STORMWATER
FLAGSTAFF WATER SERVICES

FLAGSTAFF
WATER
SERVICES

CITY OF FLAGSTAFF · ESTABLISHED 1882 · ARIZONA

FLAGSTAFF STORMWATER
STRATEGIC PLAN

Master Planning, Development Review and Inspection, Floodplain Management, Maintenance, Flood Response, Capital Improvement.

We are Water

FLAGSTAFF AND **STORMWATER MANAGEMENT**

With clean air, a cooler climate, and beautiful natural areas, Flagstaff is a great place to live and visit. Residents and visitors enjoy the many amenities Flagstaff has to offer—from the Flagstaff Urban Trails System (FUTS) of bike and pedestrian paths to the Grand Canyon to the unique biodiversity of surrounding forests. Home to Northern Arizona University and world-class research centers, Flagstaff residents are informed, passionate, and engaged in issues concerning their community.

Urban development over the years in Flagstaff has significantly altered the natural hydrology and the hydraulics of this stormwater system, with many natural elements having been replaced or augmented by man-made facilities. Urban development continues, and the City recognizes that climate is causing more intense precipitation events, increased frequency of wildfires, and elevated flooding risks, requiring enhanced planning and improvements to stormwater maintenance and infrastructure. To manage these issues, the Stormwater Section of the Flagstaff Water Services Department is charged with managing a stormwater utility service area subject to stormwater service charges. Recently, these responsibilities have expanded with increasing wildfire and flooding risks due to climate change.

PURPOSE OF THIS STRATEGIC PLAN

With increasing climate change and severe weather patterns, stormwater management, flood management, and pollutions prevention are becoming increasingly important. Consequently, this Strategic Plan focuses on the future, providing the Stormwater Section's staff an opportunity to communicate risks, recommended actions and investments, and identify opportunities within a 5-year planning horizon. Specific objectives include:

- Provide a substantive and easy to read overview of flooding and pollution prevention issues
- Identify the major challenges, risks, and recommended actions and investments
- Increase confidence among the Flagstaff City Council and the community that the Stormwater Section is appropriately mitigating the risks of flooding and the environmental damage caused by stormwater pollution
- Establish a basis for future community dialogue on specific stormwater and pollution prevention issues
- Ensure that Strategic Objectives are aligned with Stormwater Section's values, standards, City Council goals, and the appropriate elements of Flagstaff's Climate Change Action and Adaptation Plan
- Provide the basis for estimating the financial implications of stormwater management

ELEMENTS OF THE STRATEGIC PLAN

Strategic Foundation
Defines the Stormwater Section's fundamental responsibilities. The Behavioral Values are appropriately the same as those noted in the Water Services Division 2025 Strategic Plan.

Business Values
Specific commitments to provide compelling value, for example flood protection and pollution prevention. They establish a consistent framework for developing more detailed standards, identifying issues, assessing risks, implementing solutions, and communicating in a meaningful way.

Stormwater Basics and Major Challenges
Things people should know about stormwater in Flagstaff, including basic concepts and an overview of the most significant risks facing the community.

Standards
Rules, levels of quality, or achievements that are considered acceptable or desirable. The Section's standards drive its activities, decisions, proposed investments and are the basis for transparent operations. Some of these standards are legal or regulatory, for example FEMA and Arizona regulations, or following Low Impact Development (LID) and best management practices (BMPs). Other standards are developed internally and in collaboration with the City Council, city management, and the community.

Strategic Objectives – The Strategic Objectives outlined in this plan describe significant challenges, opportunities, and recommended actions or investments relevant to the planning horizon. They do not address tasks that are part of normal operations, nor do they reflect final policy decisions or indicate that there is approved funding for a given action or investment.

Museum Gauge

STRATEGIC FOUNDATION

MISSION

To professionally and cost effectively minimize the flood damage and pollution from stormwater events.

BEHAVIORAL VALUES

We are guided in our daily decisions and activities by these values:

INTEGRITY

We are transparent, honest, and ethical in all our communications and our actions

LEADERSHIP

We are proactive in protecting the interests of our staff, customers, and community

RESPECT

We thoughtfully consider each other's differences and opinions

COLLABORATION

We listen and openly share our ideas to achieve better decisions and outcomes

COMMITMENT

We strive to meet high standards of service and reliability

RESPONSIBILITY

We are accountable for our behaviors, actions, and use of public resources.

Flooding on Route 66

BUSINESS VALUES

Business Values describe the Section's commitments to provide compelling value to the residents and businesses it serves. These Business Values establish a consistent framework for developing more detailed standards, identifying issues, assessing risks, and evaluating and implementing solutions. The Section's Business Values are the same as the Water Services Division, with the exception that they focus on flood protection and pollution prevention instead of reliable water supplies and water service.

- **Sound Planning and Appropriate Investment**
- **Flood Protection and Pollution Prevention**
- **Protecting Public Health and the Environment**
- **Exceptional Customer Service**
- **Sound Financial Management, Increasing Efficiency**
- **Transparency and Community Engagement**

STORMWATER BASICS

The Stormwater Section - The City of Flagstaff Stormwater Section is part of the Water Services Division and has been established to regulate, operate, protect, maintain, and enhance the stormwater drainage systems in the City. Although it's part of the Water Services Division, it has all the functions, complexity, and responsibilities of a separate utility. It administers the Stormwater Management Program and performs studies and analyses as required, prepares capital improvement plans, performs routine maintenance and repair of stormwater assets, obtains federal and state permits, communicates with businesses, residents, and developers, and acquires lands, easements, and rights-of-ways to perform its duties.

