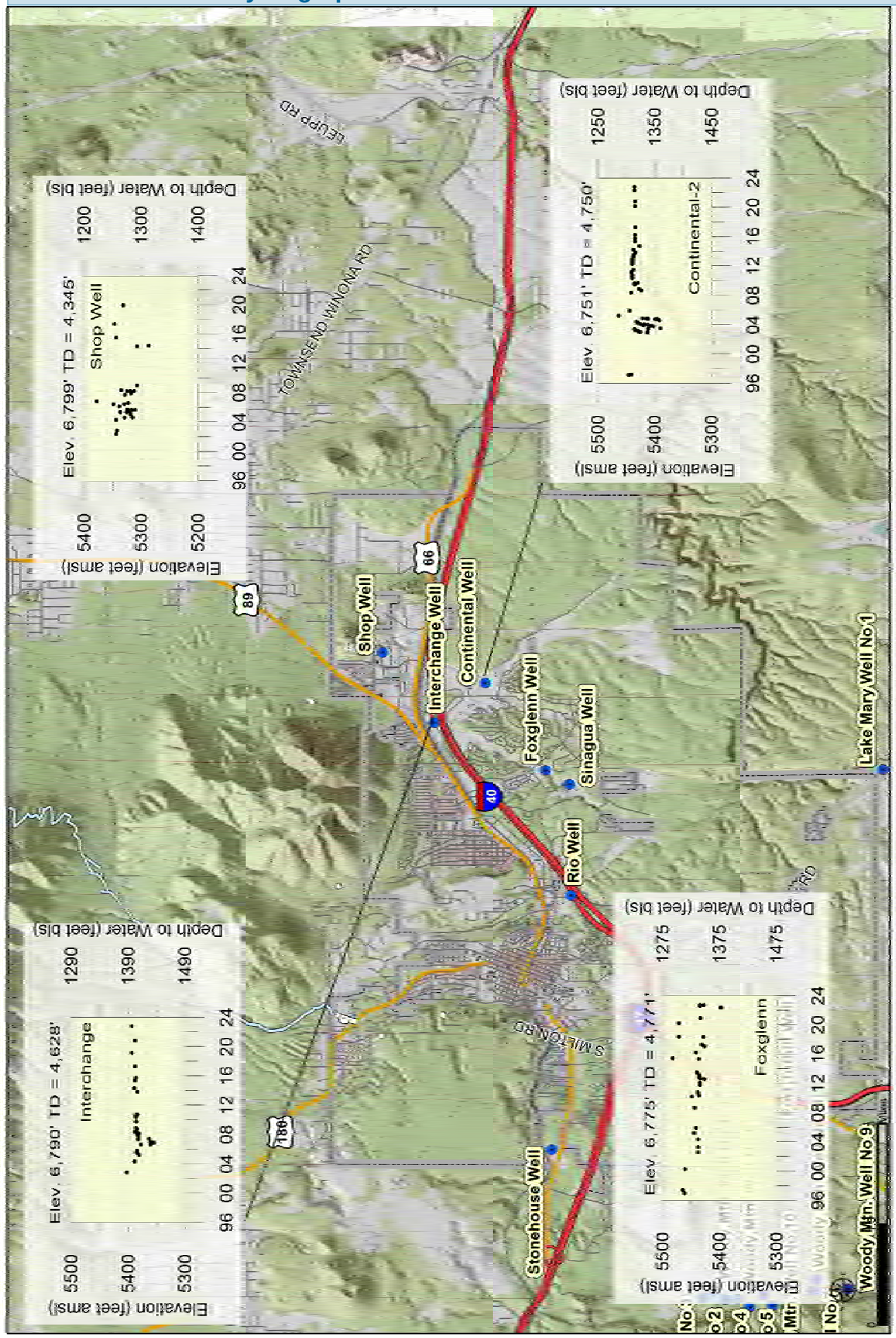
10-4 Water Level Hydrographs — Woody Mountain Wells



10-4 Water Level Hydrographs — Woody Mountain Wells



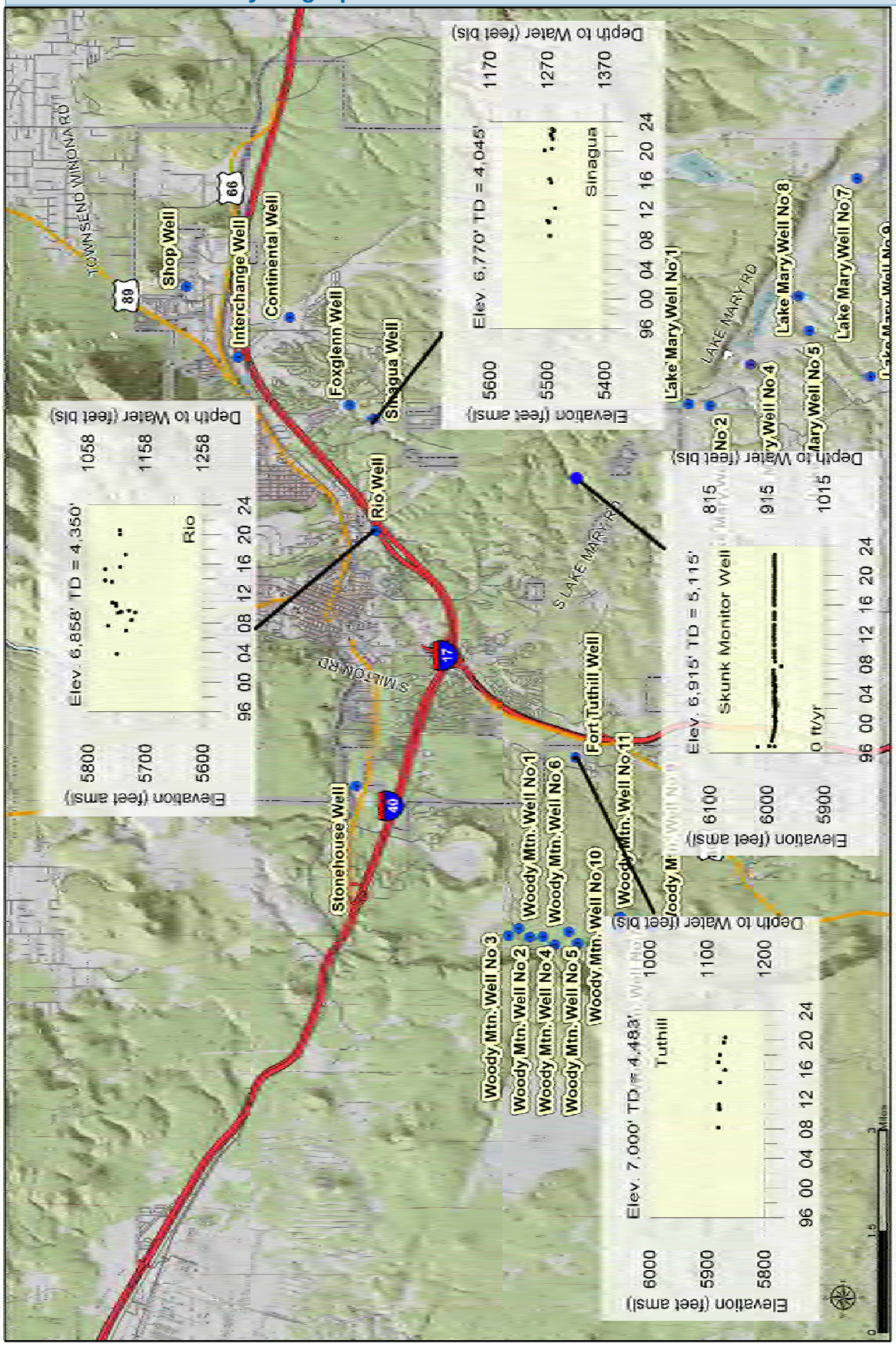
10-4 Water Level Hydrographs — Local Wells East



Elev. = Elevation of well at land surface in feet above mean sea level.
TD = Bottom elevation of well in feet above mean sea level.

NOTE: These hydrographs display the static water level through time, although some values may be influenced by pumping. The y-axis on the right shows the measured depth to water from land surface, in feet. The y-axis on the left shows the water level as the elevation equivalent in feet above mean sea level.

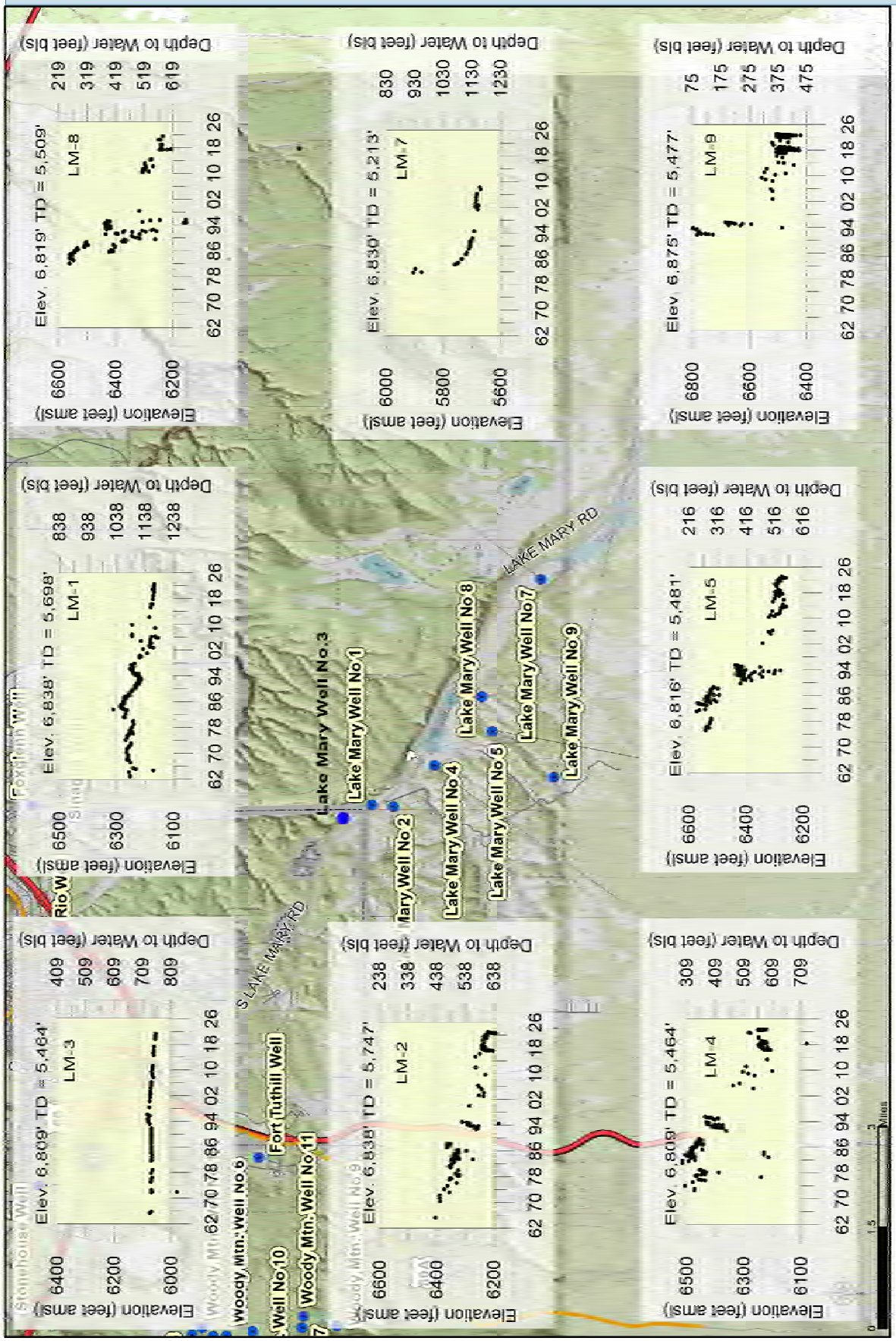
10-4 Water Level Hydrographs — Local Wells West



NOTE: These hydrographs display the static water level through time, although some values may be influenced by pumping. The y-axis on the right shows the measured depth to water from land surface, in feet. The y-axis on the left shows the water level as the elevation equivalent in feet above mean sea level.

Elev. = Elevation of well at land surface in feet above mean sea level.
TD = Bottom elevation of well in feet above mean sea level.

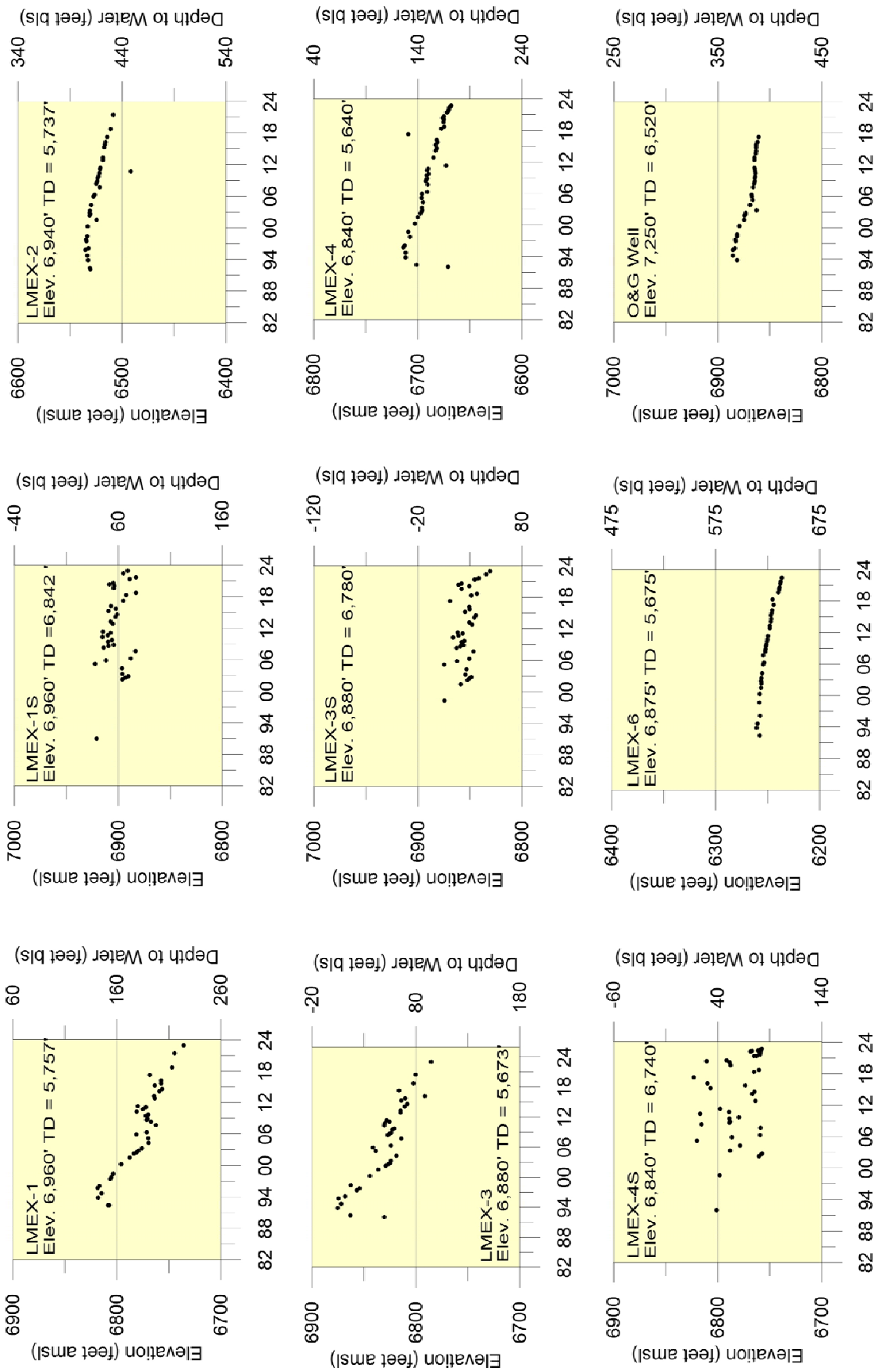
10-4 Water Level Hydrographs — Lake Mary Wells



NOTE: These hydrographs display the static water level through time, although some values may be influenced by pumping. The y-axis on the right shows the measured depth to water from land surface, in feet. The y-axis on the left shows the water level as the elevation equivalent in feet above mean sea level. The y-axis spread on all graphs is 400 feet.

