Flagstaff Water Resources Master Plan

(WRMP)

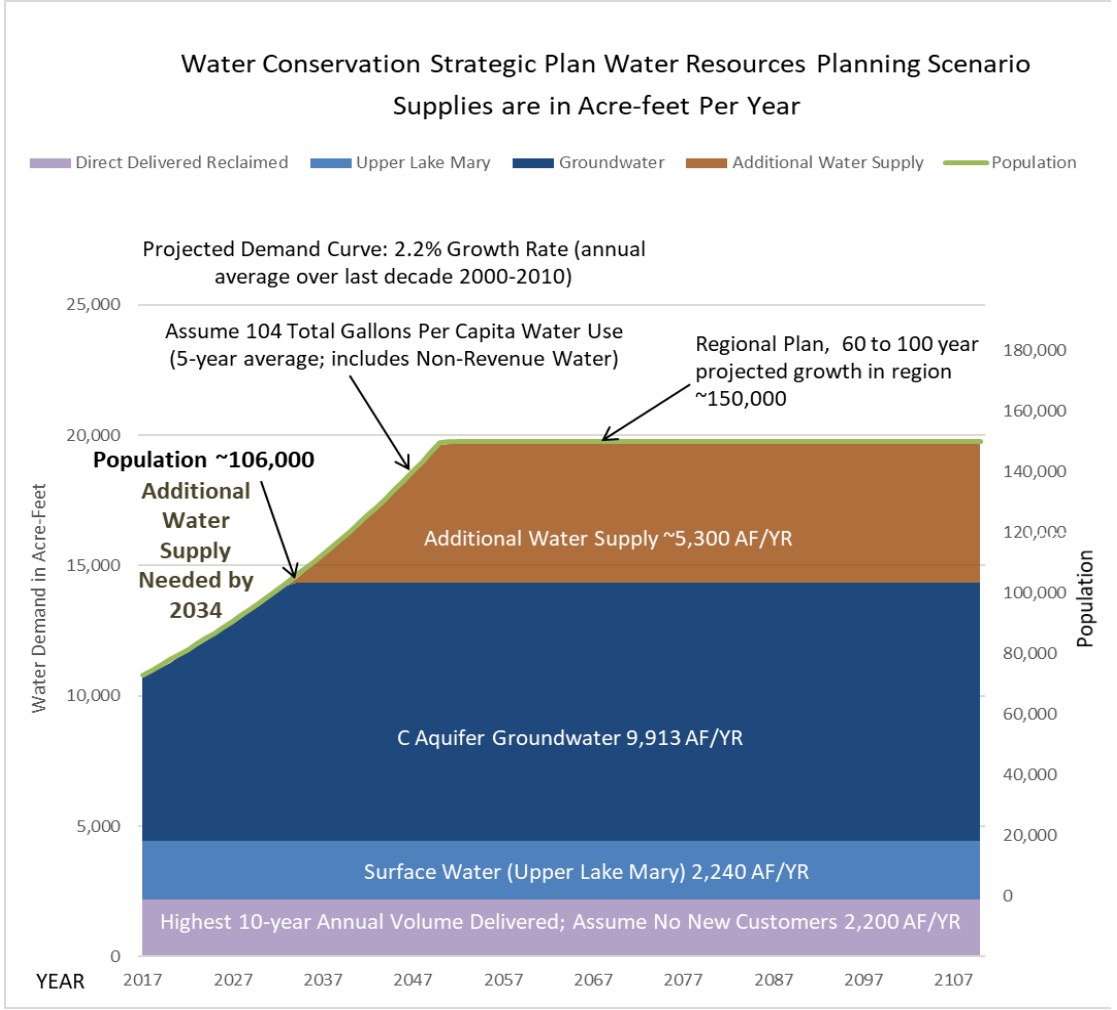
FLAGSTAFF WATER SERVICES
WATER RESOURCES & CONSERVATION

CITY OF FLAGSTAFF · ARIZONA · ESTABLISHED 1882 ·

Brown AND Caldwell

Why Now?