	2003	2005	2007	2009	2012	2018	2019	2021	2022
News:	Stormwater Section Created	First Rate Change and credit manual	Master Planning	ALERT netw ork, LID Ordinance	FWPP	Rio De Flag Flood Control Project	Museum Fire, Climate Action Plan, Rio de Flag Project	Spruce Wash flooding	Pipeline Fire
Rate ($/ERU month	$ 0.53	$ 0.93	$ 1.02	$ 1.22	$ 1.30	$ 2.24	$ 3.74	$ 3.74	$ 3.74
Responsibilities:	FEMA Floodplain Management Development review, Construction Inspections, Maintenance funding Water quality & MS4	Capital Improvement Drainage Investigation	NEAMDS Study	ALERT gauges LID ordinance	Regional Watershed Management	Rio De Flag Flood Control Project	Climate change planning Post-fire flood response Maintenance operations Asset Management/GIS Rio de Flag Project	Regional Flood Management	Individual Direct Assistance Detention Basin Maintenance

Stormwater Fees and Service Levels

The Stormwater Section was created in 2003 and was expanded in 2006, 2015, 2019 to regulate, operate, protect, and maintain the stormwater drainage systems in the City. Stormwater fees provide the funding to carry out these roles. One of the biggest challenges and important roles of the Stormwater Section is to advocate for appropriate investment in flood protection and pollution prevention and to prioritize capital improvements. Appropriate investment is determined by standards. Priorities are set by assessing the risks to life and property, when standards may not be met, and when there are potential financial losses.

Open channel maintenance.

The System

Flagstaff's Municipal Separate Stormwater System (MS4) is separate from the sanitary sewer system and is comprised of open channels, culverts, pipes that allow stormwater to cross under roads, and catch basins that capture and guide stormwater. More broadly, the system comprises any assets that contribute to stormwater control and flood prevention, including detention or retention basins that reside on both public and private property and FEMA special flood hazard areas (commonly referred to as FEMA floodplains and floodways). In general, Flagstaff has no formal municipal stormwater conveyance system. Flood mitigation is accomplished by adding stormwater provisions to local areas or specific development sites. The Army Corps of Engineers Rio de Flag Project, designed to address downtown flooding, represents major infrastructure and could be categorized as a first step in developing a more comprehensive municipal stormwater system.

Floodplains and Flood Insurance

Flood insurance is regulated by FEMA, including setting flood insurance rates, though the City operates as the local administrator for FEMA on floodplains and flood insurance discounts. FEMA also responds to natural disasters. Any property that is designated to be in a FEMA floodplain that has a mortgage must have flood insurance. This insurance can be expensive ($2000-$4000 per year), mainly because properties in a floodplain are deemed to have a significant risk for flooding. So, maps that define FEMA floodplains are an important issue for property owners and developers. Floodplain maps produced by FEMA are a broad brush, and these maps are constantly being revised locally, typically driven by requests from developers. The Stormwater Section enforces local, state, and Federal regulations by way of Erosions Control Plans required by FEMA, the Arizona Department of Department of Environmental Quality (ADEQ), and the Flagstaff Stormwater Design Manual. It does not create or change municipal regulations without Council approval. The Stormwater Section is responsible for the Community Rating System (CRS) that provides insurance discounts by demonstrating higher standards than baseline FEMA regulations.

Stormwater System Maintenance

Stormwater assets underperform if they are clogged due to trash or natural debris, sediments, or because they are old and need repair. Ideally, the Stormwater Section should ensure that if flooding does occur, it's not due to maintenance insufficiencies, but rather migrated debris from the time of the precipitation event. Maintenance of private storm water assets is the responsibility of the property owner. This applies to both public and private stormwater assets. Proper maintenance is also the prerequisite for evaluating the design, capacity, and performance of current infrastructure which is essential for identifying needed capital improvements.

Drainage capital improvement.

Solving, Not Moving the Problem

t's not uncommon for a flooded area to act as a detention pond, which can limit peak flows to downstream areas. This illustrates a common stormwater management challenge. It's not acceptable to solve an upstream problem that causes a problem downstream, in other words, moving the problem from one area or neighborhood to another. Meeting this standard increases the complexity and cost of stormwater projects. In most cases, planning needs to begin where the water will eventually end up and then work backward to determine how it will safely get there.

Impacts of New Development

The impacts of new development to the City over time is increasing area of impervious surfaces or hardscape, but this will not increase total flows in the City's conveyances provided the on-site storm water mitigation is designed and installed properly i.e., providing detention/retention assets and complying with Low Impact Development (LID) standards. The risk created by a specific development site is flooding or having sediment dumped on a neighboring property. This typically occurs because the site did not comply with Stormwater Pollution Prevention Plan (SWPPP) requirements or Best Management Practices (BMPs). Or in some cases, a storm's magnitude was so intense that installed BMPs were inadequate to prevent flooding damage.

New Development Site Management

On any given site (new, infill, or redevelopment) Stormwater codes and LID provisions are designed to ensure that peak flows do not increase, and the basic path of the flow is not altered. Peak flow is typically controlled with onsite detention or retention basins or by directing flow toward landscaping (which amounts to passive rainwater harvesting). In almost all cases, development causes total flow discharged from a site to remain the same even with an increase in hardscape (roofs, driveways, parking lots) thanks to designed and installed mitigation to preserve preconstruction discharge rates. This means that by providing adequate local and regional mitigation, stormwater risks are remaining the same due to the cumulative impacts of development.