Elev. = Elevation of well at land surface in feet above mean sea level.
TD = Bottom elevation of well in feet above mean sea level.

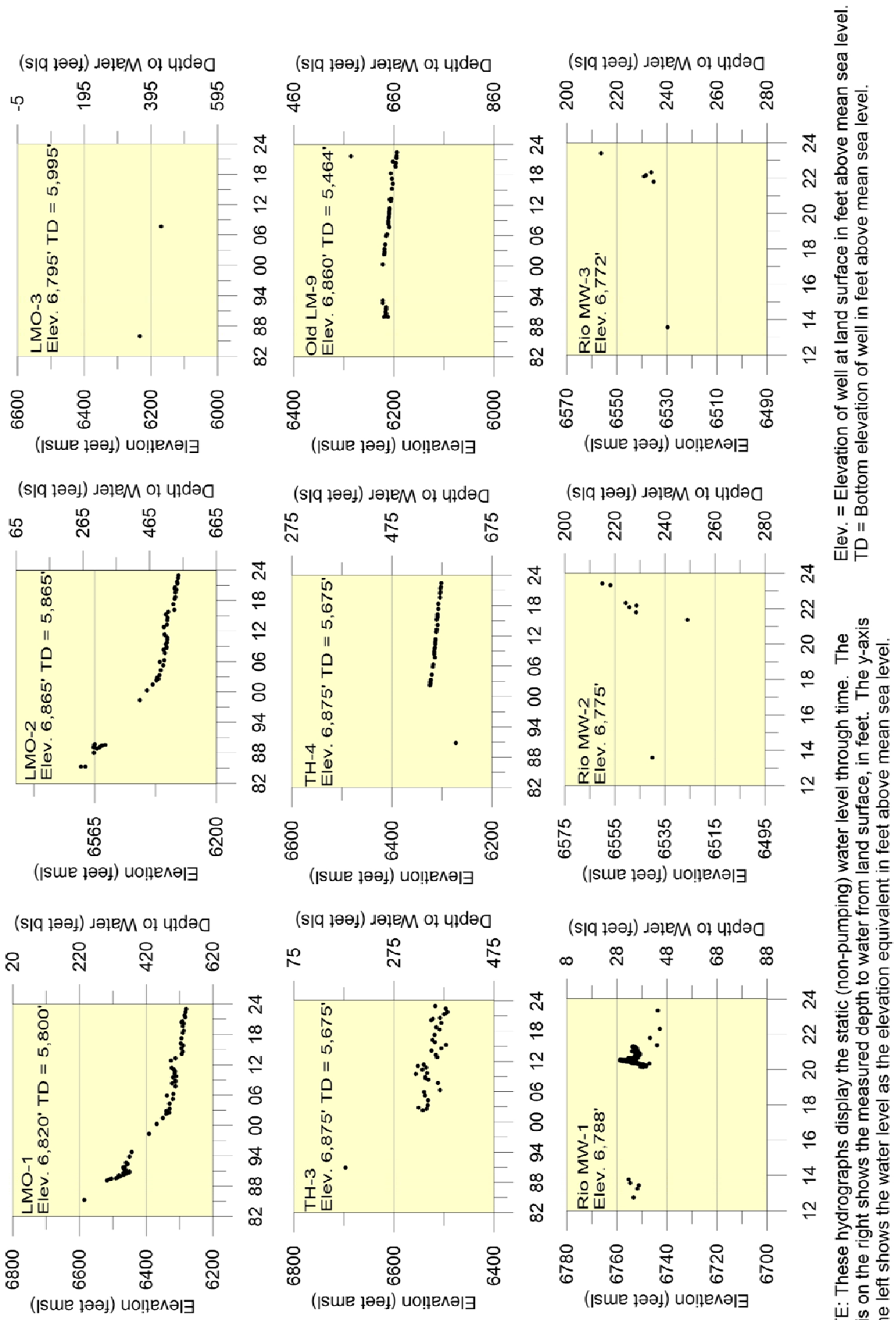
10-4 Water Level Hydrographs — Lake Mary Observation Wells



NOTE: These hydrographs display the static (non-pumping) water level through time. The y-axis on the right shows the measured depth to water from land surface, in feet. The y-axis on the left shows the water level as the elevation equivalent in feet above mean sea level.

Elev. = Elevation of well at land surface in feet above mean sea level.
TD = Bottom elevation of well in feet above mean sea level.

10-4 Water Level Hydrographs — Lake Mary & Rio de Flag Observation Wells



NOTE: These hydrographs display the static (non-pumping) water level through time. The y-axis on the right shows the measured depth to water from land surface, in feet. The y-axis on the left shows the water level as the elevation equivalent in feet above mean sea level.

Elev. = Elevation of well at land surface in feet above mean sea level.
TD = Bottom elevation of well in feet above mean sea level.

11 UPPER LAKE MARY WATERSHED DATA

11-1 Upper Lake Mary Monitoring at Newman Canyon—2022 Summary

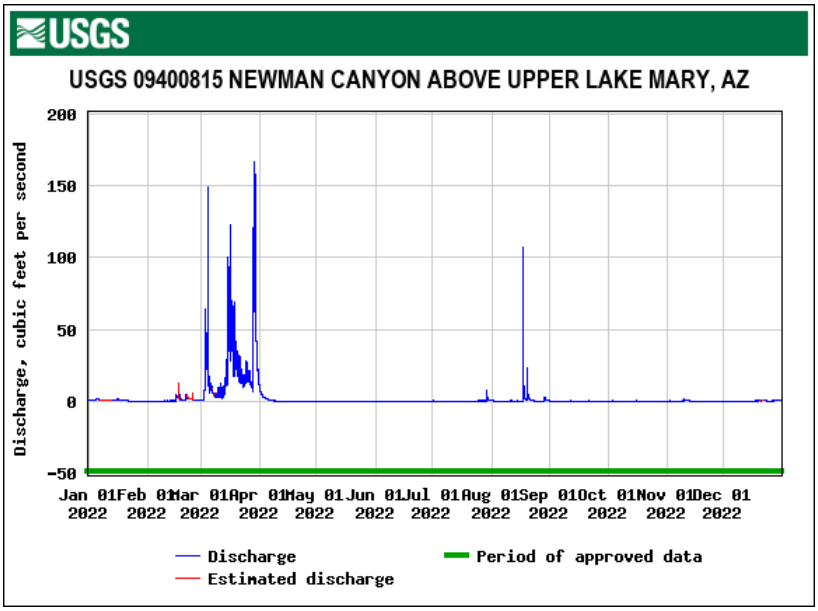
The Water Services Division, Flagstaff Watershed Protection Project & the Lake Mary—Walnut Canyon Technical Advisory Committee partnered with the US Geological Survey to install a stream flow gauge and sediment sampler in Newman Canyon in 2014. Newman Canyon is the largest tributary to Upper Lake Mary. Sediment and stream gauge data are available at *https://waterdata.usgs.gov/nwis.* A turbidity sensor was added to the site in January 2020.

The lake level was 22% full in January 2022, came up to 43% in March and was 21% full in December 2022.

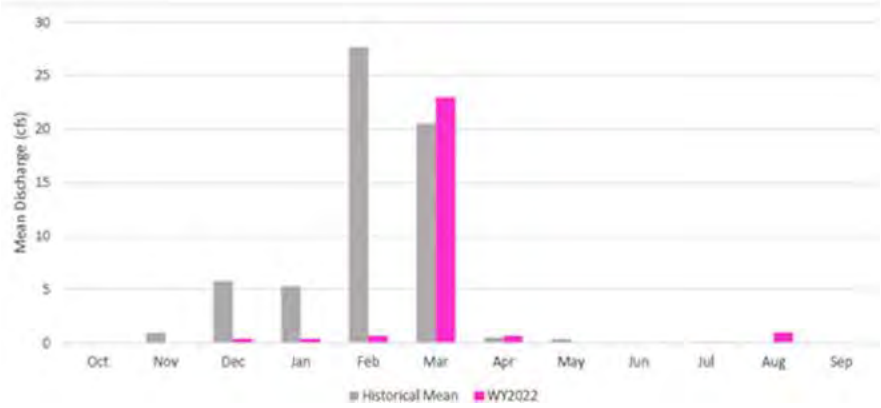
The following information is from an unpublished 2022 Water Year Annual Report provided by Kathryn Cooney and Kurt Schonauer, USGS Flagstaff Field Office.

The full report is available at *www.flagstaff.az.gov/3467/Upper-Lake-Mary-Watershed-Monitoring-Pro*

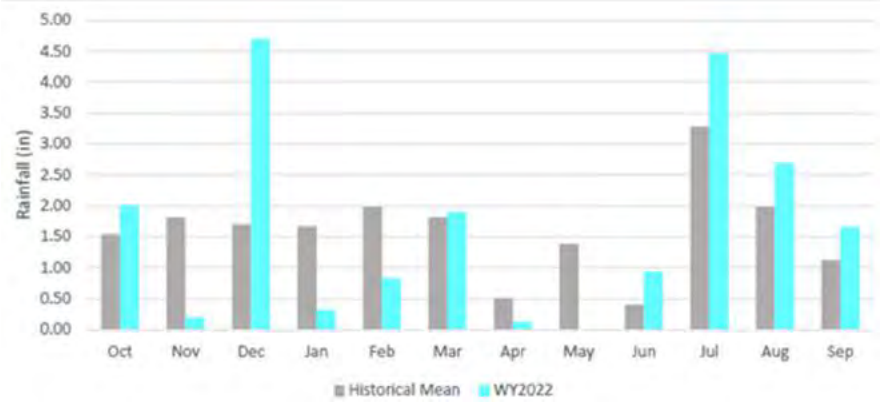
Flows this water year were intermediately dry with short durations of flow during rain, snow, or snowmelt events. October and November had zero flow, corresponding with historically low flows in the fall at this site. December, January, and February had mean flows under 1.0 cfs despite historical mean flows for those months being much higher. This could be due to a lack of precipitation required to sustain flows. December had more precipitation than average, but January and February had minimal recorded precipitation. During these winter months in WY 2022, only short-term bursts of flow were observed, with the longest duration of continuous flow between



2022 Water Year streamflow graph in cubic feet per second (cfs) from *https://waterdata.usgs.gov/nwis/rt?*



Historical monthly mean discharge (cfs) compared to WY2022 monthly mean discharge at Newman Canyon stream gauge.



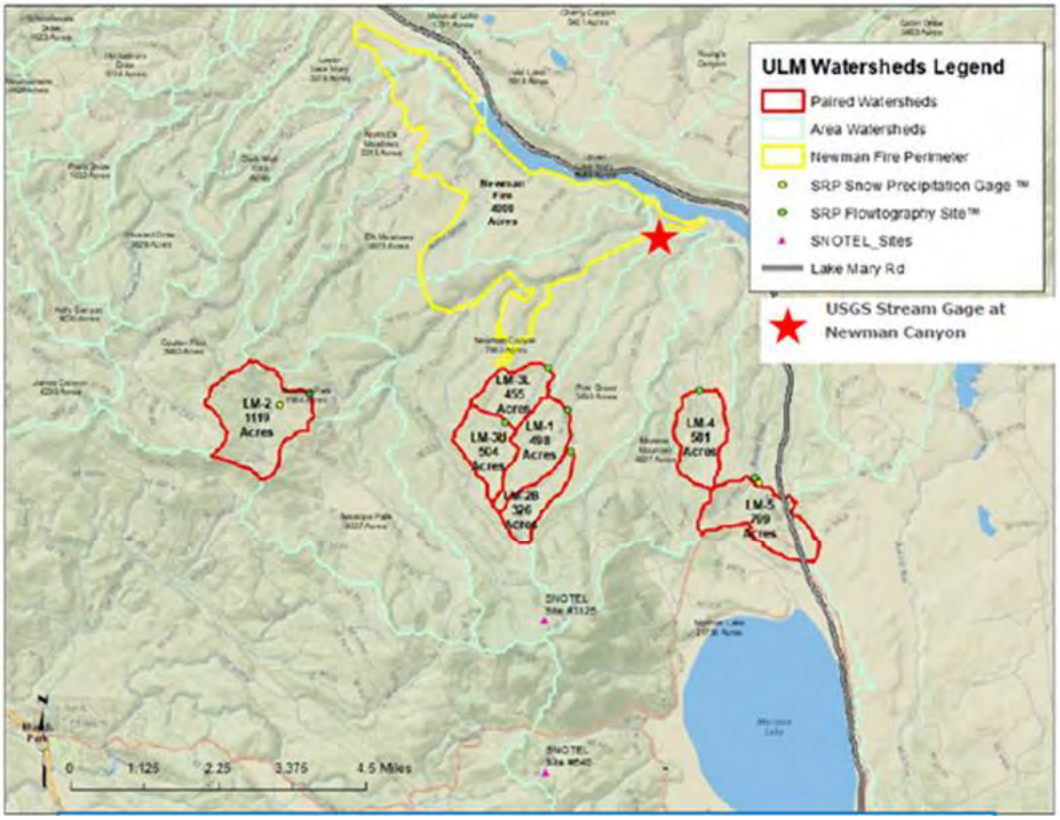
Historical monthly rainfall (in) compared to WY2022 monthly rainfall at Newman Canyon stream gauge.

December 24 and January 22 with a maximum discharge of 5.10 cfs. Flows picked up again on February 16 and were sustained until April 09 by three major high flow events reaching 149, 123, and 167 cfs. Continuous flow did not return at the site until July 27 and only lasted until August 2 with a peak of 7.2 cfs. Monsoons producing greater than average rainfall resulted in a high flow event from August 17 until August 24 with a peak of 107 cfs. Flows remained sporadic and intermittent for the remainder of the water year with minor short-term flows under 3cfs.

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
WY2016	3.6	3.25	1.3	1.2	0.45	1.1	1.01	3.14	1.02	4.19	3.56	2.15
WY2017	0.49	2.36	4.57	3.17	1.9	1.38	0.16	0.8	0.02	4.08	2.07	0.54
WY2018	0	0.02	0	1.04	2.21	0.88	0.07	0.64	1.26	3.81	3.16	0.96
WY2019	4.97	0.4	1.08	1.95	5.21	2.81	0.38	3.01	0.02	0.84	0.92	1.06
WY2020	0.15	3.71	2.89	0.51	1.36	2.8	1.06	0.17	0	1.78	0.47	0.02
WY2021	0.05	1.15	0.32	2.13	0.73	1.93	0.35	0.53	0.07	4.97	1.72	1.99
WY2022	2.01	0.2	4.7	0.31	0.83	1.9	0.12	0	0.93	4.47	2.69	1.65

Monthly total rainfall (in) from October 2015 through September 2022 (WY 2016 – WY2022). Data was pulled from Aquarius using “Rainfall since last reading” plots.