- Additional water supplies needed as soon as ~20 years
- Available options have significant cost
  - Red Gap Ranch
  - Potable reuse with advanced treatment
- Update 2011 Draft Master Plan
- Update Adequate Water Supply Designation
- Build resilience in water resource portfolio
  - Impacts of climate change
  - Sustainable aquifer pumping



Source: City of Flagstaff

Proposed Project Team

- **Brown and Caldwell:**
  - Katie Vanyo, P.E.* - One Water Project Engineer, COF WRMP Project Manager
  - Adias Fostino* - Phoenix Municipal Group Project Environmental Engineer
  - Kirk Westphal, P.E. – National Water Resources Leader
  - Robert McCandless, P.E. – Regional One Water Leader

  Subconsultants:
  - **WestWater Research (WWR)** – Rate analysis and economics
  - **Southwest Decision Resources (SDR*)** – Stakeholder engagement and public outreach

*Indicates NAU graduate or local resource

Goals and Objectives

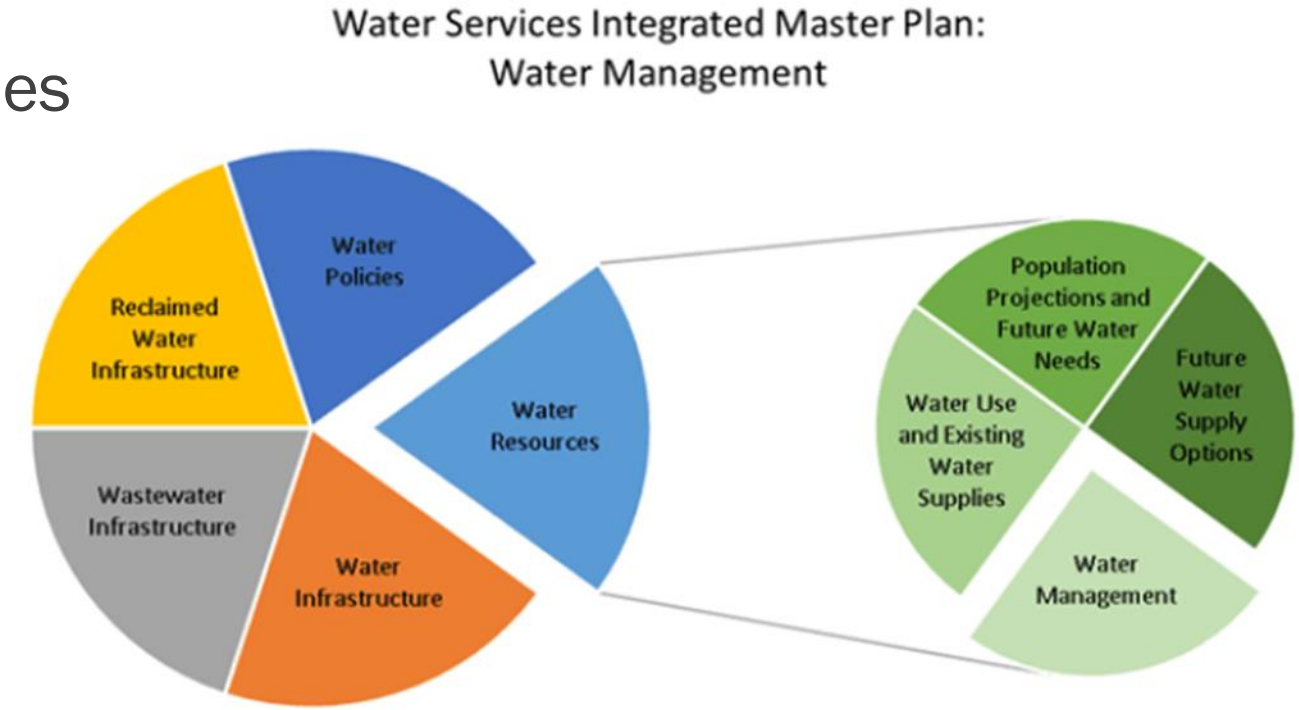
- Goals and Objectives:
  - 1.5 year planning effort
  - Provide a roadmap to implement water management strategies that satisfy near-term and long-term water demands
  - Develop a sustainable water budget
  - Develop value-based sustainability metrics
  - Assess water supply options for alignment with City's Climate Action and Adaptation Plan (CAAP).