Establishing Spatial Weather Distinctions

It's possible that certain areas of Flagstaff are prone to certain weather events, especially with respect to smaller storm cells or monsoons. Recent events suggest that definable patterns may exist. Ongoing data collection, specifically stormwater footprint information, is necessary to establish credible patterns. Establishing these spatial trends could dramatically increase the effectiveness and efficiency of CIP investments, specifically decreasing costs and flooding risks.

Army Corps of Engineers Rio de Flag Flood Control Project

This project is a twenty-year effort of the City of Flagstaff and the U.S. Army Corps of Engineers to prevent safety hazards and property damage caused by floods. It is a $122M project with 65% of the funding provided by the Army Corps. Project provisions being built along the Rio de Flag and Clay Avenue Wash will significantly reduce flooding in the downtown area. The project realigns the primary floodway, constructs underground and surface floodway structures, and will provide stormwater connections to the project's infrastructure. Once completed, this project has the potential to prevent damage to approximately 1,500 structures in Flagstaff, valued at over $916M. Though this project is a significant step forward in flood mitigation, it does not resolve all stormwater issues.

MAJOR **CHALLENGES**

Advancing Climate Change

Without the impacts of climate change, stormwater management amounts to ensuring that private drainages and stormwater system assets were designed and properly constructed, overseeing new development and its impacts, and ensuring that stormwater assets are being properly maintained. However, climate change is changing the game. Changes in Flagstaff's weather patterns in the next 5 years will be more dramatic than the last 10 years. A drying trend that increases the risk of wildfires, increased flooding due to intense monsoons, more rain-on-snow events, and large storms with wet snow are consistent with both climate change modeling and recent experience. Precipitation events previously designated as 100 or 1000 year storms are now regular occurrences. Responding to these challenges will require a fully staffed stormwater utility and significant

Flooding on North Foxglenn St.

enhancements in data collection, characterization of flows and system capacity, and making compelling arguments for significant investments.

Wildfires and Associated Off-Forest Flows

This may be the biggest stormwater challenge facing Flagstaff. Burned areas from wildfires can cause a ten-fold increase in stormwater flows. Wildfires also illustrate one of the ways that climate change causes reinforcing negative effects. Longer dry periods increase the risks of wildfires, wildfires burn the soil and strip it of its water holding capacity, and climate change increases the risk of more intense precipitation events. The net result is an expansion of the areas in and around Flagstaff where severe flooding can occur. These risks are directly proportional to burned area surrounding the City, which is increasing. Given that it can take decades for a forest to recover, in 10 years the total burned area surrounding Flagstaff could be significantly greater than it is today. In fact, recent wildfires have re-burned areas that were recovering from the 1977 Radio Fire and the 2010 Schultz Fire.

Risk to Older Infrastructure

Up to 40% of Flagstaff's older neighborhoods are at risk for significant flooding. These neighborhoods and their stormwater assets, built anywhere from 20 to 70 years ago, were constructed using different engineering design standards and arguably based on different weather assumptions and frequency of wildfires. In some cases, there were no standards at the time of the development. The Stormwater Section was created in 2003, with previous development review only occurring sporadically. Stormwater Fund increases in 2006, 2015, and 2019 were driven by increases in the deferred capital improvements list for Stormwater, a chronic issue that has not substantively eased due to increasing construction and design costs in the region. Also, it's not uncommon to find that construction failed to meet the standards in place at the time.

Characterizing Precipitation Events

It no longer makes sense to use the terms 100-year or 1000-year storms when these events are occurring every few years, or several times in one year. With accelerating climate change, weather patterns from decades ago are no longer a reliable indicator of future events. To plan appropriately, likely events must be defined using climate change modeling and data from more recent storms. These events must be characterized in terms of a footprint, which describes the amount of precipitation and flows that occur in a given area over a given time. Translating the risks of advancing climate into specific storm footprints will help to prioritize stormwater capital improvements.

