

City of Flagstaff  
Council Retreat Presentation  
**Stormwater  
Infrastructure Briefing**

**A 2021 Assessment**





TEAM FLAGSTAFF

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# Stormwater in Flagstaff: Current Projects and Future Options



# Current Capital Projects

*from 5-year Capital Plan, focused on:*

- Rio De Flag Flood Control Project
  - Side Laterals/Improvements that connect to Rio De Flag
  - Spot Improvements – Annual Allocation
    - ✓ Dedicated to ongoing drainage issues
- **Funded through current (2019) stormwater rate fee**
- \$3.74 per Equivalent Runoff Unit - ERU (1500 sq ft impervious surface)
  - Projects identified in 2007-2010 Northeast Area Master Drainage Study (NEAMDS)



# Current Capital Projects

## **FY22 Projects, Prioritized Annually:**

- Phoenix Ave Bridge (underway in 2021)
- Linda Vista Culvert at Spruce Wash (completed in 2020)
- Rio De Flag Lateral – Santa Fe Ave.
- Rio De Flag Lateral – Malpais (Clay Wash)
- Columbia Circle ~ replaced with Steve's Wash at Soliere Ave. (early 2020)
- Rio De Flag Lateral – Downtown
  - ✓ A 2021 FEMA BRIC grant application was denied as uncompetitive
- Fanning Wash at Route 66

# FY22 Stormwater Capital Budget

**\$8.3 Million**

Includes Annual Base  
Budget Allocation of

\$700,000 for  
Improvements

and Rio De Flag projects



- **Spruce Wash** (Museum Fire response)
  - ✓ Dortha Channel Improvements
  - ✓ Killip Detention Basin- design
  - ✓ Channel improvements
    - **FY22 \$1.8 Million**
- **Rio De Flag Projects and related Laterals**
  - **FY22 \$4.2 Million**
- **Other Projects, Reserves**
  - ✓ Phoenix Bridge
  - ✓ Spot Improvements
    - **FY22 \$2.3 Million**

➤ **No funding for other watersheds**



# *What Changed?* Summer 2021



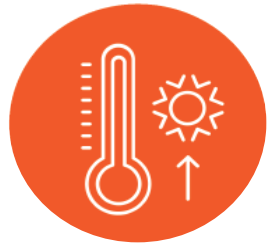
## **First True Monsoon Season Since 2019 Museum Fire**

- **Flooding from Museum Burn Scar**
  - ✓ Two years of record dry summers
  - ✓ Four large flood events in Summer 2021
  - ✓ Ongoing flood threat exists downstream of the burn area
- **200-year Rain Event on south side of Mt. Elden**
  - ✓ Event incised mountain slopes and channels
  - ✓ Upper and lower Fanning Wash now at greater risk
  - ✓ Damage to watershed and city infrastructure

# Climate Change in Flagstaff



Compared to today, by 2050, on average we can expect to see...



- Hotter temperatures.
- Increased aridity and more severe drought conditions.



- Less snowpack.
- More precipitation as rainfall instead of snowfall.



- Increased wildfire risk.

Climate change will have cascading impacts in our community from health to housing.



Water



Land Use & Housing



Tourism & Economy



Health

# Vulnerabilities: Water Supply, Quality, & Infrastructure



## AVAILABILITY

**HIGH  
VULNERABILITY**



Reduced water availability and increased demand could cause water shortfalls.

## QUALITY

**MEDIUM-HIGH  
VULNERABILITY**



More wildfire, drought, and flooding are likely to impair water quality.

## INFRASTRUCTURE

**HIGH  
VULNERABILITY**



More wildfire and flooding are likely to significantly damage natural and human-made water infrastructure.



# Options - Museum Fire Flood

## Option 1. Continue Annual Response

- ✓ Potentially **\$1.8 million annually** in clean-up response, or **\$18 million** over 10 years.

## Option 2. Spruce Channel Improvements

- ✓ Improvements to existing infrastructure footprint at **\$12-\$18 million**

## Option 3. New Stormwater infrastructure

- ✓ Add 6-8 ft dia. pipe/tunnel, running parallel to existing wash at **\$10-\$30 million**



# Current Options - Museum Fire Flood

## Option 1. Continue Annual Response

- The Summer 2021 Flood Cleanup cost \$1.8 million
  - ✓ The burn scar in Spruce Watershed will take **10 years** (or more) to heal, potentially costing **\$18 million** reacting to flood events
  - ✓ This doesn't include recurring private damage, indirect community costs or County costs (sandbags)
- **Actual costs may be significantly higher.**





# Current Options - Museum Fire Flood

## Option 2. Spruce Channel Improvements

- **\$12-18 million** in improvements within existing Stormwater infrastructure footprint, from Paradise Rd to Route 66
  - Add enhancements to existing infrastructure
  - Increase flow capacity through the city
  - Minor adjustments to Stormwater footprint
- Upstream channel detention and retention projects must occur to attenuate flows to city's design flow capacity