- Key Components:
  - Collaborative effort – Commission, Council and community
  - One Water approach
  - Align integrated planning approach with community goals, values, resource protection and resource utilization

Source: Water Research Foundation Blueprint for OneWater

Major Elements

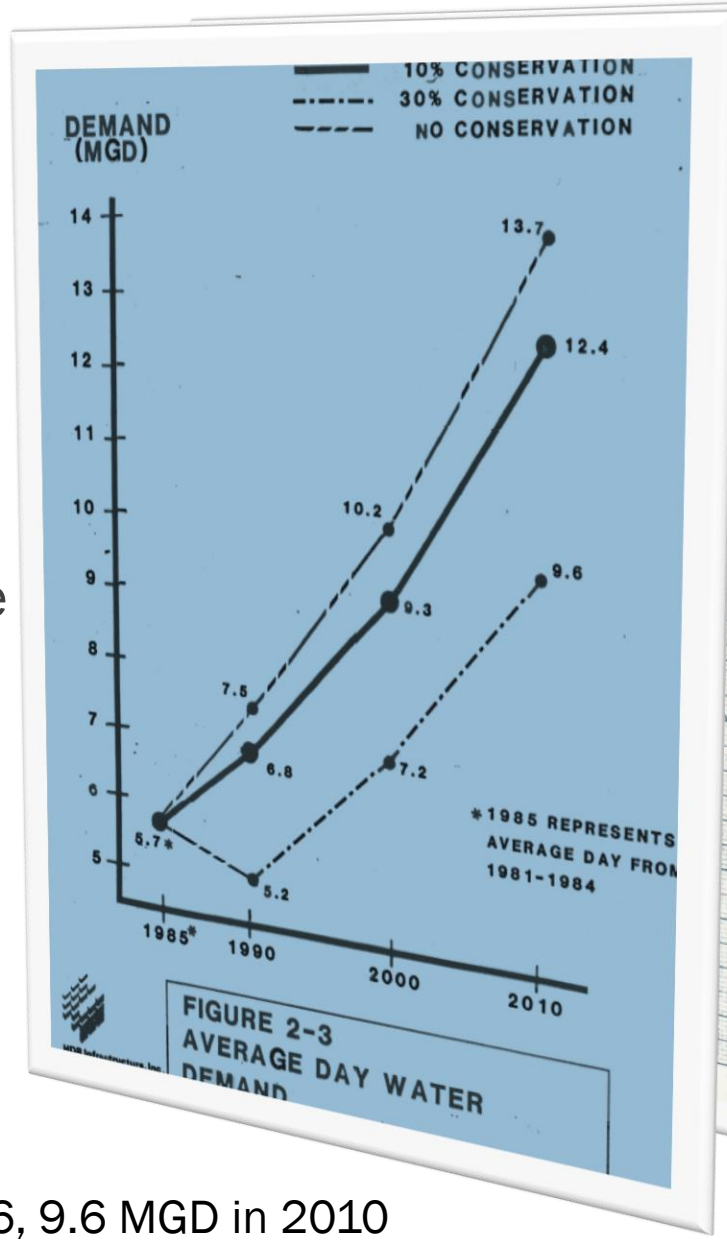
- Provide historical and current context
- Engage stakeholders and public to define values, objectives and policies
- Update water demand projections
- Develop water balance
- Define and assess alternatives
- Present findings and recommendations