11-2 Upper Lake Mary Watershed Monitoring Program Update



The City was recently awarded a grant from the National Park Service to assemble a baseline hydrology report to summarize data collected under the program and data available within the watershed. This report was completed by Water Services Technician Mallory Rakowski as a draft in July 2022, and is available at the monitoring program website for download *https://flagstaff.az.gov/3467/Upper-Lake-Mary-Watershed-Monitoring-Pro.* The report includes a summary of the program background, a summary of available hydrological data, and a summary of data collected by the City and the Salt River Project since the program’s inception in 2014.

11-3 Upper Lake Mary Monthly Water Level History, Jan 1960—Dec 2022

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1960	14.5%	13.4%	12.0%	46.9%	42.8%	38.2%	33.5%	28.2%	26.2%	22.7%	21.2%	19.2%
1961	17.3%	16.0%	14.5%	22.5%	20.7%	17.3%	14.3%	12.7%	11.1%	9.2%	8.0%	7.2%
1962	6.5%	6.0%	34.9%	65.8%	67.5%	61.9%	54.8%	49.2%	42.8%	39.1%	35.4%	32.5%
1963	30.3%	27.9%	25.9%	23.3%	21.0%	17.5%	14.5%	12.3%	11.7%	10.1%	8.4%	7.1%
1964	6.6%	5.5%	4.9%	10.9%	24.2%	20.7%	17.3%	16.0%	13.8%	11.9%	9.6%	9.0%
1965	8.4%	21.0%	25.3%	42.8%	85.2%	80.8%	71.2%	66.9%	61.9%	56.2%	52.0%	79.1%
1966	106.1%	101.7%	98.5%	106.1%	96.8%	87.5%	79.7%	72.4%	65.4%	59.1%	53.4%	49.7%
1967	100.4%	95.5%	89.1%	83.6%	81.4%	73.7%	65.0%	63.7%	61.0%	55.3%	50.2%	45.5%
1968	44.1%	41.1%	61.9%	90.8%	98.5%	85.8%	78.0%	72.4%	65.9%	61.0%	55.9%	50.4%
1969	48.1%	86.3%	84.2%	100.0%	96.7%	88.5%	81.1%	74.9%	69.8%	65.4%	59.2%	55.9%
1970	52.2%	47.3%	46.4%	55.4%	56.8%	49.0%	42.5%	38.7%	35.2%	44.7%	39.1%	36.0%
1971	33.3%	29.3%	26.6%	26.0%	21.5%	18.2%	13.7%	11.3%	10.7%	9.4%	11.3%	10.2%
1972	37.6%	34.8%	32.6%	28.6%	25.7%	22.4%	19.7%	17.4%	16.1%	15.0%	64.4%	64.9%
1973	68.8%	66.4%	69.3%	87.4%	100.0%	98.9%	87.4%	82.1%	73.9%	65.9%	61.0%	55.4%
1974	51.3%	48.6%	45.1%	45.1%	39.6%	31.8%	25.3%	22.4%	17.7%	14.1%	11.7%	9.1%
1975	7.4%	5.0%	8.0%	23.5%	37.6%	34.1%	29.7%	27.6%	23.5%	21.5%	17.9%	16.1%
1976	13.7%	10.2%	33.3%	49.0%	62.5%	58.7%	50.9%	46.0%	40.0%	36.8%	32.6%	29.0%
1977	26.3%	23.5%	21.5%	18.6%	17.4%	13.9%	11.0%	8.0%	5.4%	3.1%	2.9%	2.5%
1978	2.3%	2.6%	57.3%	100.0%	96.2%	87.9%	77.5%	71.4%	64.9%	58.2%	54.0%	64.6%
1979	100.0%	97.3%	92.9%	100.0%	100.0%	94.5%	84.2%	76.5%	67.4%	60.1%	55.4%	51.3%
1980	47.7%	53.6%	100.0%	100.0%	100.0%	91.8%	84.2%	77.0%	67.4%	61.0%	55.4%	50.9%
1981	47.3%	42.1%	38.3%	37.6%	38.7%	32.6%	28.0%	22.6%	19.9%	17.7%	15.0%	13.3%
1982	12.5%	12.7%	39.6%	100.0%	95.9%	87.4%	78.0%	70.3%	66.4%	62.5%	55.9%	67.4%
1983	84.2%	82.6%	100.0%	100.0%	100.0%	94.0%	85.3%	78.5%	72.9%	82.1%	78.5%	76.0%
1984	90.7%	89.6%	85.3%	79.5%	74.4%	68.3%	59.2%	54.5%	51.3%	46.0%	42.9%	38.7%
1985	43.4%	41.2%	50.9%	100.0%	100.0%	91.8%	78.0%	69.8%	61.5%	59.2%	58.2%	60.1%
1986	56.8%	65.9%	84.2%	78.0%	70.9%	62.9%	56.8%	54.0%	51.8%	58.7%	52.7%	49.5%
1987	46.0%	56.8%	84.7%	86.9%	80.6%	70.9%	62.0%	55.9%	50.9%	44.7%	46.0%	42.5%
1988	37.6%	48.3%	50.4%	61.0%	54.5%	46.0%	38.7%	33.7%	31.5%	24.7%	22.9%	21.5%
1989	21.0%	25.7%	34.4%	31.6%	30.6%	23.2%	21.3%	19.7%	17.9%	16.7%	15.4%	15.2%
1990	15.0%	15.0%	19.2%	18.1%	17.2%	14.5%	14.1%	13.1%	13.0%	12.5%	12.2%	12.2%
1991	12.2%	13.7%	29.0%	51.8%	61.0%	53.6%	47.3%	40.4%	33.3%	28.6%	24.7%	21.3%
1992	21.0%	21.0%	41.6%	68.3%	65.9%	63.4%	55.6%	50.4%	47.7%	41.2%	38.3%	36.8%
1993	62.0%	100.0%	100.0%	100.0%	94.5%	87.4%	80.0%	71.4%	67.4%	59.2%	54.5%	52.7%
1994	48.6%	44.2%	46.4%	55.9%	58.2%	52.7%	42.5%	36.8%	32.9%	29.3%	26.3%	25.3%
1995	25.3%	25.3%	100.0%	96.7%	97.3%	90.7%	81.6%	74.9%	69.8%	65.9%	62.5%	56.3%
1996	53.6%	50.0%	46.0%	40.8%	36.4%	30.4%	26.3%	24.7%	22.6%	21.3%	19.9%	19.2%
1997	18.4%	23.2%	25.0%	44.7%	48.6%	43.8%	38.3%	33.3%	30.4%	28.3%	25.3%	22.9%
1998	21.8%	26.0%	20.7%	69.8%	91.2%	83.1%	73.4%	66.9%	56.8%	55.4%	51.3%	46.0%
1999	42.5%	40.0%	37.6%	37.2%	37.2%	33.7%	31.8%	30.1%	28.6%	40.0%	35.6%	32.9%
2000	30.4%	29.3%	48.6%	32.6%	31.8%	26.3%	21.8%	20.7%	17.9%	18.9%	18.9%	18.9%
2001	15.7%	15.9%	18.4%	37.6%	37.6%	34.1%	30.1%	27.1%	25.3%	24.1%	23.2%	21.5%
2002	19.2%	18.4%	17.4%	16.7%	15.2%	13.0%	11.4%	10.7%	9.4%	9.3%	8.9%	8.9%
2003	8.9%	8.6%	21.5%	38.7%	34.1%	32.2%	28.3%	28.0%	28.3%	27.3%	25.7%	26.3%
2004	26.3%	25.7%	26.0%	39.6%	36.8%	32.9%	28.3%	26.3%	25.3%	23.8%	22.9%	29.4%
2005	64.4%	100.6%	100.6%	100.6%	98.9%	91.2%	83.7%	76.0%	72.4%	66.9%	62.9%	58.2%
2006	54.5%	51.3%	48.1%	47.3%	43.9%	39.0%	35.2%	31.8%	29.7%	27.3%	25.3%	23.2%
2007	22.1%	21.5%	21.3%	20.7%	18.9%	17.2%	14.7%	13.7%	13.0%	11.9%	11.1%	11.6%
2008	24.6%	38.9%	55.3%	101.1%	97.7%	84.8%	76.1%	72.6%	70.3%	65.2%	61.7%	59.2%
2009	57.1%	56.2%	71.4%	75.2%	69.4%	62.2%	54.3%	49.1%	42.3%	38.0%	34.5%	31.5%
2010	30.3%	31.0%	31.8%	86.5%	99.4%	90.4%	82.1%	77.3%	70.3%	63.7%	59.2%	54.3%
2011	49.1%	52.8%	65.2%	60.7%	53.4%	46.4%	41.4%	36.1%	33.3%	31.4%	29.9%	28.6%
2012	28.6%	27.2%	26.9%	37.3%	35.3%	29.5%	25.0%	23.3%	22.7%	21.1%	19.2%	18.6%
2013	18.2%	29.0%	29.9%	42.3%	38.9%	34.4%	29.1%	28.2%	28.2%	35.7%	32.9%	32.1%
2014	28.6%	27.4%	40.2%	37.2%	33.7%	28.6%	25.6%	27.0%	27.0%	26.0%	24.0%	23.0%
2015	24.0%	32.0%	66.0%	66.0%	62.0%	57.0%	52.0%	48.0%	44.0%	42.0%	42.0%	43.0%
2016	42.0%	48.0%	55.0%	51.0%	50.0%	46.0%	41.0%	39.0%	36.0%	33.0%	31.0%	33.0%
2017	57.0%	82.0%	102.0%	98.0%	92.0%	82.0%	79.0%	75.0%	70.0%	66.0%	62.0%	58.0%
2018	54.3%	52.4%	48.1%	44.6%	39.7%	33.7%	31.4%	28.2%	25.6%	24.6%	22.9%	21.8%
2019	25.2%	72.6%	101.7%	96.1%	91.0%	83.7%	77.3%	70.9%	66.7%	62.2%	60.7%	68.2%
2020	67.0%	69.0%	90.0%	86.0%	79.0%	72.0%	67.0%	60.0%	55.0%	51.0%	47.0%	45.0%
2021	43.3%	41.5%	41.0%	37.3%	33.7%	30.0%	28.9%	26.6%	24.4%	23.3%	22.1%	22.7%
2022	21.8%	21.3%	34.5%	32.2%	28.9%	26.0%	24.7%	24.4%	22.9%	21.8%	21.3%	20.8%
Historic Average	38.0%	41.4%	50.5%	59.8%	59.8%	53.9%	48.0%	43.9%	40.3%	37.9%	36.0%	35.1%
Historic Median	30.4%	34.8%	45.1%	51.8%	56.8%	49.0%	42.5%	38.7%	33.3%	35.7%	32.9%	32.1%
Historic Low	2.3%	2.6%	4.9%	10.9%	15.2%	13.0%	11.0%	8.0%	5.4%	3.1%	2.9%	2.5%
Historic High	106.1%	101.7%	102.0%	106.1%	100.0%	98.9%	87.4%	82.1%	73.9%	82.1%	78.5%	79.1%
5 year low	21.8%	21.3%	34.5%	32.2%	28.9%	26.0%	24.7%	24.4%	22.9%	21.8%	21.3%	20.8%
5 year high	67.0%	72.6%	101.7%	96.1%	91.0%	83.7%	77.3%	70.9%	66.7%	62.2%	60.7%	68.2%
5 year average	42.3%	51.4%	63.1%	59.2%	54.4%	49.1%	45.9%	42.0%	38.9%	36.6%	34.8%	35.7%