# Current Options - Museum Fire Flood

## Option 2. Spruce Channel Improvements *(existing footprint)*

|  |              |
|--|--------------|
| • Spruce Channel Master Plan Development | \$ TBD       |
| • Paradise Channel Improvement           | \$ 140,000   |
| • Park Way area detention/retention      | \$ 3,000,000 |
| • Linda Vista culvert improvement        | \$ 1,000,000 |
| • Cedar culvert improvement              | \$ 1,000,000 |
| • Dortha Inlet improvement               | \$ 800,000   |
| • Arroyo Seco Diversion                  | \$ 1,000,000 |
| • Killip School Detention Basin          | \$ 4,600,000 |
| • Channel Improvements (various)         | \$ 600,000   |

- **Estimated Range, with inflation and contingency: \$12-18 million**
- **Does not include Forest Service/Flood Control District coordination**



# Future Options - Museum Fire Flood

## **Option 3. New Stormwater Infrastructure** *(new footprint)*

- Future need, based on re-evaluation of Master Plan
  - A long-term strategy for post-fire flow mitigation
  - Provide additional capacity beyond improvements to existing channel alignment
  - Would work in **tandem with Option 2**, Improvements to Existing Infrastructure
  - Cost: Without design input, likely **\$10- \$30 million**
- **Effectiveness is uncertain based on changes in watershed condition, climate change and future storm intensity.**



# Museum Fire - Discussion

## Review Options:

### Option 1. Continue Annual Response

- ✓ Potentially **\$1.8 million annually** in clean-up response, or **\$18 million** over 10 years.

### Option 2. Spruce Channel Improvements

- ✓ Improvements to existing infrastructure footprint at **\$12-\$18 million**

### Option 3. New Stormwater infrastructure

- ✓ Add 6-8 ft dia. pipe/tunnel, running parallel to existing wash at **\$10-\$30 million**

Questions or Direction on Museum Fire/Flood?



# Mt. Elden Drainage Issues

## Damage to Fanning Wash and in Appalachian and Shadow Mountain neighborhoods

- Rain events created newly-incised channels, which efficiently directed flows into these neighborhoods



- **Flooding caused greater damage in these neighborhoods than the 2021 Museum Fire scar, as social media recorded cars floating downstream**