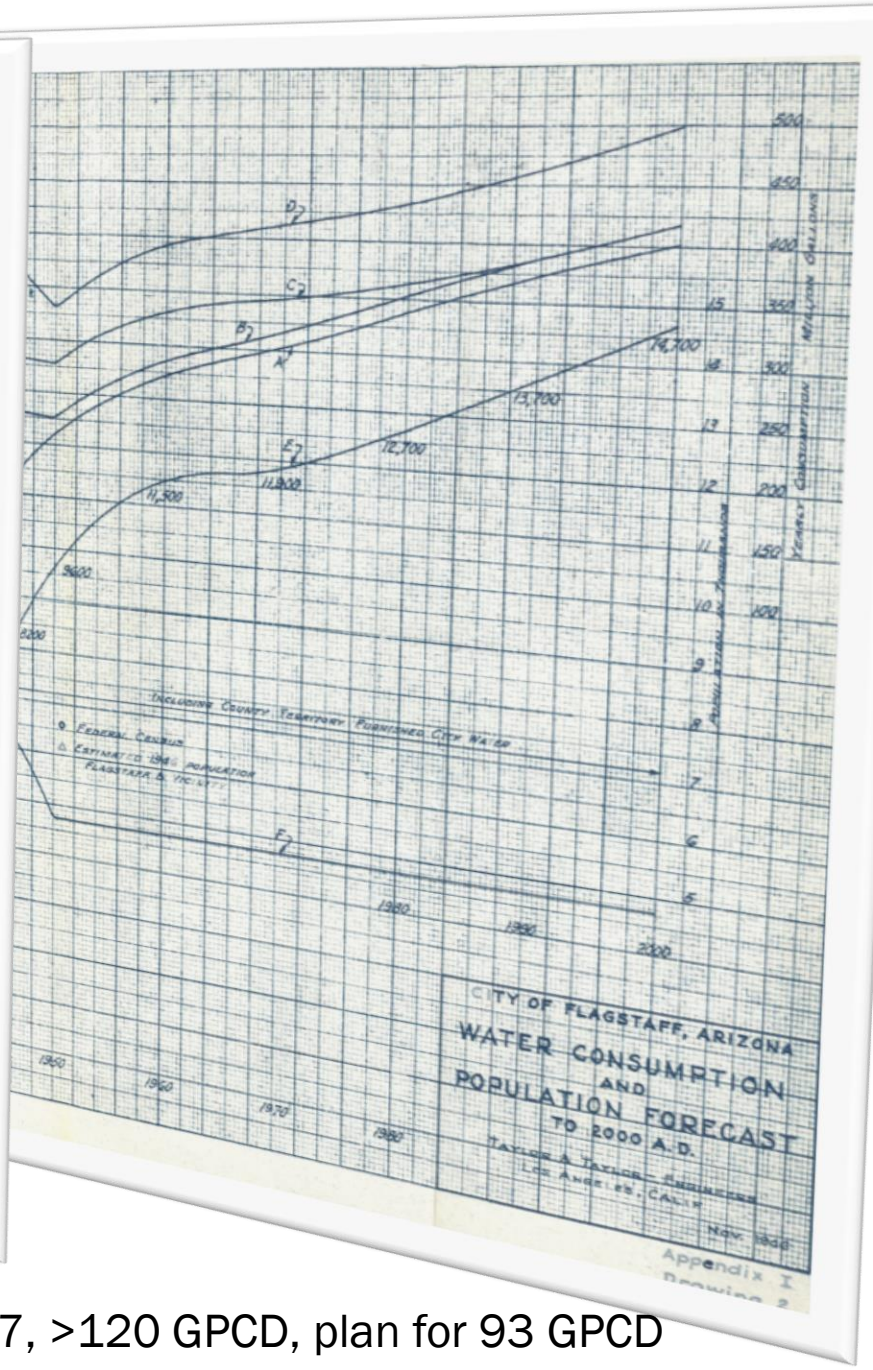
Source: City of Flagstaff Water Resources Management – Adequate Water Supply Designation

Background

- Includes
  - History of water resources & past alternatives
  - Summary of relevant regulations
  - Describe current water resource and identify challenges with each (quality, quantity, watershed health, impacts from climate change)
  - Learning from the past
- Material to be provided by City staff
- Flexibility & Adaptability