11-4 Upper Lake Mary Inflow Report & Predicted Water Budget 1970-2023

YEAR	LOWEST LEVEL OCT-APRL	DATE	HIGHEST LEVEL SPRING	DATE	RUN-OFF GAIN	TOTAL YEARLY LOSS %	SURFACE WATER PROD (MG)	SW PROD LOSS OF LAKE	EVAP/SEEPAGE LOSS OF LAKE	CALENDAR YR PRECIP INCHES	SNOW SEASON, OCT-APRL
1970	46.4%	3/6/1970	56.8%	5/1/1970	10.4%	-27.5%	1044.86	-20.52%	-6.98%	24.02	95.70
1971	29.3%	2/5/1971	29.3%	2/5/1971	0.0%	-19.1%	847.34	-16.64%	-2.46%	21.01	56.60
1972	10.2%	12/3/1971	37.6%	1/7/1972	27.4%	-22.6%	636.40	-12.50%	-10.10%	24.67	50.30
1973	15.0%	10/6/1972	100.0%	5/4/1973	85.0%	-51.4%	1171.30	-23.01%	-28.39%	19.71	210.00
1974	48.6%	2/1/1974	48.6%	2/1/1974	0.0%	-43.6%	1303.22	-25.60%	-18.00%	17.41	70.00
1975	5.0%	2/7/1975	37.6%	5/2/1975	32.6%	-27.4%	720.08	-14.14%	-13.26%	20.10	141.10
1976	10.2%	2/6/1976	62.5%	5/7/1976	52.3%	-39.0%	1113.08	-21.86%	-17.14%	20.12	131.60
1977	23.5%	2/4/1977	23.5%	2/4/1977	0.0%	-21.2%	849.49	-16.69%	-4.51%	18.77	70.20
1978	2.3%	1/6/1978	100.0%	4/7/1978	97.7%	-46.0%	897.60	-17.63%	-28.37%	30.72	116.30
1979	54.0%	11/3/1978	100.0%	5/4/1979	46.0%	-52.3%	1232.64	-24.21%	-28.09%	19.68	145.50
1980	47.7%	1/4/1980	100.0%	5/2/1980	52.3%	-61.6%	1259.06	-24.73%	-36.87%	29.30	177.10
1981	38.4%	3/6/1981	38.7%	5/1/1981	0.3%	-26.2%	1078.16	-21.18%	-5.02%	23.37	92.40
1982	12.5%	1/8/1982	100.0%	4/2/1982	87.5%	-44.1%	1230.27	-24.17%	-19.93%	31.09	121.60
1983	55.9%	11/5/1982	100.0%	5/6/1983	44.1%	-24.0%	942.45	-18.51%	-5.49%	29.47	142.60
1984	76.0%	12/2/1983	90.7%	1/6/1984	14.7%	-52.0%	902.66	-17.73%	-34.27%	20.09	32.00
1985	38.7%	12/7/1984	100.0%	5/3/1985	61.3%	-43.2%	1479.67	-29.06%	-14.14%	26.67	136.00
1986	56.8%	1/24/1986	84.2%	3/28/1986	27.4%	-38.3%	1380.27	-27.11%	-11.19%	32.39	105.40
1987	45.9%	1/30/1987	86.9%	4/25/1987	41.0%	-49.3%	1857.80	-36.49%	-12.81%	23.98	121.60
1988	37.6%	1/24/1988	61.0%	4/28/1988	23.4%	-40.3%	1789.80	-35.16%	-5.14%	21.68	104.50
1989	20.7%	2/23/1989	34.8%	3/30/1989	14.1%	-19.6%	116.00	-2.28%	-17.32%	14.44	77.70
1990	15.2%	1/11/1990	19.2%	3/29/1990	4.0%	-7.1%	33.00	-0.65%	-6.45%	25.67	113.40
1991	12.1%	12/5/1990	63.4%	4/11/1991	51.3%	-42.4%	1144.50	-22.48%	-19.92%	21.83	127.90
1992	21.0%	1/30/1992	70.3%	4/9/1992	49.3%	-33.5%	981.60	-19.28%	-14.22%	34.71	158.90
1993	36.8%	12/28/1992	100.0%	4/15/1993	63.2%	-54.9%	1345.90	-26.44%	-28.46%	35.60	149.70
1994	45.1%	2/24/1994	58.7%	5/1/1994	13.6%	-34.9%	1117.30	-21.95%	-12.95%	21.91	149.20
1995	23.8%	2/12/1995	100.0%	4/27/1995	76.2%	-51.4%	1107.90	-21.76%	-29.64%	17.79	99.10
1996	48.6%	2/8/1996	48.6%	2/8/1996	0.0%	-30.2%	619.25	-12.16%	-18.04%	11.81	28.50
1997	18.4%	1/1/1997	51.8%	4/17/1997	33.4%	-30.9%	581.33	-11.42%	-19.48%	15.61	107.50
1998	20.9%	2/19/1998	90.7%	4/27/1998	69.8%	-53.5%	1095.90	-21.53%	-31.97%	27.30	136.70
1999	37.2%	4/1/1999	41.6%	4/15/1999	4.4%	-13.8%	386.62	-7.59%	-6.21%	15.72	72.00
2000	27.8%	9/9/1999	34.8%	4/4/2000	7.0%	-19.1%	255.77	-5.0%	-14.08%	15.38	74.40
2001	15.7%	1/1/2001	38.5%	4/16/2001	22.8%	-21.8%	308.50	-6.1%	-15.74%	17.55	125.10
2002	16.7%	3/30/2002	16.7%	3/30/2002	0.0%	-8.1%	63.76	-1.3%	-6.84%	12.88	38.90
2003	8.6%	2/6/2003	40.4%	3/27/2003	31.8%	-15.7%	200.65	-3.9%	-11.73%	17.85	54.90
2004	24.7%	2/22/2004	40.4%	3/26/2004	15.7%	-18.3%	293.58	-5.8%	-12.53%	23.61	48.10
2005	22.1%	10/20/2004	100.0%	4/7/2005	77.9%	-48.7%	1195.98	-23.5%	-25.20%	24.01	131.70
2006	51.3%	2/1/2006	51.3%	2/1/2006	0.0%	-30.6%	506.21	-9.9%	-20.66%	15.56	44.60
2007	20.7%	4/1/2007	20.7%	4/1/2007	0.0%	-10.2%	96.03	-1.8%	-8.4%	17.46	50.40
2008	10.5%	11/27/2007	100.0%	3/27/2008	89.47%	-45.7%	954.58	-17.94%	-27.76%	18.85	99.50
2009	54.3%	1/16/2009	76.7%	3/11/2009	22.40%	-47.2%	1220.04	-22.93%	-24.26%	11.65	86.00
2010	29.5%	1/8/2010	101.7%	4/11/2010	72.19%	-51.1%	1299.95	-24.44%	-26.66%	27.89	140.5
2011	50.6%	1/27/2011	65.8%	3/26/2011	15.19%	-38.9%	1113.185	-20.92%	-17.97%	20.67	88.4
2012	26.9%	3/8/2012	37.3%	3/27/2012	10.40%	-19.6%	304.513	-5.72%	-13.88%	14.89	102.9
2013	17.7%	1/16/2013	43.6%	3/21/2013	25.90%	-16.2%	512.476	-9.63%	-6.53%	24.79	69.7
2014	27.4%	2/28/2014	42.3%	3/8/2014	14.85%	-20.3%	338.17	-6.36%	-13.93%	20.67	44.4
2015	22.0%	12/31/2014	69.9%	3/17/2015	47.9%	-28.5%	604.13	-11.36%	-17.14%	27.25	62.9
2016	41.4%	10/9/2015	55.8%	3/3/2016	14.4%	-26.8%	529.53	-9.95%	-16.88%	25.8	78.3
2017	29.0%	12/16/2016	100.0%	4/6/2017	71.0%	-45.0%	580.86	-10.92%	-34.08%	18.00	96.5
2018	55.0%	4/19/2018	55.0%	4/19/2018	0.0%	-33.4%	694.63	-13.06%	-20.34%	21.58	38.0
2019	21.6%	1/10/2019	100.0%	3/7/2019	78.4%	-40.0%	734.99	-13.82%	-26.18%	26.1	118.7
2020	60.0%	11/19/2019	90.0%	3/31/2020	30.0%	-49.8%	1037.04	-19.49%	-30.28%	9.59	70.3
2021	40.2%	3/18/2021	41.0%	4/1/2021	0.8%	-19.0%	342.04	-6.43%	-12.55%	25.66	56.2
2022	22.0%	3/3/2022	35.0%	4/6/2022	13.0%	-14.1%	144.35	-2.71%	-11.39%	18.47	163.1
2023	20.9%	12/31/2022	100.0%	3/22/2023	79.1%	-50.0%	850	-15.98%	-34.02%		
2024	50.0%										
Historic Average %	30.1%		64.9%		34.7%	-33.9%	816	-15.9%	-18.6%	22	98
5 yr. average	41%		77%		36%	-37%	715.41	-13%	-26%	20.21	75.94

NOTES

Evaporation accounts for ~20% of total loss

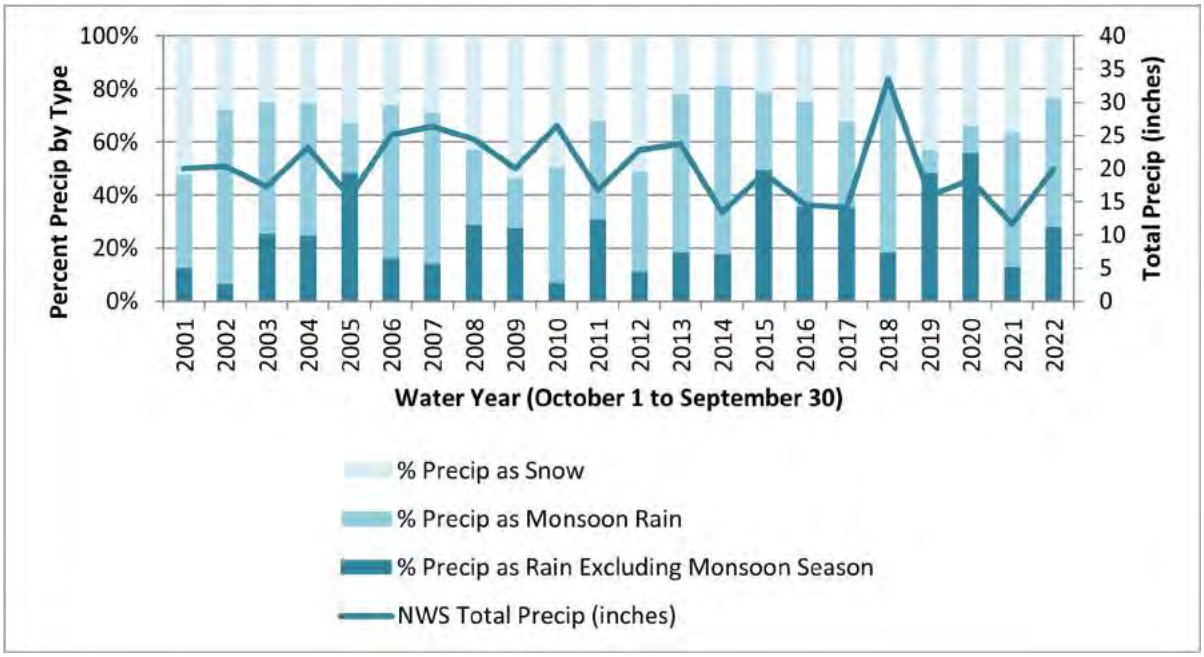
Bold=low level occurred in fall of previous year

Cells highlighted in red are projected to determine approximate evaporation loss for coming year.

Surface water production is in million gallons.

11-5 Precipitation Trends

Water Services is interested in snowpack and summer precipitation patterns to inform our understanding of how precipitation in general influences aquifer recharge and overland runoff into Upper Lake Mary. The graph below shows the water-year precipitation received as a rain to snow relationship for the past 22 years. Water years 18-19 and 19-20 were record setting dry monsoon years (the "non-soon"). As indicated in the bar graph, very little precipitation was received as rain during monsoon season. Water Services will incorporate these and other climate data and projections into its next Water Resources Master Plan. Data converted to determine rain/snow ratio assumes 1" of rain is equal to 12" of snow. The 2022 water year period of record was updated based on records from 2000-2023 at National Weather Service Pulliam Airport.



Water Year Average	NWS Snow (inches)	NWS Monsoon Rainfall (inches)	NWS Total Precip (inches)	Non-Monsoon Rain converted (calculated)	Total Rain converted (inches)	Snow as precip converted (inches)	% Precip as Rain Excluding Monsoon Season	% Precip as Snow	% Precip as Monsoon Rain
WY 22	56.20	9.75	20.03	5.60	15.35	4.68	28%	23%	49%
WY 21	88.90	10.30	20.38	2.67	12.97	7.41	13%	36%	51%
WY 20	70.30	1.78	17.31	9.67	11.45	5.86	56%	34%	10%
WY 19	118.70	2.08	23.17	11.20	13.28	9.89	48%	43%	9%
WY 18	38.00	9.59	15.67	2.91	12.50	3.17	19%	20%	61%
WY 17	96.50	8.19	25.07	8.84	17.03	8.04	35%	32%	33%
WY 16	78.30	10.47	26.31	9.32	19.79	6.53	35%	25%	40%
WY 15	62.90	7.06	24.42	12.13	19.18	5.24	50%	21%	29%
WY 14	44.40	12.73	19.98	3.55	16.28	3.70	18%	19%	64%
WY 13	69.70	15.67	26.39	4.91	20.58	5.81	19%	22%	59%
WY 12	102.90	6.30	16.73	1.86	8.16	8.58	11%	51%	38%
WY 11	88.40	8.43	22.82	7.02	15.45	7.37	31%	32%	37%
WY 10	140.50	10.29	23.71	1.71	12.00	11.71	7%	49%	43%
WY 09	86.00	2.51	13.38	3.70	6.21	7.17	28%	54%	19%
WY 08	99.50	5.44	19.27	5.54	10.98	8.29	29%	43%	28%
WY 07	50.40	8.32	14.59	2.07	10.39	4.20	14%	29%	57%
WY 06	44.60	8.14	14.14	2.28	10.42	3.72	16%	26%	58%
WY 05	131.70	6.38	33.49	16.14	22.52	10.98	48%	33%	19%
WY 04	48.10	7.94	15.90	3.95	11.89	4.01	25%	25%	50%
WY 03	54.90	9.05	18.33	4.71	13.76	4.58	26%	25%	49%
WY 02	38.90	7.61	11.63	0.78	8.39	3.24	7%	28%	65%
WY 01	125.10	6.94	19.88	2.52	9.46	10.43	13%	52%	35%

12 WATER CONSERVATION

12-1 Program Overview & 2022 in Review

In 2022, the Water Conservation team implemented many water saving programs for residential and commercial customers across the Flagstaff community, with particular focus on WaterSense rebates and fixture retrofits. Staff provided rebates and retrofits for 253 tank toilets, 24 flush valve toilets, 1,472 faucet aerators, 632 showerheads, 9 urinals, and 8 faucets through this program.

Outreach Programs

In 2022, the Water Conservation team provided direct outreach to over 4,000 stakeholders across 53 public events, including 13 that took place during the annual Water Awareness Month campaign. Our team also continued our partnership with Arizona Project WET, through which we reached an additional 2,900 stakeholders.

In October, Water Conservation staff offered 134 insulating covers for outdoor hose bibbs to community members to help prevent outdoor leaks.

Rain Barrel Program

The Water Conservation team hosted 9 rainwater harvesting workshops in 2022, reaching 276 stakeholders. The workshops also included water efficient landscaping tips and free supplies to reduce indoor and outdoor water use. Water Conservation had its first volunteer event to make rain barrels last year during which 12 volunteers were able to make 68 rain barrels. This initiative saves significant staff time. A total of 250 community members requested rain barrels, and Water Conservation gave away 147 barrels and totes to the public.

K-12 School Retrofit Program

Water Conservation performed 5 school retrofits in our second year of this program, which provides $10,000 annually to implement water efficiency upgrades in Flagstaff's K-12 schools.

- Mountain School will save an estimated 12,800 gallons a year following the replacement of 10 toilet valves, 18 faucet aerators, and 3 leaky faucets.
- Haven School will save close to 15,000 gallons each year through the replacement of 2 leaky faucets and 11 faucet aerators.
- Flagstaff Junior Academy - Bonito campus will save an estimated 17,500 gallons per year through the replacement of 2 leaky faucets, 11 faucet aerators, and 12 showerheads.
- Ponderosa High School will save 5,000 gallons annually through the installation of 11 high efficiency aerators and the repair of an outdoor hose bibb leak.
- Flagstaff High School's retrofit is in progress and will include high efficiency toilets, showerheads, and faucet aerators.

12-1 Program Overview & 2022 in Review, continued

Innovation Funds

In 2022, the Water Conservation Program invested $1,500 to purchase low water use grass seed as part of our ongoing commitment to testing innovative water saving technologies in Flagstaff. 20 residential households agreed to test out the low water use seed (called Pearl's Premium), and will report back their experiences.

Water Conservation also invested in irrigation controllers that shut down an irrigation system when it is raining. Water Conservation will be providing these to community members who do an irrigation consultation.

Commercial Consultations

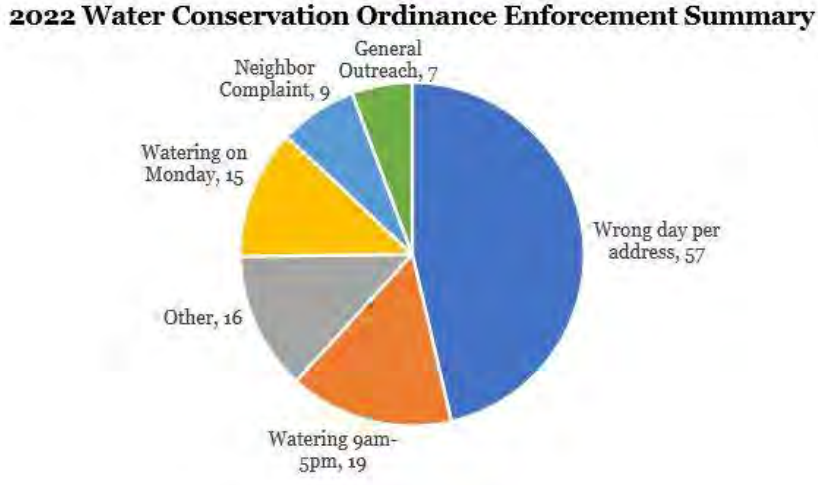
Water Conservation partnered with two hotels in 2022, retrofitting 99 rooms as well as staff restroom and kitchen areas. Additional hotels were recruited through these projects and will be undergoing retrofits in 2023.

Residential Consultations

Water Conservation staff did 16 residential consultations and another 30 outdoor consultations for the Low Water Landscape Program in 2022. Water Conservation staff launched an irrigation consultation program in late summer 2022 and will expand the offering in 2023.