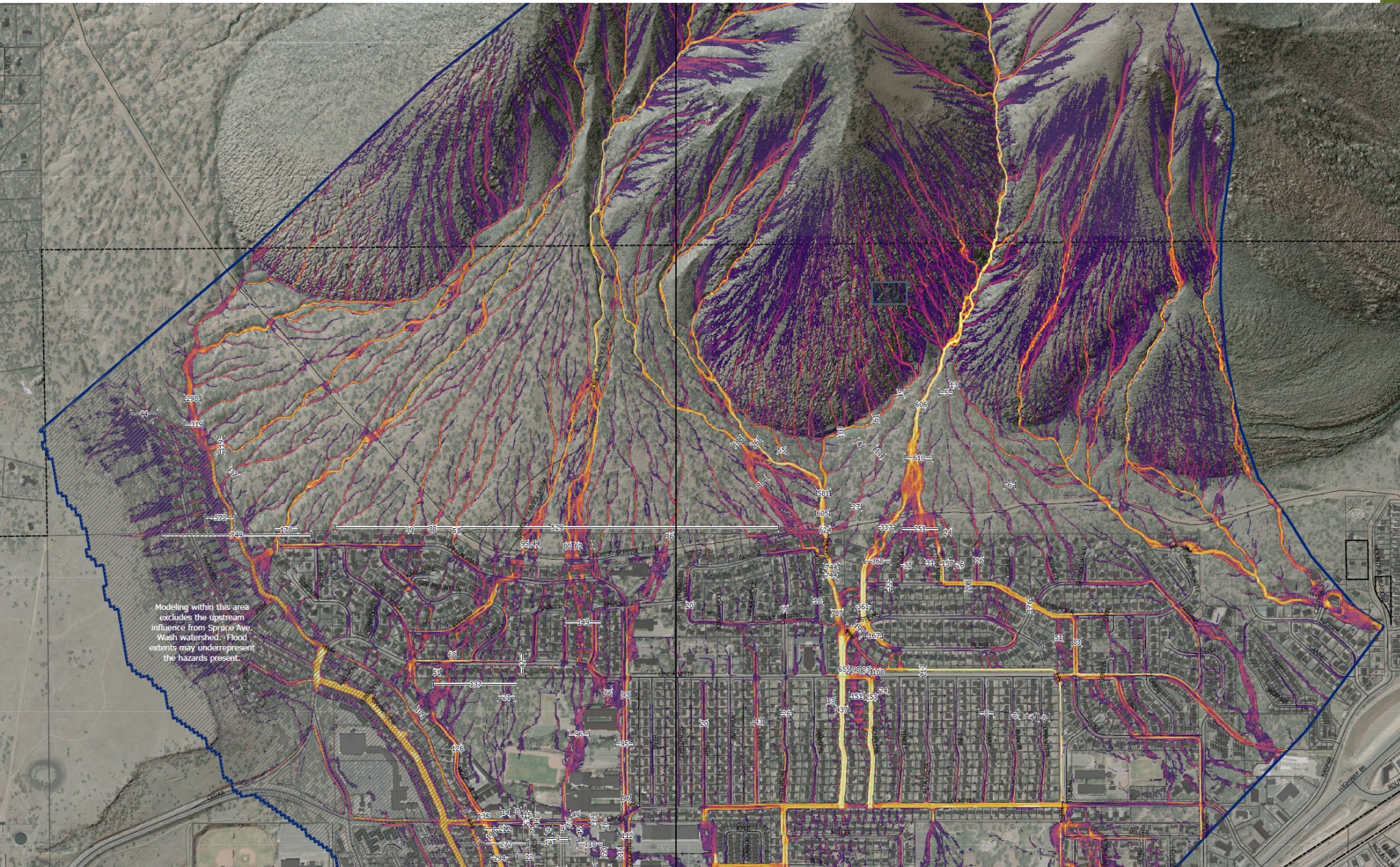
# Mt. Elden Drainage Issues



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Drainages south  
of Mt. Elden

Hydrologic  
model created  
shortly after  
flood events





# Current Options – Mt. Elden Drainage

## Mitigation Costs

- **Detention basin on Pipeline property**
  - ✓ Mitigates flooding through Shadow Mountain neighborhood
  - ✓ Cost: \$2.9 million
- **Channel diversion on Pipeline property**
  - ✓ Mitigates flooding of Appalachian Dr. and Monte Vista Dr.
  - ✓ Cost: \$830,000
- **Fanning Wash improvements**
  - ✓ Needed to mitigate Steve's Blvd, Hemberg Dr. and Route 66
  - ✓ Cost: Unknown, likely \$2 million range



# Stormwater Budget Summary

## CIP and Maintenance

- **CIP annual budget**..... approximately \$700,000
- **Maintenance budget**..... approximately \$300,000
  - 33% open channel, 66% closed system
- **Additional funding needs:**
  - ✓ Museum Fire mitigations: **\$18M – Option 1 or Option 2** (CIP)
  - ✓ Mt. Elden mitigations: **\$6M** (CIP)
  - ✓ Additional maintenance: **\$80,000/year** in additional maintenance
  - ✓ Long-term Museum Fire funding -**Option 3: \$10-\$30M** (estimate)

# Stormwater Infrastructure Briefing

Council Budget Retreat  
September 30, 2021



Questions ?

# Financial Considerations Water Services





# Financial Considerations

## Wastewater and Stormwater Needs

- Wildcat Hill Funding - Options 1 or 2
  - \$45+ Million for 5-Year Plan
  - \$135-\$268 + Million to complete Option 1 or 2
- Stormwater
  - Post wildfire flood mitigation – Museum fire flood area
    - \$12-18 Million over next 5 years
  - Mt Elden Drainage Mitigations
    - \$6 Million over next 5 years
  - Additional annual maintenance needs: \$80,000



# Financial Considerations



| Type of Funding (no priority order)  | Wastewater (\$180-\$313M)         | Stormwater (\$25M)                |
|--|-----------------------------------|-----------------------------------|
| User Fees/Pay as you go<br><ul style="list-style-type: none"> <li>Increase user fees to fund projects</li> </ul>   | Yes                               | Yes                               |
| <b>Capacity</b> Fees – Growth related portion only<br><ul style="list-style-type: none"> <li>Increase capacity fees to fund</li> </ul>                         | Yes, Partially                    | No                                |
| Debt Financing (Revenue Bonds/Water Infrastructure Loans)<br><ul style="list-style-type: none"> <li>May need User Fee and/or Capacity Fee increases</li> </ul> | Yes, may require change in policy | Yes, may require change in policy |
| Federal and/or State Funding<br><ul style="list-style-type: none"> <li>Future federal infrastructure bills</li> </ul>  | Yes                               | Yes                               |
| Re-prioritize existing capital equipment and project   | Maybe some, but not enough        | Maybe some, but not enough        |
| General Obligation Bonds – Secondary Property Tax<br><ul style="list-style-type: none"> <li>Possible for November 2022 election (or later)</li> </ul>          | Yes                               | Yes                               |
| General Fund Support   | Yes                               | Yes                               |
| Sales Tax – Possible future election   | Yes                               | Yes                               |

# Questions?