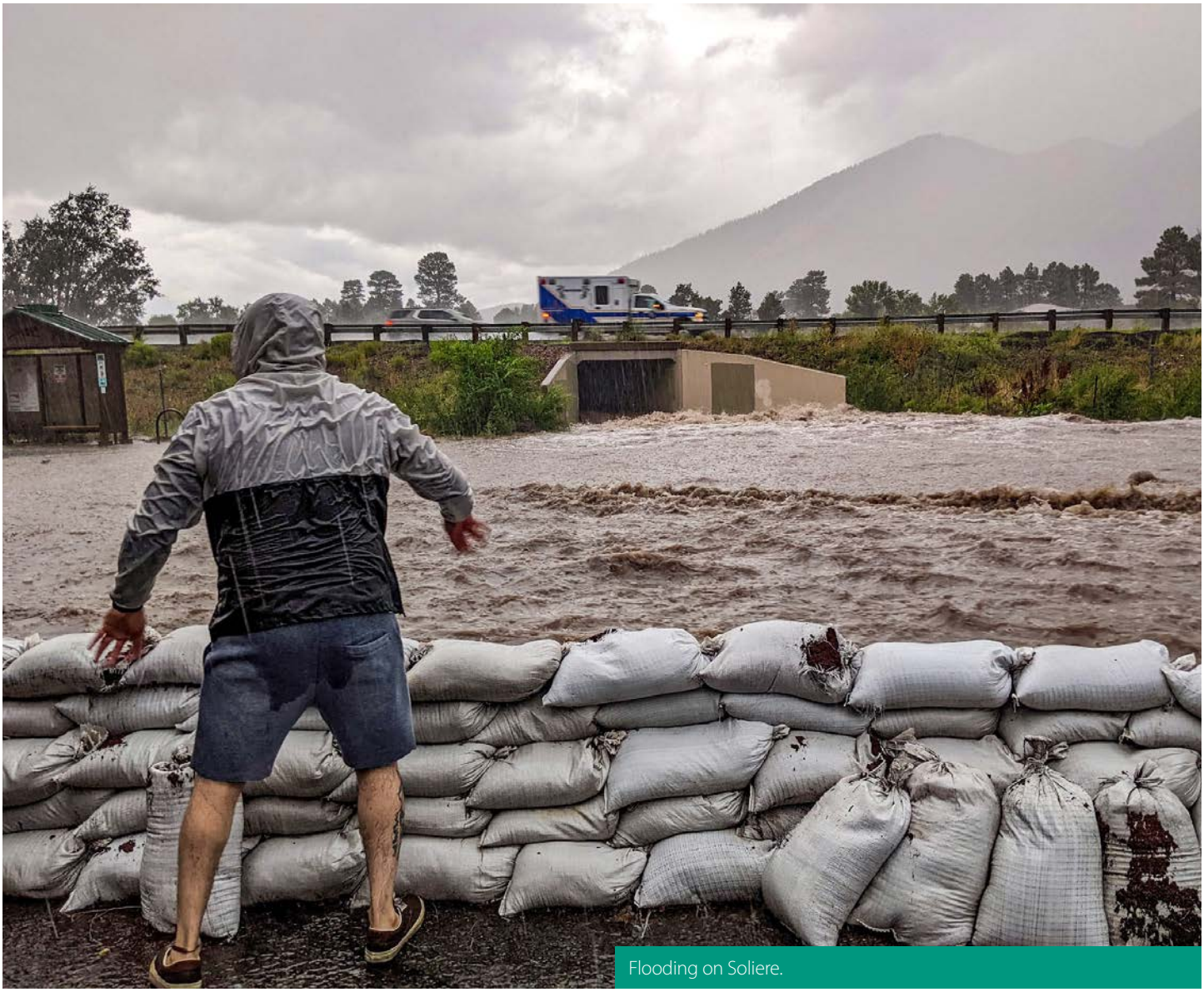
Human Resources

Today's staffing for the Stormwater Section is not aligned with the fact that it has all the roles of a fully functioning utility, the growing risk of flooding, and the human and financial costs of these risks. A significant increase in resources is needed to address flood response, planning, maintenance, analyses, and defining/prioritizing capital improvements.

The Overall Danger – Given the increasing frequency and severity of intense precipitation events and the increase in areas burned by wildfires, the risk that Flagstaff will fail to respond appropriately to stormwater and flooding issues is high unless significant changes are made in approach and available resources.

ASSESSING AND MITIGATING **RISKS**

Stormwater management is a risk management problem. The cost of severe weather events and flooding can be high, and climate change models predict that the frequency of these events is increasing. The challenge for the Stormwater Section is to ensure that the risk of damage due to flooding is low despite the changing climate and the cumulative impacts of development. Meeting this objective requires that the Section set clear performance standards, ensure that the system is sized appropriately, perform needed maintenance, and ensure that new development does not harm neighbors and or increase flooding risks.



Flooding on Soliere.

flagstaff.az.gov/utilities

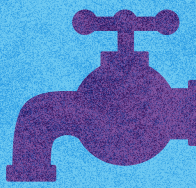
STRATEGIC **OBJECTIVES**

Using Strategic Objectives to Describe the Future

The Section's Strategic Plan employs several criteria for assessing future challenges and opportunities. These criteria include the following:

- Making sure that the Section is complying with current regulations and standards
- Responding to climate change, increasing wildfire threats, and changes in the condition of assets
- Addressing evolving community needs and taking advantage of opportunities to increase efficiency
- Ensuring that standards, risks, and needed investments are communicated clearly

Assessing the Section's activities using the criteria above has led to the development of a series of *Strategic Objectives* that address perceive needs and future performance to standards. They do not represent final policy decisions or reflect the availability of funding, rather they are recommendations for analyses or actions that should be pursued. In this sense, these objectives establish a framework for the Section's staff to continue clarifying the issues, establishing priorities, collaborating with experts, and leading a dialogue with the City Council and the community about investing appropriately in mitigating flooding and pollution risks.



SUMMARY OF STRATEGIC OBJECTIVES:

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

STRATEGIC OBJECTIVE NO. 1:
RESPOND TO WILDFIRE FLOODING RISKS AND EVENTS

Relevant Standards	• Protect public health, safety, and the local environment • Ensure that provisions to manage stormwater are resilient to climate change
Background	Flagstaff is surrounded by a forest, and unfortunately forests are periodically burned by wildfires. Wildfires not only burn down trees, but change the characteristics of the soil, specifically the ability for water to infiltrate into the soil. In fact, the biggest contributor to flooding after a wildfire is the changes in soil characteristics. This can increase peak stormwater flow by as much as 10 times that of non-burned areas.
Challenge/ Opportunity	• Climate change not only increases the risk of wildfires but also more intense monsoons and precipitation events, both of which Flagstaff is already experiencing. • In the last 12 years, Flagstaff has experienced 3 significant wildfires, (Schultz, Museum, and Pipeline) occurring in 2010, 2019, and 2022 respectively. Prior to these fires, the last significant fire impacting the City was the 1977 Radio Fire. Consistent with climate change models, this suggests that the frequency of wildfires is increasing. • It takes decades for a burned area to recover, some studies showing 80 years or more. In fact, the most recent fires around have re-burned areas that were still recovering from the Radio and Schultz Fires. • There are no practical ways to amend large areas of burned forest soils to speed recovery. • Since the frequency of wildfires is likely increasing, and recovery is very slow, in 10 years the burned area around Flagstaff could be significantly larger than it is today. So, the cumulative risk of flooding due to climate change (more intense storms and more burn area) will also increase with time. • More flooding in burned areas will require new stormwater assets, including culverts, channels, and detention/retention basins. This new infrastructure will also require ongoing maintenance. • Flagstaff is surrounded by federal lands, so efforts to reduce wildfire risks with preventative forestry practices must be coordinated through the appropriate authorities.
	• Analyze new burned area flooding risks and build preventative measures before flooding occurs. • Train staff in Incident Command System (ICS) and Incident Management Team (IMT) processes to integrate with City and County Emergency Management services. • Assess wildfire trends and develop CIP plan and staffing requirements associated with building and maintaining new stormwater infrastructure specific to addressing wildfire related flooding. • Conduct incident command system training for Stormwater Section staff • Create an IGA with the Flood Control District to determine roles and responsibilities