12-2 Water Conservation Code Enforcement Summary

Water Conservation staff performed 123 interactions with customers regarding the Water Conservation Ordinance in 2022. The violations and interactions by type are included in the pie chart below.



12-3 Partnerships & Events

4th Grade Water Festival & Project WET Partnership

Our partnership with Arizona Project WET was secured with a five-year IGA in 2021. The Water Conservation Program will pay up to $15,000 annually for Project WET to implement the annual 4th Grade Water Festival as well as to provide other water-based education to Flagstaff's K-12 schools.

Summary of Annual 4th Grade Water Festival Outreach

	2022	2021	2020	2019	2018	2017	2016	2015
Schools	11	6	9	9	14	14	12	10
4th Grade Classes	32	20	24	30	37	36	32	28
4th Grade Students	693	443	542	736	918	908	849	735
Teachers	32	20	25	30	36	35	67	28
Teacher Training Hours	70	14	154	56	84	70	14	35
Parent Volunteers	61	25	N/A	24	90	73	88	68
Festival Volunteers	115	60	N/A	80	82	70	15	32

	2014	2013	2012	2008	2007	2006	2005
Schools	ND	11	10	17	15	17	17
4th Grade Classes	ND	26	22	38	36	39	37
4th Grade Students	1080	667	538	923	862	932	887
Teachers	39	28	47	42	36	40	40
Teacher Training Hours	119	7	190	111	228	272	80
Parent Volunteers	156	65	0	80	35	90	30
Festival Volunteers	60+	37	40	68	59	59	148

Water Awareness Month

Staff hosted 21 events throughout Water Awareness Month this year, reaching approximately 1,500 people. Events included:

- Downtown Water Conservation Scavenger Hunt
- First Friday Art Walk
- Lake Mary Water Treatment Plant Tour (pictured)
- Water Energy Nexus talk at Bright Side Bookshop
- Earth Day Festival
- Flagstaff's Water Resources talk at the East Flagstaff Community Library
- Full STEAM Ahead

12-4 Drought Preparedness—Water Availability Strategies

STRATEGY I **Water Awareness: In effect when water demand is equal to or less than safe production capability.**

1. Implements Odd/Even Watering Schedule; Odd addresses are allowed to water T, Th, and Sa, even addresses on W, F, Su. No watering Mondays. Watering by hand allowed any day of the week. No watering between 9 a.m. and 5 p.m.
2. Prohibits unauthorized use of fire hydrants
3. Prohibits wasting water
4. Prohibits golf courses from irrigating with potable water
5. Provides for new landscape permits

STRATEGY II **Water Emergency: In effect when water demand exceeds safe production capability for five (5) consecutive days.**

1. Continue rules established by Strategy I
2. New landscape permits not issued
3. Adds vehicle washing to watering schedule (exception for commercial car washes)
4. Prohibits washing buildings and paved areas
5. Prohibits filling fountains, ponds, pools with potable water
6. Prohibits use of potable water for construction activity
7. Implements Drought Rate Structure
    - Single-Family Residential: Water Consumption between 6,401 and 11,700 gallons billed at 150% the established rate. Water Consumption in excess of 11,700 gallons billed at 200% the established rate.
    - Multi-Family, Commercial, Industrial, and Institutional: Billed at 120% the established rate.
    - Standpipes: Billed at 130% the established rate. Use limited to 25-mile radius.

STRATEGY III **Water Crisis: In effect when water demand exceeds total production capability, and the amount of water in storage may impair fire protection for the City.**

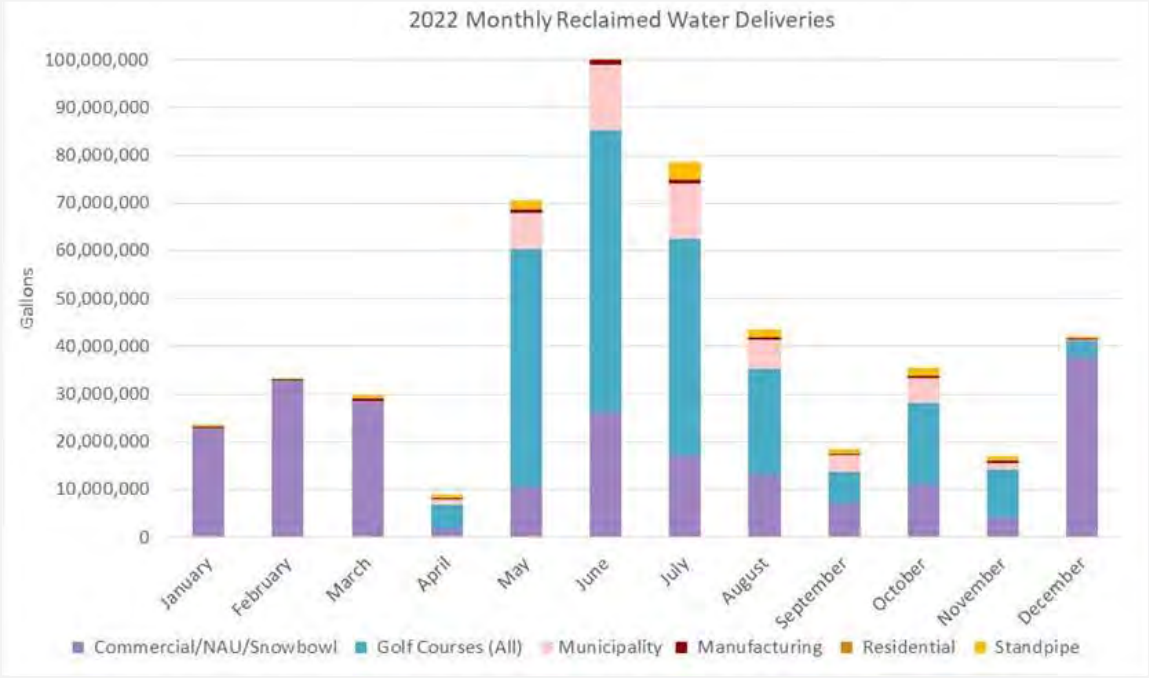
1. Continue rules established by Strategy I and Strategy II
2. Prohibits all outdoor potable water use
3. Authorizes additional measures as deemed necessary

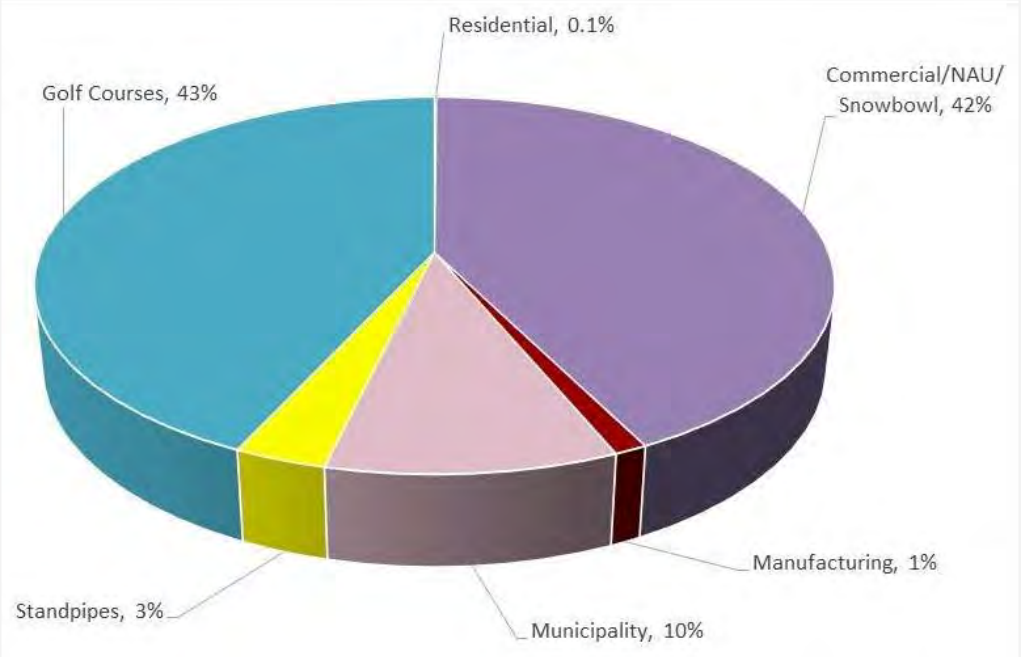
***Safe Production Capability*:** 90% of total water resources available measured in million gallons per day, based on potable water production and distribution components.

This information is covered in City Code 7-03-001-0014 Water Conservation

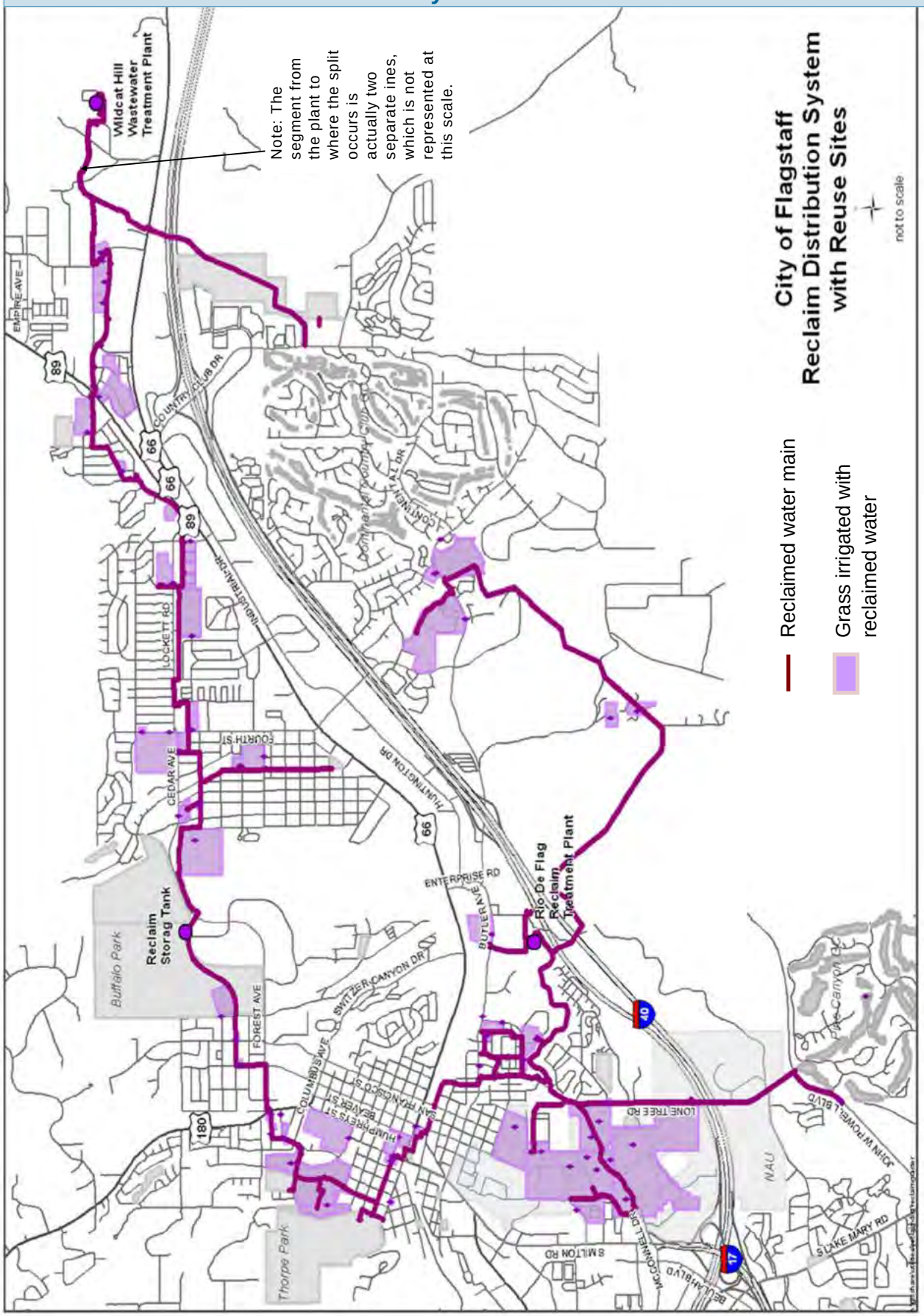
13 RECLAIMED WATER

13-1 Reclaimed Water Use by Customer Class





13-2 Reclaimed Water Distribution System



13-3 2022 Water Reclamation Plant Flow Report

WILDCAT PLANT	PLANT INFLUENT	TOTAL OF ALL TREATED EFFLUENT	PLANT DISCHARGE	RECLAIM DELIVERED REUSE SYSTEM	RECLAIM DELIVERED CONTINENTAL
MONTH	FLOW (GAL)	(GAL)	WILDCAT (GAL)	FLOW (GAL)	FLOW (GAL)
JAN	101,300,000	100,001,000	100,001,000	0	0
FEB	98,929,000	88,234,000	88,234,000	0	0
MAR	114,800,000	111,480,000	106,083,000	0	5,397,000
APR	106,535,000	99,580,000	68,088,000	3,670,000	27,822,000
MAY	106,770,000	93,945,000	25,314,000	30,994,000	37,637,000
JUNE	101,990,000	91,262,000	30,618,000	25,624,000	35,020,000
JULY	122,130,000	114,755,000	73,053,000	26,503,000	15,199,000
AUG	118,100,000	118,830,000	116,328,000	922,000	1,580,000
SEPT	106,290,000	105,955,000	91,047,000	837,000	14,071,000
OCT.	112,900,000	110,201,000	101,643,000	0	8,558,000
NOV.	96,790,000	96,636,000	92,165,000	1,030,000	3,441,000
DEC	115,538,000	101,238,000	93,795,000	7,410,000	33,000
	1B	**2B = 3B+4B+4B1**	**3B**	**4B**	**4B1**
WCH TOTAL	**1,302,072,000**	**1,232,117,000**	**986,369,000**	**96,990,000**	**148,758,000**

RIO PLANT	PLANT INFLUENT	TOTAL OF ALL TREATED EFFLUENT	PLANT DISCHARGE	RECLAIM DELIVERED REUSE SYSTEM
MONTH	FLOW (GAL)	(GAL)	RIO DE FLAG (GAL)	FLOW (GAL)
JAN	56,548,000	53,431,000	21,156,000	32,275,000
FEB	51,377,000	48,549,000	17,986,000	30,563,000
MAR	53,074,000	49,596,000	45,867,000	3,729,000
APR	53,187,000	50,345,000	23,387,000	26,958,000
MAY	53,319,000	50,552,000	21,753,000	28,799,000
JUNE	52,825,000	50,334,000	21,973,000	28,361,000
JULY	38,746,000	37,321,000	26,539,000	10,782,000
AUG	52,057,000	50,460,000	38,535,000	11,925,000
SEPT	56,043,000	53,974,000	25,201,000	28,773,000
OCT.	56,634,000	54,575,000	40,571,000	14,004,000
NOV.	55,897,000	54,070,000	18,729,000	35,341,000
DEC	47,559,000	45,859,000	18,946,000	26,913,000
	1A	**2A = 3A+4A**	**3A**	**4A**
RIO TOTAL	**627,266,000**	**599,066,000**	**320,643,000**	**278,423,000**
	1 = 1A + 1B	**2 = 2A + 2B**	**3 = 3A + 3B**	**4 = 4A + 4B + 4B1**
TOTAL (2) PLANTS	**1,929,338,000**	**1,831,183,000**	**1,307,012,000**	**524,171,000**
Acre-Feet	**5,921**	**5,620**	**4,011**	**1,609**

Notes: Total Reuse Delivered (1,609 AF) does not match Utility billing data of total "billed" (1,547 AF)

Wildcat no longer has site specific load out stations for city or county haulers. All reclaim users, except Continental, get water from the reclaim distribution system.