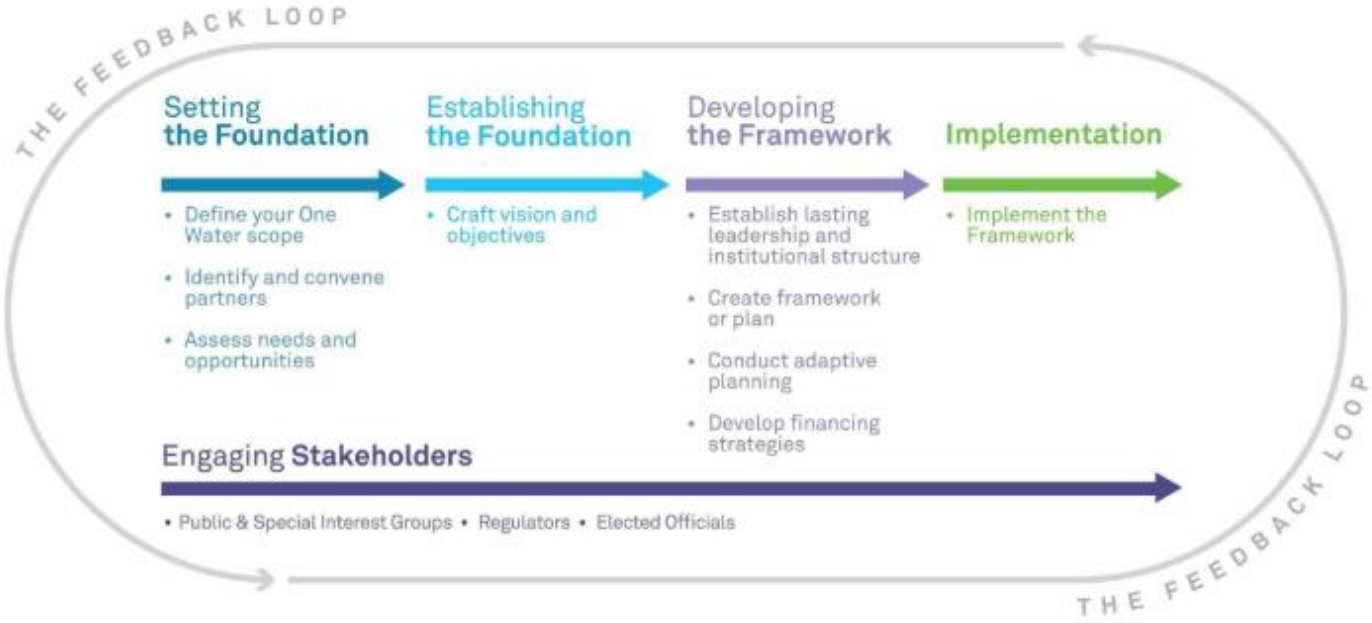
1986, 9.6 MGD in 2010



1947, >120 GPCD, plan for 93 GPCD

Stakeholder Engagement and Public Outreach

- Follows the OneWater planning process
- Support from Southwest Decisions Resources
- Identify stakeholder and focus groups (Commission, others…)
- 3 Major workshops
- Public forum for presentation of findings and recommendations



Source: Water Research Foundation Blueprint for OneWater

Workshops

- Workshop #1
  - Identify stakeholder group
  - Develop survey
  - Establish goals, objectives and policies
  - Develop focus group on specific topics
- Workshop #2
  - Develop criteria for evaluating water supply alternatives
  - Provide input on metrics to measure water resource scenarios
- Workshop #3 + public outreach
  - Develop public outreach campaign for public comment on alternatives
  - Develop public survey to solicit input on goals, values, and preferred water supply alternatives
  - Conduct stakeholder workshop open to public observation to present results of alternative comparisons
  - Conduct public forum - held after technical analysis is complete

Water Demand Projections

- Update water demand projection model: population & land use (City to provide)
- Account for variable growth rate and unit water demands (City)
- Model impacts of land use changes on water demand (by WWR)
- Model economic benefit of new developments and business attraction per unit of annual water use (by WWR)
- Demand model will be provided to consultant by City staff