STRATEGIC OBJECTIVE NO. 2:
CLARIFY CLIMATE CHANGE CHARACTERISTICS AND OVERALL STORMWATER CHALLENGES

Relevant Standards	• Protect public health, safety, and the local environment • Ensure that the risks of flooding, or damage due to flooding, are low. • Ensure that provisions to manage stormwater are resilient to climate change
Background	Stormwater system performance and damage due to flooding are impacted by the severity and timing of precipitation events and the impacts of wildfires. These events produce stormwater flow rates that can either be handled by current stormwater infrastructure, or be overwhelmed, causing flooding and damage. The issue is not necessarily the overall severity of the storm, but the precipitation intensity on a given area in given period of time (the precipitation footprint).
Challenge/ Opportunity	Flagstaff is facing the following challenges related to climate change and increasingly severe weather. • Climate change is accelerating, which translates into accelerating uncertainty related to future weather patterns, especially in a given region, area, or neighborhood. • It no longer makes sense to characterize storms as 100-year or 1000-year events when these events are occurring every few years, or several times in a single year. With accelerating climate change, weather pattens from even 10 years ago are no longer a reliable indicator of future events. • A drying trend that increases the risk of wildfires, higher flooding risks due to intense monsoons, more rain-on-snow events, and large storms with wet snow are all consistent with climate change modeling and recent experience. These events will continue, and likely be more severe, in the future. • If recent record monsoons had occurred in older or more vulnerable neighborhoods, the damages could be catastrophic and endanger lives.
Specific Responses	• Consider recent weather events and trends, general climate change modeling, and consult with climate experts on Flagstaff's weather to create a clearer picture of the weather events that should be considered in Flagstaff's stormwater planning. • Translate weather events into precipitation footprints. Express these footprints in terms of amount of water, area, time, and resulting flow rates. • Consider adding a climate change acceleration factor to recent storms, weather conditions, and even wildfire frequency to account for changes likely to occur over the next 10 years. • Produce a substantive and easy to read brief that clarifies weather patterns, including information on precipitation footprints, spatial trends, and plans to improve this information over time. • Enhance the rain and flow gauge network and the emphasis on hydrology in the Stormwater Section. This will create a stronger foundation for understanding stormwater footprints, flows, spatial trends, and for improving emergency alerts to first responders and residents. • Use the increased clarity on weather events to continue optimizing system maintenance and Capital Improvement (CIP) projects and priorities. • Consider the appointment of a dedicated hydrologist for the stormwater section • Conduct modeling of various climate change and land use change scenarios to determine the range of stormwater system capital investment needed to meet future challenges

STRATEGIC OBJECTIVE NO. 3:
MAXIMIZE/OPTIMIZE STORMWATER SYSTEM MAINTENANCE

Relevant Standards	• Protect public health, safety, and the local environment • Ensure that provisions to manage stormwater are resilient to climate change • Minimize the number of flooding or drainage complaints caused by maintenance problems
Background	For the stormwater system to function at its capacity, it must be well maintained. This means ensuring that the system is clear of debris and that assets are in good condition (not crumbling or past their useful life).
Challenge/ Opportunity	Consistent with climate change models, the intensity of rainstorms in Flagstaff has been increasing. • Flagstaff has experienced "100-Year" storms in 2014, 2016, 2018, and a "1000-Year" storm in 2018. Storms that were considered very unlikely may now be the norm. • Given increasing flooding risks and frequency of flooding, maintenance is critical. Approximately 80% of drainage complaints are related to maintenance issues. • System maintenance is becoming increasingly more difficult with repetitive flood events, debris flows, and sediment flows from wildfires. • Maintenance conditions can change rapidly. A cleared grate can become blocked again the next day. • Until recently, the stormwater system was not fully defined or documented, which made it difficult to perform proactive maintenance. • Assessing asset conditions on closed systems and culverts is difficult. These types of assets have not been completely characterized. • Many stormwater assets are privately owned and maintained. The performance of these assets is important for protecting neighbors and overall performance of the system. • If the system is not appropriately maintained, it's more difficult to evaluate design issues and capacity. • Emergency response demands the time and resources of the Stormwater staff, making it more difficult to accomplish annual system maintenance and improvements
Specific Responses	Appropriate maintenance based on clearly defined standards is the foundation for effective stormwater management. Given the risks associated with climate change and Flagstaff having an under-sized system in many areas, the Stormwater section should adopt a highly proactive approach to maintenance. • Complete the definition of the stormwater system, including assessing the condition of all significant underground stormwater assets. • Categorize drainage complaints or flooding events as either maintenance or design related and use these data to refine maintenance standards and activities. • Develop or refine current standards that define optimum system maintenance, clearly specifying the balance between proactive and reactive maintenance. • Establish clear response times to maintenance related drainage complaints. • Update the maintenance workplan to meet updated standards, making sure to address seasonal considerations in maintenance scheduling and level of effort. • Produce annual maintenance report for the stormwater system that addresses performance to standards, identifies new or refined standards, and outlines changes to maintenance activities.