Total Processed/Unmetered = 1 - 2 = 1,929,338,000 - 1,831,183,000 = 9,815,500 gallons

a) Rio Plant Sludge/Septage - Not metered on main influent flow meter and self reported by haulers. Calculated at Wildcat.

b) Septage/Grease/Mud Sump - Grease received does not enter the wastewater treatment process. Mud is deposited into a drying bed and allowed to settle out, then any water is drained off into the treatment process.

c) Wildcat Unmetered - During the winter Wildcat decants the water off the top of the Solids Stabilization Basins/SSBs and return it to the treatment plant to maintain acceptable levels in the SSBs. That could account for some 10 to 15 MGY unmetered. Unmetered stormwater also enters the SSBs, the 60 acre sludge injection field, and some smaller areas around the plant.

14 SCADA INFORMATION SYSTEMS

SCADA/IS (System Control and Data Acquisition/Water Information Systems) formed a new section of Water Services in 2019. This section manages a huge volume of complex data projects throughout the division. Examples of data management include: the work order management system, GIS, meter data, field sensors, security systems, and the SCADA system. SCADA drives the remote-control processes of water production, field distribution and wastewater treatment plant operations.

A 2014 SCADA Masterplan demonstrated that Water Services needed improvements to our SCADA system, recommending additional funding dedicated to SCADA projects and a position to manage them. A SCADA Administrator position was created in 2017, reclassified to capture Information System (IS) in 2019 when the SCADA/IS section was created. This Section manages and oversees all data projects in Water Services, including SCADA. The two Instrumentation and Electrical (I&E) Supervisors require very specialized skills, moving from other sections where they continue to manage every aspect of water as it moves through the system; from well drilling and production to releasing A+ reclaimed water. Maintaining, upgrading and growing these data-driven systems has challenged the team, stretching resources and staff while building needed skills and leveraging both internal and external expertise.

The Information System (IS) Administrator develops and maintains work order management system, sewer inspection van, and web applications, creating dashboards that display and collect new data in real time, such as the leak detection dashboard.

Crew member installing a smart field device to capture real-time pressures in the reclamation distribution system.

The SCADA/IS section pursues three standards:

1) Resilience: Ensure continuity of operations for the entire system, including preparedness for disasters and emergencies such as fire, cyber-attack, or power outage. Maintain backup for all systems, ensure all service packs, updates, patches, and firmware are up to date.
2) Serviceability: Retain expertise and skillsets to effectively maintain our systems through ongoing training and contracts with vendors. Every part of SCADA and IS systems need qualified personnel that can track and perform maintenance.
3) Data-driven: Provide Sections the best available data to allow informed decision-making by managers, directors, and other City leadership.

One of the Collector App Dashboards.

14-1 SCADA Information Systems—2022 Achievements

Through 2022, we continued to make improvements to process monitoring and the asset maintenance system throughout the water systems. SCADA/IS follows Strategic Objective Number 1, to create a standards-driven culture, collecting data and monitoring it throughout the system.

Work areas in 2022 included:

- Improvements to the SCADA network:
  - Staff added the Lake Mary #2 tower to our SCADA network — this is a dedicated SCADA link that improves isolation from other City networks
    - We are continuing the planned build out of the SCADA network that will allow for multiple routes for data to travel.
  - We are continuing to develop network clusters that improve security and data packaging and unpacking across the SCADA system.
- CMMS and GIS
  - As-builts update into GIS
    - Adding more information about our Treatment plants and other Water Services IS sites into our GIS.
    - Streamlining the process for Stormwater relates service request using our Cityworks program.
  - Populating Valve Workorders in our water reclamation plants
    - Gave treatment plant staff the ability to add valve information into the GIS.
    - Inspections and work orders have been generated and completed for critical valves in our reclamation plants.
- Operational dashboards
  - Expanding our dashboards for better data driven decision throughout Water Services.
- Expanding smart field device program:
  - Improved data collection on our collections, water distribution and reclaimed networks.
  - Flexible sewer flow data collection allows us the deploy flow and level sensors throughout the collections systems to learn more about certain areas of the system, including The Rio de Flag Reclamation Plant's influent pump station.
  - Moveable pressure sensors allow us to monitor and tune our pressure throughout our reclaimed and potable distribution systems. This helps crews make better decisions on the management of our distribution system.
- Physical security improvements:
  - Implementation of pole cameras for survey and inspection of underground Stormwater infra-structure.
  - Expand the Physical Security Network for better monitoring of the security of our assets.
  - Standardize door access database and a security card that will work with Water Services, Police, and other City facilities.

15 STORMWATER MANAGEMENT

The City's Stormwater Management program includes projects and programs that oversee stormwater quantity (flood control), stormwater quality (AZPDES Municipal Permit), FEMA floodplain administration and watershed management and restoration.

The Stormwater Section is funded by the Stormwater Utility that was established in 2003. The Utility supports the Capital Improvement Program (CIP), stormwater infrastructure maintenance, development permit review, drainage investigations and floodplain administration.

15-1 Key Program Summary (descriptions are provided on subsequent pages)

1. Capital Improvement Program
2. Construction Site Inspections
3. Drainage Investigation Response
4. Development Review
5. Floodplain Administration
6. Open Channel Assessment and Maintenance
7. Watershed Planning & Museum Fire Response

15-2 Capital Improvements Program (CIP)

City Stormwater staff members are responsible for managing Stormwater's Capital Improvements Program, which is funded at $700,000 per year. Capital Improvement projects include the Army Corp of Engineers Rio de Flag Flood Control design review, Wildwood Hills detention-retention pond, Phoenix Avenue Bridge replacement, Spruce Wash sediment basins at Park Way, Killip School Regional Detention Facility, and Spruce Wash at Dortha Inlet improvement. Phoenix Ave Bridge was completed in early 2022, Killip School RDF was completed in mid-2022 and the Schultz Flood Basins were completed in fall 2022. Spruce Wash improvements are ongoing.

15-3 Construction Site Inspections

The Stormwater Section is tasked with conducting inspections of commercial and multi-unit residential projects approved within the City. These inspections are intended to ensure compliance with stormwater development requirements and to provide direction on appropriate Best Management Practices (BMPs) installation and maintenance in accordance with the Stormwater Pollution Prevention Plan (SWPPP) or Erosion Control Plan (ECP). In 2022, the Stormwater Inspector visited 65 individual sites with a total of 921 individual inspections.

Rock and cinder track out pads prevent sedimentation to streets adjacent to the project location.

MS4 Program

The City of Flagstaff's MS4 program continues to ensure compliance through inspection and enforcement of best management practices (BMP) for erosion and sediment control, post-construction installations, and conducting drainage complaint responses.

Properly installed silt fence prevents stockpiled sediment from migrating.

15-4 Drainage Investigation Response

The Stormwater Section conducted **61 drainage investigations** during the last year. These investigations include illicit discharge, floodplain violations, as well as private and public flooding reports. These investigations sometimes result in the inspector identifying maintenance needs or projects that are corrected by the City's Water Services Department. During investigations on private property, staff provides guidance to homeowners detailing how to improve drainage on their lots.

BEFORE: Inspector responds to drainage complaint.

AFTER: Inspector locates and clears blocked inlet.

15-5 Development Review

The rate of development in Flagstaff continued at a fast pace for another year. The Stormwater Section participates in the City Interdivision Staff (IDS) process. This process provides review for all Concept and Site Plans submitted to the City. The Stormwater Section reviewed 15 new Site Plans this year. Each site plan goes through a multiple review process that starts with Concept Plan and ends with an approved Site Plan. This IDS process also reviews all plats, both preliminary and final, zoning amendments, both concept and direct to ordinance in conjunction with a site plan, and annexations.

The Stormwater Section also reviews all Civil Plan submittals both for City Capital projects as well as private development Civil Plans and outside agency Civil Plans that are within City Floodplain areas.

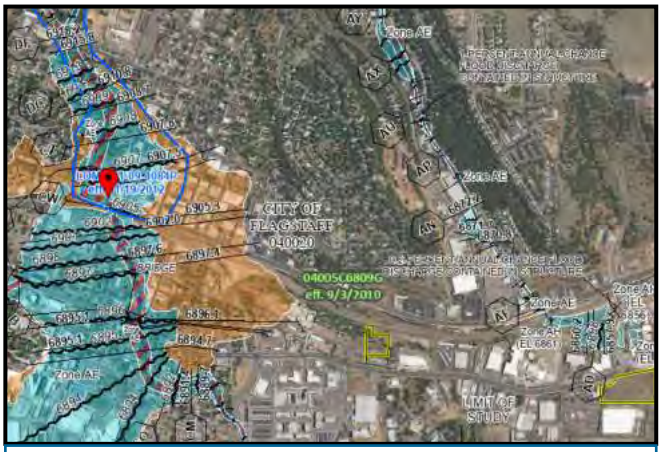
This review process requires a detailed review of all civil construction drawings and submitted engineering drainage reports for compliance with City Code. Stormwater also reviews many of the building permits submitted to the City.

2022 Permit and Plan Review	2021	2022
Pre-application meetings	94	90
New Concept Plans (not including resubmittals)	51	52
New Site Plans	38	15
Total first review Concept and Site Plans	89	67
Engineering Plan Review (not including resubmittals)	42	42
Building Permit Submittals (not including resubmittals)	260	296
Grading Permits	25	25
New zoning map amendment review submittals	3	4
New final Plat Submitted in 2022	9	13
New Annexation Submittal	1	1
Temporary Use Permit Reviews	24	18
Floodplain use permits review	32	15

15-6 Floodplain Administration

The Stormwater Section continues to support the Flagstaff Engineering Capital Improvement Section in the joint City of Flagstaff-Army Corp of Engineers Rio de Flag Flood Control Project. Stormwater staff reviews technical, stormwater aspects of the project that this section will manage upon completion. Water Services has taken over the outreach portion of this project, assisting in distributing information developed by the marketing consultant.

Staff provides public outreach on floodplain health, flood prevention, and flood insurance.



FEMA floodplain and floodway in the downtown area.

Over-excavation of the ADOT Milton Bridge for future RDF Tunnel.

The Stormwater Section is tasked with the administration of the FEMA floodplains throughout town. We participate in the National Flood Insurance Program (NFIP), which reduces flood insurance premiums by 25% for our residents through the Section administration of the Community Rating System (CRS). Flagstaff is currently a Class 5 community, one of the highest ranked CRS communities in Arizona. The Stormwater Section also administers the Floodplain Regulations adopted by City Council. Stormwater provides assistance to citizens considering development in the floodplain by conducting Flood Zone Determinations. These determinations provide specific information in writing to the customer allowing them to better understand any restrictions on projects proposed in the floodplain. This past year the Section completed **18 flood zone determinations**. Stormwater also issues floodplain use permits for allowed activities within the floodplain. This requires review of submitted construction documents and reports to determine compliance with floodplain codes. The section issued **15 floodplain use permits** in 2021.

15-7 Open Channel Maintenance

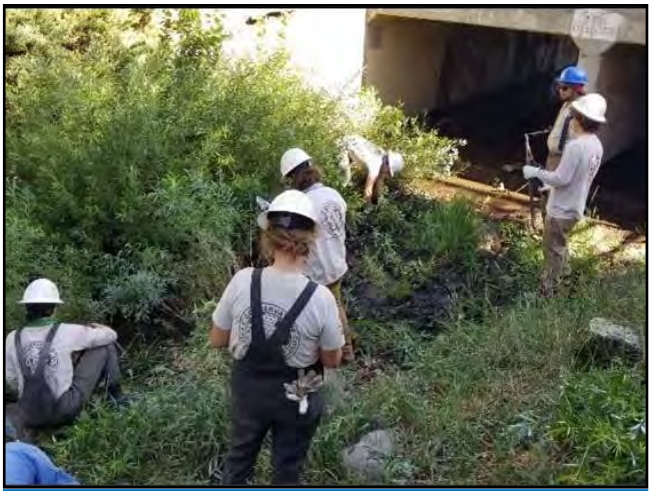
The Stormwater Section maintains 26 miles of FEMA-reported open channels and another 112 miles of natural channels and minor ditches within City limits. These stream reaches consist of City-owned properties, public rights-of-way, public easements, and privately owned public drainage easements. Maintenance projects are listed on the City's website as well as through annual reports. Annual assessments include 143 individual stream reaches compiled in Cityworks, Water Services' computer maintenance management system. The annual report can be viewed online at *www.flagstaff.az.gov/4404/Stormwater-Maintenance*

Maintenance in 2022 included:

- Dredging of the Rio de Flag at the Cheshire Wetlands,
- Post-flood clean up in Coconino Estates neighborhood,
- Vegetation removal along the Rio de Flag downstream of the Pipeline Fire,
- Invasive tree (Siberian elm) removal along the Rio de Flag, and
- Woody debris removal downstream the Museum Fire burn area.

Cheshire Wetlands before dredging.

Cheshire Wetlands after dredging.



Conservation crew removing vegetation from channel.

Siberian elm removed from channel and lower banks.

15-8 Watershed Planning & Museum Fire Response

The Stormwater Section assists with watershed planning and management in the City and at areas used by Water Services. Activities include being a core member of the Watershed Alliance for the Rio de Flag (WARF), assisting with the Southside Community Specific Plan, assisting Water Resources with Upper Lake Mary Watershed monitoring, collecting rain, stream, and sediment data in select washes, and assisting with monsoon emergency operations and post-fire flood response.

A substantial amount of time was spent on monsoon flood response. The year was largely driven by the 2022 Pipeline Fire, which added new post-fire flood areas to the west portion of Flagstaff. The Stormwater Section served on the Incident Management Team and coordinated response with the Coconino County Flood Control District, Arizona Department of Emergency and Military Affairs, FEMA, and nearly every City division.

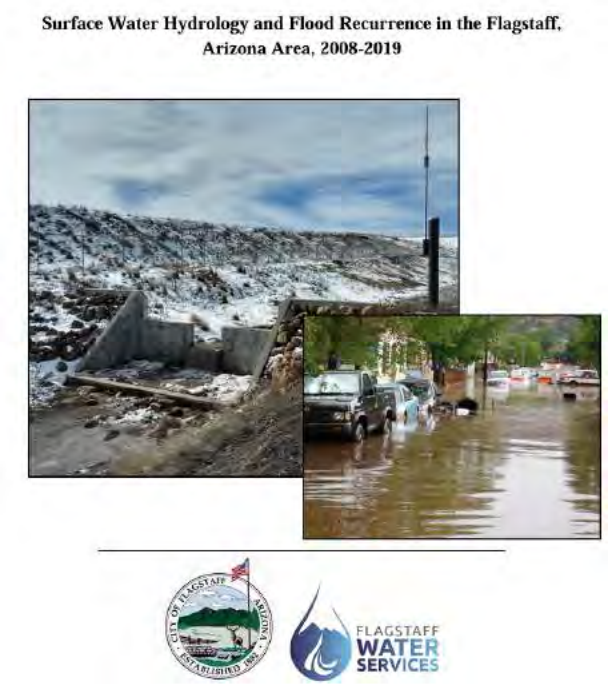
Schultz Creek Flood and Sediment Detention Basin construction.

15-8 Watershed Planning & Museum Fire Response, continued

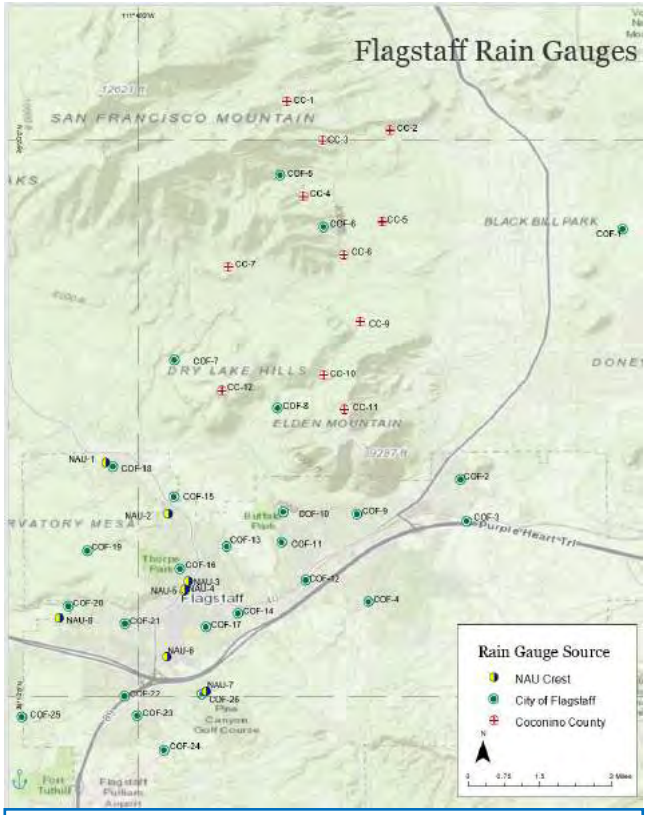
Stormwater maintains a series of rain and stream gauges for public safety, drainage design, and hydrologic studies. The gauge network can be viewed in real time at *rain.flagstaffaz.gov/jefmap/*

The rain and stream gauge networks are currently operating under the ALERT 1 radio telemetry protocol. Gauges are maintained annually, and data is summarized for long-term interpretation of rainfall-runoff. Improvements in data analysis this year included a technical report of 2008-2019 flows *(www.flagstaff.az.gov/DocumentCenter/View/69716/Surface-Water-Hydrology-Flagstaff-Arizona-2008-2019),* geomorphic relationship between watershed size and stream capacity, and the continuation of a Rio de Flag hydrology study that began in 2018 with FEMA funding.

Flood Alert Gauge at the south end of Francis Short Pond.



New technical reports allow for updates to the Stormwater Design Manual and local drainage code.



Flagstaff vicinity flood alert network.

A downward looking radar gauge on Spruce Wash near the Museum Fire burn scar.

16 REGULATORY COMPLIANCE

The Regulatory Compliance Section is comprised of two labs, a pretreatment program, and administration. The mission of this section of the Water Services Division is to ensure that the City of Flagstaff is compliant with all sampling and reporting requirements and best management practices (BMPs) as directed under state and federal regulations and permits for our drinking water, wastewater, recycled water, surface water, stormwater, industrial pretreatment, and cross-connection programs. The Regulatory Compliance Section is also responsible for ensuring each facility in Water Services is properly permitted and any discharge is correctly reported to the Arizona Department of Environmental Quality (ADEQ). Staff philosophy is responsiveness, performing duties with honesty and integrity, and a commitment to meeting industry standards of excellence. We value co-worker input and strive to maintain high motivation by providing an environment that encourages improvement and teamwork.

The section's wastewater program is responsible for operating the Arizona Department of Health Services (ADHS) certified wastewater lab. The lab is responsible for sample collection and analysis in accordance with Arizona Pollution Discharge Elimination System (AZPDES) and Aquifer Pollution Prevention (APP) permits, reports to ADEQ and USEPA, and administers the City Scavenger Waste program. Scavenger wastes include septage, grease interceptor waste, and car washing muds brought to the Wildcat Hill Water Reclamation Plant. The program includes assuring loads are manifested and billed correctly and wastes meet requirements of the program.

The section's drinking water program is responsible for operation of the ADHS-certified drinking water lab. The lab is responsible for sample collection and analysis in accordance with Safe Drinking Water Rules to assure the safety of the City's drinking water supply and reporting to ADEQ and the U.S. Environmental Protection Agency (USEPA). The program is also responsible for addressing drinking water complaints. This is achieved by dedication to exceeding customer expectations and by continuously improving our programs.

Staff collect water samples from the McAllister Well and Pumphouse.

The Industrial Pretreatment Program is responsible for administering Industrial Pretreatment permitting and enforcement; the City cross connection program; and the Fats, Oils, and Grease (FOG) programs. The Pretreatment Program has six permitted industries listed as Significant Industrial Users (SIUs), shown on the map on page 72. The Pretreatment Program assures the City is in compliance by keeping industries in compliance with local and federal statutes. The cross-connection program oversees around 2,800 backflow devices to ensure no pollutants or contaminates enter the City water distribution system. The FOG program regulates food service establishments to keep pipe-clogging substances out of the City wastewater collection system.

Forgotten grease interceptor at a sandwich shop.

Besides managing two State-licensed laboratories, the Regulatory Compliance Section administers the Multi-Sector General Permit (MSGP) at the Wildcat Hill and Rio de Flag Wastewater Reclamation Plants, administers the Municipal Separate Storm Sewer System (MS4) permit and citywide de Minimis permit for the City, and works with regulatory agencies to update permits.

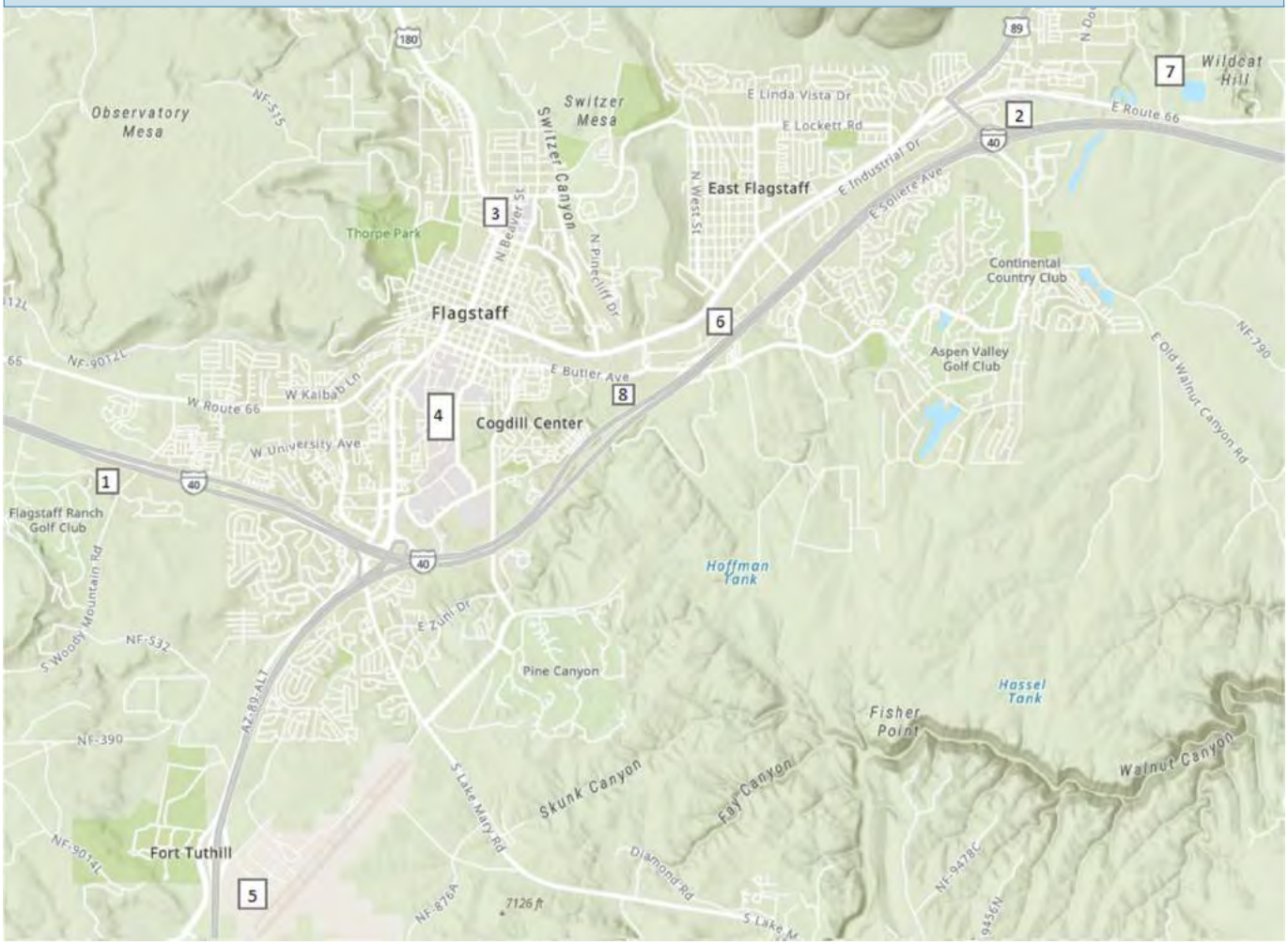
The Regulatory Compliance Section also represents the City by maintaining relationships with other professionals in the water, wastewater, and environmental compliance fields, and participating in or hosting meetings and workshops. The section is a liaison with numerous outside agencies and organizations that include the United States Environmental Protection Agency (USEPA), Arizona Department of Environmental Quality (ADEQ), Arizona Department of Water Resources (ADWR), AZ Water, and Environmental Laboratory Advisory Committee (ELAC).

16-1 2022 Summary & Accomplishments

Staff performing a backflow test.

- The Industrial Pretreatment program was inspected by PG Environmental as an agent of ADEQ in June of 2022. Overall, the program is in compliance, but there were a few deficiencies found in the course of the inspection.
- The language changes that were discovered during the inspection were changed in City code and industrial discharge permits before the end of 2022.
- Three industries successfully renewed their discharge permits for another 5-year term.
- The wastewater lab welcomed a new lab supervisor and two new lab technicians.
- There have been numerous challenges with cyanide false positives from the City's contract labs resulting in exceedances for reporting. ADEQ has been appraised of the situation and has indicated that it is an issue state-wide.
- ADEQ visited both water reclamation plants and conducted sampling on influent, effluent, and solids for PFAS and PFOS. This is part of a voluntary state-wide sampling plan by ADEQ to monitor PFAS and PFOS at water reclamation plants.
- The drinking water lab along with the water production team had a sanitary survey conducted by ADEQ in October. A Notice of Opportunity to Correct Deficiencies (NOC) was issued with very minor findings. The NOC was closed out within 45 days of issuance.
- Drinking water customer complaints are down significantly from previous years. Only 5 customer visits were completed by the lab staff since May of 2022.
- Inner Basin wells and the North Reservation Plant were deactivated on the list of the City's water sources due to the destruction of the road and pipeline caused by flooding after the Pipeline Fire.

16-2 Significant Industrial Users



Legend

Significant Industrial User (SIU)
1. W. L. Gore & Associates (Woody Mountain)
2. Nestle Purina
3. Flagstaff Medical Center
4. Northern Arizona University
5. Joy Cone
6. Mission Linen

Treatment Plant
7. Wildcat Hill Water Reclamation Plant
8. Rio de Flag Water Reclamation Plant

17 CUSTOMER SERVICE

Customer Service is responsible for municipal billings, delinquent collections, and customer inquiries. Meter services collects the water meter readings, completes service connections/ terminations, and service orders including high consumption readings and customer requests. Housed under Management Services, the customer service team works closely with Water Services staff to identify possible leaks, help customers monitor their usage, and pay their bills. Customer Service also oversees the load out station software payment system and customer account management. Customer Service provides the front-line customer experience, fielding billing and general water inquiries.

2022 Notable Accomplishments:

- Customer Service call center fielded over 21,000 inbound calls.
- Completed nearly 2,900 new account activations, 2,400 billing edits, and 400 landlord service transfers.
- Increased capability through new meter reading software to offer ability to review daily readings on majority of customers' accounts. Currently this data can be provided to customers over the phone when troubleshooting leak or high usage concerns. Future capabilities are in discussion.
- Implemented a new process for disconnections which has lessened the need for physical disconnects. Collection process on delinquent accounts has resulted in nearly $3 million in collections.
- Staff partnered with utility assistance programs to connect customers in need to programs that could help them. Over $180,000 was received in utility assistance.
- New load station software was implemented, offering greater ease of use to hauling customers including real time payment posting and an account portal.

Utility assistance flyer distributed through 2022

18 2021 MISCELLANEOUS INFORMATION

18-1 Statistics

CONVERSIONS

psi	pounds per square inch	2.304 feet of water head
acre-foot	gallons in acre, 1 foot deep	325,851 gallons
cubic foot	gallons in 1 cubic foot	7.48 gallons
cubic foot per second	flow rate	450 gallons per minute
million gallons per day	flow rate	694 gallons per minute
GPCD	gallons per capita per day	
mg/l	milligram per liter	part per million
TTHM	total trihalomethanes	
break horsepower		(total lift x gpm)/39600.67 kw (kilowatt hours)

CITY PERMIT NUMBERS

WATER
Public Water System No. 403008
APP (general) 511845, LTF# 86246

WATER RESOURCES
ADWR Designation No. 41-900002.0002
ADWR Community Water System ID 91-000086.0000

STORMWATER
AZPDES AZSM92125, LTF# 92125

GENERAL/OTHER
Recycled Water Type 3-R511384, LTF# 71879
AWWA Membership No. 00033456
City Wide AZPDES (de Minimis) AZDM89490, LTF# 89490

WASTEWATER
Wildcat Hill WRP: AZPDES individual AZ0020427, LTF# 79298
AZPDES (MSGP) AZMS79759, LTF# 79759
Air Quality Registration# 90972
APP 100760, LTF# 74830
Rio de Flag WRP: AZPDES AZ0023639, LTF# 78360
AZPDES (No Exp Wvr Strmwtr) AZNC68986, LTF#: 68986
APP 102421, LTF# 71878
Pesticide General Permit #96638

LABORATORY
Wildcat Hill WRP Laboratory Lab License# AZ0022
Drinking Water Compliance Laboratory Lab License# AZ0023

REVENUES

WATER	FY 2022	$20,881,533	FY 2021	$20,405,831
SEWER	FY 2022	$12,758,001	FY 2021	$13,993,452
RECLAIMED WATER	FY 2022	$1,023,730	FY 2021	$1,405,038
STORMWATER	FY 2022	$4,540,639	FY 2021	$6,675,822

(FY=July through June)

SYSTEM INFORMATION 2022 (Approximate)