STRATEGIC OBJECTIVE NO. 4:
CLARIFY SERVICES LEVELS AND ENHANCE CUSTOMER SERVICE

Relevant Standards	• Protect public health, safety, and the local environment • Ensure that the risks of flooding, or damage due to flooding, are low • Ensure that provisions to manage stormwater are resilient to climate change • Provide flood proofing technical and financial support for at-risk properties • Provide exceptional customer service based on clearly defined standards • Respond to drainage complaints withing 24 hours
Background	Stormwater fees for a property are based on the amount of impervious surface (roofs, driveways, parking lots etc. because this increases runoff and flooding risks. Fees are used to fund the activities of Flagstaff's Stormwater Section, which has been established to regulate, operate, protect, maintain, and enhance the stormwater drainage systems in the City. Collecting fees requires that the Stormwater Section define the value that these fees produce in terms of standards and service levels. Also, the Stormwater Section interacts with residents at a grass roots level, so customer service standards need to be clear.
Challenge/ Opportunity	• The Stormwater Section is clearly responsible for stormwater maintenance and CIP efforts, but it's less clear what stormwater fees actually cover with respect to resolving flooding problems in specific neighborhoods, specific properties, and the timeframe in which issues will be addressed. • Recently, the Stormwater Section has been given new flood response responsibilities previously handled by the County, signaling a pivot to both regional and urban flood control roles. • Lack of clarity about stormwater service levels translates into lack of clarity about liability. • Up to 40% of the properties in Flagstaff are susceptible to flooding simply due to the historic periods in which they were constructed. For example, homes and other buildings built below street level or built before the year 2000 do not meet present-day standards for protecting against inundation. Given the increasing storm intensities caused by climate change, their susceptibility to flooding will only get worse with time. • Service levels must define whether flooding issues and risks will be addressed with system level solutions, including timeframes, or individual structure flood proofing support. • The impacts of a wildfire can cause a 10-fold increase in stormwater flows, for example 1.5" of rain per hour causing a 100-year flow. Services levels related to flooding risks from wildfires are unclear. Sandbags and modular barriers are not acceptable long-term solutions. • Often, addressing whether the City is responsible for resolving a stormwater issue for a specific customer has boiled down to assessing whether the City did something, or allowed something to occur, that caused the problem. • Stormwater staff often address issues that are not the responsibility of the Stormwater Section.
Specific Responses	• Develop more detailed standards related to service levels for maintaining and enhancing system assets and risk mitigation for individual properties and customers. • Review Stormwater Section activities and ensure that these activities are within the scope of responsibilities for the Section. • Improve emergency response communications by improving the rain and flow gauge system • Integrate the Stormwater Section with City and County Emergency Management in relevant flood standards, planning, and external funding requests

STRATEGIC OBJECTIVE NO. 5:
INCREASE SUPPORT FOR FLOODPROOFING OF INDIVIDUAL STRUCTURES

Relevant Standards	• Ensure that the risks of flooding, or damage due to flooding, are low. • Evaluate flood proofing technical and financial support for properties at high risk
Background	There are two basic ways to minimize damage caused by a severe stormwater event. The first is to ensure that the local and city-wide drainage infrastructure has the capacity to ensure that flooding of homes or buildings does not occur. The second is to install flood proofing measures in individual properties to minimize damage during a flood, and/or restrict the flooding to outdoor areas.
Challenge/ Opportunity	Since climate change impacts are accelerating, it will be a major challenge for the Stormwater Section to plan, secure approval, and construct projects in the near terms that will minimize flooding risks for all neighborhoods. Until this gap is resolved, some property owners and businesses will experience flooding and flood damage (especially during the next 10 years).
Specific Responses	• Based on risks and timing of CIP improvements, identify neighborhoods that remain at higher risk for flooding and should be implementing flood proofing provisions. • Work to develop a program and funding sources to provide technical and financial support for customers in areas of need and who wish to implement flood proofing measures. • Work with the Sustainability Division and Housing Division on an integrated floodproofing grant program.

Sandbags.

STRATEGIC OBJECTIVE NO. 6:
ENHANCE CIP PROCESS AND UPDATE CIP PRIORITIES

Relevant Standards	• Sound planning and appropriate investment in stormwater assets and management • Protect public health, safety, and the local environment • Ensure that the risks of flooding, or damage due to flooding, are low • Maintain a quantitative and transparent process for identifying and prioritizing CIP projects • Minimize the number of properties in FEMA floodplains • Make compelling arguments for capital investments • Stormwater projects must solve the whole problem, not just move it to another area
Background	The biggest stormwater risk for Flagstaff is the ability of neighborhoods and the stormwater system to withstand the extreme weather events and flows due to climate change and the increased hardscape caused by development. (An increase in hardscape requires detention/retention and LID to ensure that the lot mimics it's preconstruction hydrologic performance). The Stormwater Section must have a process for evaluating these risks and prioritizing improvements.
Challenge/ Opportunity	• Flagstaff's current stormwater control system and specific infrastructure in older neighborhoods is under-sized (as many as 40% neighborhoods) with respect to handling more intense storms with larger precipitation footprints and peak flows. • Mitigating flooding in a neighborhood or area must ensure that these improvements do not move the problem to other areas. This typically increases the complexity, size, and cost of the project. • Flooding risks for a given neighborhood or area are affected by its location, the Stormwater codes were in place at the time of construction, whether these codes were followed, and the Stormwater standards that were applied to infill development or redevelopment. Buildings and neighborhoods constructed before 2001 are typically most vulnerable to flooding. • The Greenlaw neighborhood has experienced three 100-year storms in three years. In every case it experienced significant flooding because there is no access to underground stormwater assets and the neighborhood did not maintain its privately owned drainage conveyances. • The process for developing CIP projects and the standards for setting priorities has been too qualitative and not very transparent. This leaves the door open for a reactive approach to setting project priorities, which typically results in less efficient capital allocation. • There are no clearly defined standards for permanently addressing the flooding risks for areas affected by wildfires.