Number of fire hydrants — 3,432
Number of reclaim hydrants — 16
Number of manholes — 7,977 sewer — 923 stormwater
Number of valves — 11,626 water — 253 reclaim
Number of groundwater wells — 21 active drinking water production wells in 2022
Miles of sanitary sewer — 289.393 miles
Miles of water main — 446.798 miles
Miles of pipeline — 25.834 active sewer — 63.58 stormwater
Miles of closed and open channel storm drains — 73.74
Average annual gallons per household in 2022 — 133 gallons per house per day
Average annual gallons per capita per day in 2022 — 90 GPCD (including non-revenue water)
Upper Lake Mary capacity — 16,300 acre feet (USGS OFR 2008-1098)
Number of housing meters in 2022 — 16,253 (single family) 3,089 (multi-family)

KEY ELEVATIONS (Feet)

Pressure Zone A — 7,260
Pressure Zone B — 7,137
Pressure Zone A+ (RR Springs) — 7,320
Upper Lake Mary Spillway — 6,835.5 (USGS OFR 2008-1098)
Inner Basin cabin — 9,415
Lake Mary WTP — 6,960
Wildcat Hill WRP — 6,760
Rio de Flag WRP — 6,860

18-2 Water Services Division Organizational Chart—5/3/23

18-3 City of Flagstaff Water Rates & Fees

CITY OF FLAGSTAFF WATER & SEWER RATES

Effective January 1, 2022 (Subject to Change**)**

MONTHLY FIXED CHARGE

Meter Size:	Customer Class	Inside City Rate	Outside City Rate
3/4"	All	$ 16.64	$ 18.30
1"	All	19.60	21.56
1 1/2"	All	26.98	29.68
2"	All	35.84	39.42
3"	All	56.52	62.17
4"	All	86.05	94.66
6"	All	159.88	175.87
8"	All	248.47	273.32
10"	All	351.83	387.01

WATER RATES

POTABLE WATER: (per 1,000 gallons)		Customer Class	Water Rate	Water Energy Rate	*WRIP FEE	Total Inside City Rate
Single Family	Tier 1 (0 - 3,500 gallons)	R1 or R4	$ 3.44	$ 0.80	$ 0.52	$ 4.76
	Tier 2 (3,501 - 6,200 gallons)		4.45	$ 0.80	0.52	$ 5.77
	Tier 3 (6,201 - 11,500 gallons)		6.86	$ 0.80	0.52	$ 8.18
	Tier 4 (11,501+ gallons)		13.72	$ 0.80	0.52	$ 15.04
Multi-Family Units		R2 or R3	4.42	$ 0.80	0.52	$ 5.74
Commercial/Schools		C	4.69	$ 0.80	0.52	$ 6.01
Northern Arizona University		NA	4.30	$ 0.80	0.52	$ 5.62
Manufacturing		MN	4.63	$ 0.80	0.52	$ 5.95
Landscaping/Lawn Meters		LM	4.69	$ 0.80	0.52	$ 6.01
Hydrant Meter		HM	7.17	$ 0.80	0.52	$ 8.49
Standpipe*		SP	7.17	$ 0.80	0.52	$ 9.52

*Includes sales tax and environmental fee
*Effective 8/1/20

RECLAIMED WATER: (per 1,000 gallons)		Customer Class	Inside City Rate	Outside City Rate
Private Residential	Tier 1 (0 - 3,500 gallons)	R1	$ 1.43	$ 1.57
	Tier 2 (3,501 - 6,200 gallons)		1.77	1.95
	Tier 3 (6,201 - 11,500 gallons)		2.56	2.82
	Tier 4 (11,501+ gallons)		4.80	5.28
Commercial (no main Ext):		C	1.95	2.15
Commercial (w/ main Ext):		C	4.14	4.55
Manufacturing (no main Ext):		MN	1.93	2.12
Manufacturing (w/ main Ext):		MN	4.10	4.51
NAU (No main extension):		NA	1.82	N/A
NAU (with main extension):		NA	3.85	N/A
City Departmental		MU	1.95	N/A
Hydrant Meter		WR	4.00	N/A
Standpipe**		RS	4.53	N/A
Off Peak/Golf Course:	Tier 1 (0 - 150,000,000 gallons)	WR	1.65	1.82
	Tier 2 (150,000,001+ gallons)	WR	1.65	1.82

**Includes sales tax and environmental fee

18-3 City of Flagstaff Water Rates & Fees, continued

SEWER RATES			
SEWER: (per 1,000 gallons)	**Customer Class**	**Inside City Rate**	**Outside City Rate**
Residential			
Single- and Multi-Family	R1 - R4	$ 5.35	$ 5.89
Non-Residential			
Car Washes	CW	5.38	5.92
Laundromats	L	5.53	6.08
Commercial	C	5.68	6.25
Hotels & Motels	H	7.58	8.34
Restaurants	RF	9.09	10.00
Industrial Laundries	IL	8.36	9.20
Manufacturing	MN	6.09	6.70
Pet Food Manufacturers	PF	13.34	14.67
Soft Drink Bottling	SD	10.57	11.63
Ice Cream Cone Manufacturing	IC	16.48	18.13
NAU	NA	4.91	5.40

STORMWATER RATE			
STORMWATER: (per ERU)	**Customer Class**	**Inside City Rate**	**Outside City Rate**
1 ERU (Effective July 1, 2019)	All	$ 3.74	$ 4.11

TRASH AND RECYCLING			
EFFECTIVE JANUARY 4, 2022			
RESIDENTIAL	**Customer Class**	**Inside City Rate***	**Outside City Rate***
One Trash and One Recycling Container (Each Container Serviced 1x per Week)	R1 - R4	$ 23.68	26.05
Each Additional Container		10.00	11.00
COMMERCIAL	**Customer Class**	**Inside City Rate***	**Outside City Rate***
Container Size and Scheduled Pickup May Vary	Please call (928) 213-2110		

PRIVATE FIRE PROTECTION			
CONNECTION SIZE	**Customer Class**	**Inside City Rate**	**Outside City Rate**
4"	KS	$ 12.59	$ 13.85
6"		36.58	40.24
8"		77.96	85.76

18-3 City of Flagstaff Water Rates & Fees, continued

CITY OF FLAGSTAFF WATER & SEWER SYSTEM FEES

Effective July 1, 2019 except as otherwise noted (Subject to Change**)**

WATER AND SEWER FEES

All Single Family Subdivisions: Residential and Townhomes (1 Meter, 1 Unit) EXCEPT as listed in next section

Any Meter Larger than a 3/4" Must have documentation approved by Water Services 928-213-2400

Meter Size	Meter Fee	Water Capacity Fee	Sewer Capacity Fee	Service Fee	Taxes	Total Fees
3/4"	$ 340	$ 5,728	$ 3,723	$ 24	$ 33.42	$ 9,848.42
1"	$ 520	$ 9,566	$ 3,723	$ 24	$ 49.94	$ 13,882.94
1 1/2"	$ 920	$ 19,074	$ 3,723	$ 24	$ 86.67	$ 23,827.67
2" or larger Call	Call	Call	Call	Call	Call	Call

Exceptions Single Family Residential Subdivisions (1 Meter, 1 Unit)

Linwood Heights & Rock Ridge West (1" Meter Required)

1"	$ 520	$ 9,566	$ 3,723	$ 24	$ 49.94	$ 13,882.94

Pine Canyon (1 1/2" Meter Required)

1" *(See Comment Below)*	$ 520	$ 9,566	$ 3,723	$ 24	$ 49.94	$ 13,882.94
1 1/2"	$ 920	$ 19,074	$ 3,723	$ 24	$ 86.67	$ 23,827.67

** Meters <1 1/2" in Pine Canyon must be approved by the Fire Department as adequate to handle domestic & fire sprinkler system

Multi-Family Residential, Condos, Mobile Homes (Sewer Fees are Per Unit) ***Water Services Invoice Required 928-213-2400***

Meter Size	Meter Fee	Water Capacity Fee	Sewer Capacity Fee	Service Fee	Taxes	Total Fees
3/4"	$ 340	$ 5,728	$3,723 (Per Unit)	Based on # of Units		
1"	$ 520	$ 9,566	$3,723 (Per Unit)	Based on # of Units		
1 1/2"	$ 920	$ 19,074	$3,723 (Per Unit)	Based on # of Units		
2"	$ 1,070	$ 30,530	$3,723 (Per Unit)	Based on # of Units		
3"	$ 3,130	$ 57,279	$3,723 (Per Unit)	Based on # of Units		
4"	$ 4,130	$ 95,484	$3,723 (Per Unit)	Based on # of Units		
6" or Larger	Call					

Commercial/Non-Residential ***Water Services Invoice Required 928-213-2400***

Meter Size	Meter Fee	Water Capacity Fee	Sewer Capacity Fee	Service Fee	Taxes	Total Fees
3/4"	$ 340	$ 5,728	$ 3,723	$ 24	$ 33.42	$ 9,848.42
1"	$ 520	$ 9,566	$ 6,218	$ 24	$ 49.94	$ 16,377.94
1 1/2"	$ 920	$ 19,074	$ 12,399	$ 24	$ 86.67	$ 32,503.67
2"	$ 1,070	$ 30,530	$ 19,845	$ 24	$ 100.44	$ 51,569.44
3"	$ 3,130	$ 57,279	$ 37,233	$ 24	$ 289.57	$ 97,955.57
4"	$ 4,130	$ 95,484	$ 62,068	$ 24	$ 381.38	$ 162,087.38
6"	$ 6,130	$ 190,910	$ 124,099	$ 24	$ 565.00	$ 321,728.00
8"	$ 13,737	$ 305,468	$ 198,566	$ 24	$ 1,263.40	$ 519,058.40
10" Call	Call	$ 439,157	$ 285,468	$ 24	Call	Call

WATER AND SEWER SYSTEM CONNECTION FEES

WATER FEES	Tap Size	Tap Fees	Taxes	Total Fees	
Water Service Line Connection to Main - Residential Only	Call the Water Services at 928-213-2400				To determine if service line connections or if water and sewer taps are required, please contact Water Services at: 928-213-2400
Fire and Wet Taps (Contractor excavates to water main)	3/4" to 2"	$ 190	$ 17.44	$ 207.44	
	3" to 12"	$ 310	$ 28.46	$ 338.46	
Additional tap, same time and parcel, any size	3/4" to 12"	$ 125	$ 11.48	$ 136.48	

SEWER FEES	Tap Size	Tap Fees	Taxes	Total Fees
Sewer Taps (Contractor excavates to sewer main)	All Sizes	$ 275	$ 25.25	**$ 300.25**

RECLAIMED WATER SYSTEM CONNECTION FEES

RECLAIMED WATER FEES	Tap Size	Tap Fees	Taxes	Total Fees	
Water Service Line Connection to Main	Call the Utilities Division at 928-213-2400.				To determine if service line connections or if reclaimed water taps are required, please contact the Utilities Division at 213-2400.
Wet Taps (Contractor excavates to reclaimed main)	3/4" to 2"	$ 190	$ 17.44	$ 207.44	
	3" to 12"	$ 310	$ 28.46	$ 338.46	
Additional tap, same time and parcel, any size	3/4" to 12"	$ 125	$ 11.48	$ 136.48	
Contractor excavates to water main - trenching, pavement cuts and patch not included in above cost. Please contact the Utilities Divisior for more information at 928-213-2400.					

18-4 Water Services Contact Information

FACILITIES

WATER SERVICES ADMIN
2323 N. Walgreens St.
213-2400/213-2409 (FAX)

WATER DISTRIBUTION
5401 E. Commerce Ave.
213-2444

CITY HALL
211 W. Aspen Ave.
213-2000/213-2409 (FAX)

LAKE MARY WATER TREATMENT PLANT
4500 S. Lake Mary Rd.
213-2450/853-2183 (CELL)/556-1267 (FAX)

WASTEWATER COLLECTION
5401 E. Commerce Ave.
213-2445

CUSTOMER SERVICE
211 W. Aspen Ave.
213-2231

RIO DE FLAG WATER RECLAMATION PLANT
600 S. Babbitt Dr.
213-2414/853-4584 (CELL)/556-1302 (FAX)

WILDCAT HILL WATER RECLAMATION PLANT
2800 N. El Paso Flagstaff Rd.
213-2425/699-8659 (CELL)/526-3526 (FAX)

STAFF

WATER SERVICES ADMIN

Shannon Jones	**213-2420**	
Marion Lee	213-2406	
April Belinti	213-2407	
Lisa Deem	213-2471	699-5421
MacKenzie Chase	213-2400	

WATER SERVICES ENGINEERING

Gary Miller	**213-2410**	**863-8001**
Justin Emerick	213-2437	607-2541
Jackson Salazar	213-2411	

LAKE MARY WATER TREATMENT PLANT

Brian Huntzinger	**213-2459**	**522-4407**
Taylor Prichard	213-2460	
Lee Williams	213-2476	
Ladd Steele	213-2477	
Stuart Penoff	213-2456	
Tim Hourihan	213-2460	
James Holsten	213-2454	

REGULATORY COMPLIANCE/ INDUSTRIAL PRETREATMENT

Jolene Montoya	**213-2117**	**853-8643**
Laney Stevens	213-2475	606-0735
Glenn Kuyper	213-2119	853-5904
Krista Snow	213-2458	853-5793
Monique Belanger	213-2429	606-6799
Rachel Torrey	213-2428	
Aidan James Stills	213-2438	

SCADA/GIS

Timothy Harrington	**213-2413**	**326-3189**
Corryn Smith	213-2442	
William Liebe		699-6006
Lorne Cargill	213-2413	
Shawn McKee	213-2435	

WATER DISTRIBUTION

Patrick O'Connor	**213-2444**	**699-6174**
Call Out Phone #1	**853-6136**	
Lucas Staires		
Jared Bohn		
Jason Hoyungowa		
Richard Tsinnie		
Adam Nelson		
Chavez Nakai		
Matt Anaya		
Randy Cody		
Juan Rubalcava		
Bob Cunning		
Tyler Boswell		
Chase Stoneberger		
Jesse McKerracher		
Arizona 811 (Blue Stake)	1-800-782-5348	

STORMWATER

Ed Schenk	**213-2470**	**666-0458**
Chase McLeod	213-2472	
Sharon Masek Lopez	213-2473	
Doug Slover	213-2478	
Chris Palmer	213-2474	

CUSTOMER SERVICE

Jessica Kittleson	213-2267	
Nanci Thomas	213-2236	
Kim Burns	213-2233	
Rhiannon Thomas	213-2242	
Danielle Tiedeman	213-2234	
Celeste Coupe	213-2251	
Cameron Faircloth	213-2223	
Sabrina James	213-2238	
Manny Sierra	213-2244	233-5904
Scott Klotz	213-2244	856-4428
Wildine Rodriguez		
Cody McMaster		

WASTEWATER COLLECTION

Joe Almendarez	**213-2445**	**853-4876**
Call Out Phone #2	**607-8841**	
Jason Toback		
Ryan Townsend		
Lorn Sampson		
Ralph Hernandez		
Jeremiah Magana		

RIO DE FLAG WATER RECLAMATION PLANT

Vacant	**213-2426**	**853-8715**
Cory Mueller	213-2421	
Tony Hernandez	213-2425	
Matthew Black	213-2520	

WILDCAT HILL WATER RECLAMATION PLANT

Troy Dagenhart	**213-2432**
Timothy McGinnis	213-2906
Kyle Nelson	
Kiley McCormack	213-2520
Lucas Vacca	213-2421
Scott (Greg) Gede	213-2434
Joshua Cantrell	213-2421

WATER RESOURCES/CONSERVATION

Erin Young	**213-2405**	**821-5952**
Tamara Lawless	213-2404	607-7674
Emily Melhorn	213-2403	864-8026
Enforcement Aides	890-7339	864-8023