Objective No. 6 continued on page 18

STRATEGIC OBJECTIVE NO. 6:
ENHANCE CIP PROCESS AND UPDATE CIP PRIORITIES

Continued from page 17

Specific Responses

- Increase Stormwater Section focus on assessing flooding risks for specific areas and neighborhoods, prioritizing of CIP projects, and on stormwater project management.
- Implement master planning and regional modeling to support CIP planning and prioritization.
- Develop transparent risk assessment and weighting factors for prioritizing capital improvements to local infrastructure and the public stormwater.
- Consider weather expectations, effects of wildfires, system characteristics, public safety, costs of property damage, and project costs in the CIP evaluation process.
- Develop a more comprehensive database related to flood damage locations, costs, and the conditions under which this damage occurred.
- Adopt an explicit structure for making compelling arguments for investing in staff, data systems, analysis capabilities, and infrastructure.
- Provide oversight on the Rio de Flag project to ensure that it maximizes local flood mitigation in downtown and other impacted areas.
- Transition Stormwater Section to be the Project Manager for all Stormwater Projects, including funding and management of Spot Stormwater Improvements.

Basin construction.

STRATEGIC OBJECTIVE NO. 7:
ENHANCE DEVELOPMENT REVIEW PROCESS AND DEVELOPER SUPPORT

Relevant Standards	• Ensure that the risks of flooding, or damage due to flooding, are low. • Ensure that new development, infill development, and redevelopment do not increase or redirect peak stormwater flows • Ensure that provisions to manage stormwater are resilient to climate change • Ensure that new development does not cause a cumulative increase in flooding risks • Ensure that soil for new development is properly stabilized during and after construction • Support developers in implementing the most effective and cost-effective stormwater protections • Be transparent related to development standards and the costs of code compliance • Ensure that the City Council and city managers understand the cost/benefit analysis of stormwater codes and Best Management Practices (BMPs) related to development
Background	The immediate concern related to new development is that a neighbor will be flooded or have sediment dumped on their property due to development nearby. This can occur because the builder or contractor did not comply with Stormwater codes or BMPs, or that a storm was so intense that these provisions were inadequate. The longer-term and broader impacts of development are an increase in the total area of hardscape and increasing total flows to the stormwater system.
Challenge/ Opportunity	• The costs to implement flood prevention provisions for new development in Flagstaff are significant but typically less than other communities. However, relative development costs in Flagstaff are high, which puts pressure on flood control provisions and expenses. • Increasing climate change impacts call into question whether infill and redevelopment standards should be based on more severe precipitation footprints. • Current Stormwater regulations covering new development address peak flows and are designed to ensure that flooding of neighbors does not occur. But these regulations do not address total flow, which means that over time total flow and flooding risks are increasing. (An increase in impervious surfaces requires detention/retention and LID to ensure that the lot mimics it's preconstruction hydrologic performance in its post-construction state.) • Cost for basic soil stabilization during construction and for a newly developed sites are relatively low, yet a few contractors still resist implementing these provisions. This is challenging because contractors argue that they aren't being paid for landscaping. The City still requires that BMPs be installed to prevent off lot erosion and sedimentation. • 90% of contractors are very cooperative in terms of implementing stormwater provisions. Yet, complaints by a few contractors to city council and city management skew perceptions about the efficacy of codes and BMP's and the collaborative approach of the Stormwater Section. • City Council members and city management could be better informed about basic Stormwater principles, standards, and the relative cost of meeting regulations and implementing BMP's.

Objective No. 7 continued on page 20

STRATEGIC OBJECTIVE NO. 7:
ENHANCE DEVELOPMENT REVIEW PROCESS AND DEVELOPER SUPPORT

Continued from page19

Specific Responses

- Produce a substantive yet brief report on compliance with development codes, including the key issues and ramifications of non-compliance.
- Identify compelling changes to development codes that would address the increase in flood risks over time due to climate change and the increasing amount of hardscape.
- Clarify the link between the cost of a drainage report and eventual construction costs, helping developers optimize compliance and flood control benefits with costs.
- Clarify the process for managing disputes with developers and ensure that this process is approved by the City Manager and the City Council.
- Using this strategic plan as the context, conduct a workshop with Council and city management covering basic stormwater management principles, development standards and BMPs, and the costs and benefits of implementing various stormwater provisions.

Schultz basin.

STRATEGIC OBJECTIVE NO. 8:
IMPROVE COLLABORATION AND COMMUNICATIONS

Relevant Standards	• Build a strong reputation, maintaining trust and support from the community • Provide exceptional customer service based on clearly defined standards • Encourage meaningful public participation in stormwater issues and policy making • Make it easy for people to be substantively informed about critical stormwater issues in Flagstaff
Background	The Stormwater Section is charged with maintaining flood protection and pollution prevention. Both of these require appropriate investment in resources and infrastructure. Securing this investment requires that the Section be trusted related to its operations, planning, and investment proposals. The ability of city council members, city management, and public to understand Stormwater Section performance, maintenance, and capital improvement needs depends on their understanding of stormwater principles and issues. This requires strong communications by the Stormwater Section.
Challenge/ Opportunity	• As technical organizations, many utilities struggle with defining the most effective and efficient way to communicate with policy makers, employees, and the community. • Shared information is often too technical and without sufficient context, and communication activities are often not tied to specific standards or outcomes. • Other city departments know little about stormwater management and activities. • It's likely that council members and city management are not adequately informed about stormwater basics, key issues, and mitigation priorities. • The Stormwater Section is now a utility, and this involves interacting with other departments in the City as well as businesses, developers, and residents. Communication protocols need to be improved, especially when communicating with the city manager or city attorneys.
Specific Responses	• Develop a stormwater strategic plan to clarity stormwater issues, challenges, and opportunities and use plan as the context for communications with the council and city management • Build stronger relationships with policy makers, the water commission, and other influencers in the City. Ensure that these key audiences are substantively informed about stormwater issues. • Carefully review all communications leaving the section, including establishing and adhering to specific communication standards and protocols. • Recognize that support for investing in activities, staff, and CIP is tied to the quality of communications. A compelling case for investment is typically approved. • Adopt a clear structure for making compelling investment proposals that includes background information, the relevant standards, the problem or opportunity, the proposed solution, timing considerations, costs, and the ramifications of failing to act. • Define and communicate the major stormwater areas (drainages) to facilitate communications about stormwater basics, issues, risks, and needed investment. • Conduct a Stormwater Summit with key stakeholders.

STRATEGIC OBJECTIVE NO. 9:
ADDRESS STORMWATER SECTION HUMAN RESOURCE NEEDS

Relevant Standards	• Sound planning and appropriate investment in stormwater management and assets • Protect public health, safety, and the local environment • Ensure that the risks of flooding, or damage due to flooding, are low. • Ensure that provisions to manage stormwater are resilient to climate change • Maintain adequate staffing for Stormwater Section
Background	The Stormwater Section operates as a fully functioning utility. It must ensure the reliability of stormwater infrastructure in the face of climate change, assess flooding and pollution risks, respond to floods, plan and secure investment for needed capital investments, and routinely interact with customers and developers. All of these efforts require adequate staffing and human resources.
Challenge/ Opportunity	• The Stormwater Section has many strategic and operational issues to address, as outlined in this plan. However, for the most part current staffing levels (five full time professional employees and two field staff) allow for only reacting to current problems and flooding crises. • The Section has only two part time maintenance workers that are shared with and managed by the Sewer Collections department. This is not sufficient to provide needed maintenance today and the increasing maintenance as time passes. Also, there is insufficient staff to utilize current stormwater maintenance equipment. • The support for new development is at minimum levels, only allowing for inspections of commercial properties. Single family home inspections cannot be supported beyond ADUs/ garages being inspected at the footing phase and at building final inspection in order to minimize potential for erosion and sedimentation after the project is completed. • As new infrastructure needs increase, the need for capital project management increases • Recently, the Stormwater Section has taken on new responsibilities that were previously being performed by the County. This has further stretched Section resources.
Specific Responses	• Complete comprehensive staffing analysis to identify all staffing needs • Provide for 2-4 dedicated staff members to perform stormwater system maintenance • Bring CIP project management inside the Stormwater Section, adding two project managers.

CLOSING **REMARKS**

The Flagstaff Water Services Strategic Plan 2025 established stormwater as a critical issue and outlined the high-level challenges and responses. This strategic plan provides a more detailed picture of the values, standards, and major issues facing Flagstaff and the Stormwater Section in the near future. Given the accelerating impacts of climate change, the cumulative increase in hardscape from development, and the increasing frequency of wildfires, stormwater risks continue to rise, especially in older neighborhoods and those areas not enhanced by the Rio de Flag stormwater project. This is a highly visible problem in the City, and the impacts of climate change are dynamic. The Stormwater Section must have the skills and resources to provide the appropriate planning, analyses, customer service, and flood response the community needs.

Strategic Objectives

The Strategic Objectives in this plan highlight the need for the Stormwater Section to clarify services levels for individual property owners or homeowners, provide greater support for individual structure flood proofing, proactively address the flooding risks created by wildfires, put greater emphasis on understanding storm footprints, enhance the CIP project criteria and priority setting, and improve system maintenance. Supporting new and infill development has been a major focus of the Section, however, this can be enhanced with better communication about the efficacy of stormwater codes and BMP's, and when possible, doing more to help developers provide greater stormwater protections at a lower cost. In conjunction with this strategic plan, the Stormwater Section will strive to enhance its communications, including communicating the logic behind stormwater standards, emphasizing the most pressing problems, and making compelling arguments for investment.

Increasing Impacts and Investment

Given the accelerating impacts of climate change and the cumulative effects of development, investment in stormwater planning and mitigation will increase. Consequently, the Stormwater Section's ability to develop clear standards, collect and analyze the appropriate data, and make compelling arguments for investment will be critical.

Ongoing Strategic Plan Communications

The Stormwater Section will continue to communicate and discuss the issues in this Strategic Plan with the City Council, city management, and the community, especially the financial implications of proposed solutions and the ramifications of failing to act.

NEXT STEPS AND **ACKNOWLEDGEMENTS**

Brief the Water Commission and City Council on this Plan, identify staff champions for each Strategic Objective, establish an implementation process, and provide progress updates every six (6) months to Water Services Division Staff and City Management.

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