Table 3.8 : Water Demand Projections Summary

Water Demands in MGD

Scenario Type	2011 Water Demand, MGD	2013 Water Demand, MGD	Additional Water Demand, MGD	Total Water Demand, MGD
	X		Y	X + Y
Scenario A (Sprawled Development)	7.5	7.7	7.7	15.2
Scenario B (Intermediate Density)	7.5	7.7	8.1	15.6
Scenario D (Dense Development)	7.5	7.7	7.5	15.0
Known Development Scenario	7.5	7.7	2.7	10.2

Water Demands in Acre-ft/year

Scenario Type	2011 Water Demand, Ac-ft/yr	2013 Water Demand, Ac-ft/yr	Additional Water Demand, Ac-ft/yr	Total Water Demand, Ac-ft/yr
	X		Y	X + Y
Scenario A (Sprawled Development)	8,400	8,600	8,600	17,000
Scenario B (Intermediate Density)	8,400	8,600	9,100	17,500
Scenario D (Dense Development)	8,400	8,600	8,500	16,900
Known Development Scenario	8,400	8,600	3,000	11,400

Source: COF Water Infrastructure Master Plan, 2014, NCS Engineers

Develop Water Balance

- Develop water balance for all reclaimed water sources
- Review reclaimed water allocations, wastewater flow projections, seasonal variability and conservation planning efforts
- Determine available reclaimed water for use as supply

Source: https://www.snowbowl.ski/the-mountain/snowmaking/

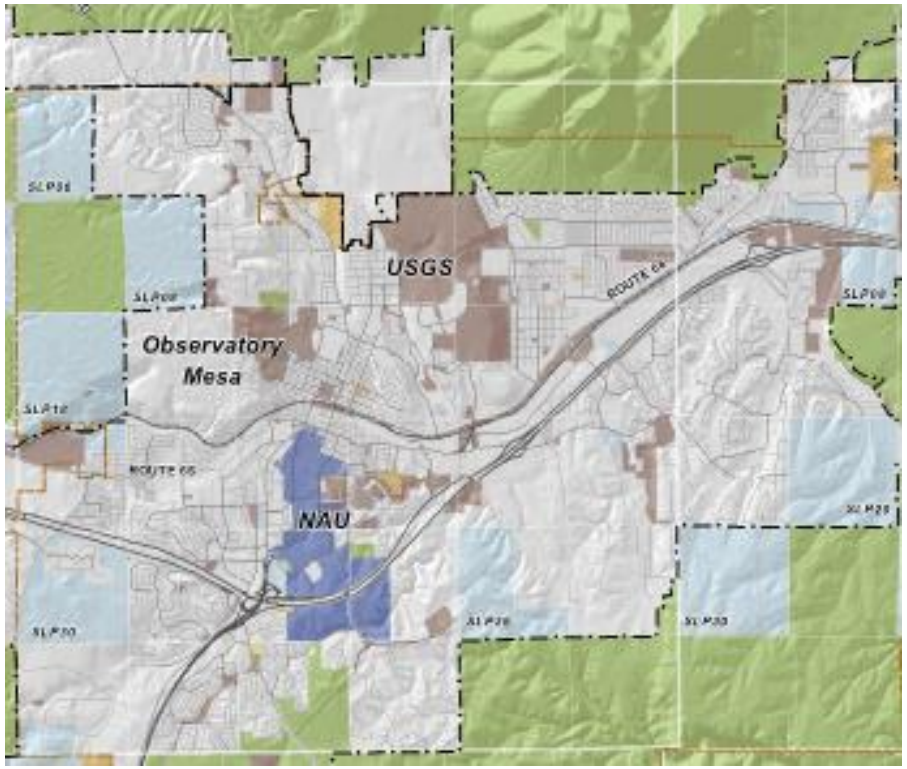
Source: https://www.continentalflagstaff.com/golf/

Define Alternatives

- Additional local water wells
- Reclaimed system “purple-pipe” expansion
- On-site reuse
- Stormwater capture & recharge (dry wells)
- Water conservation
- Recharge of excess water (spilled over the dam) from Upper Lake Mary to recharge Lake Mary Wellfield
- Indirect Potable Reuse
  - Groundwater Augmentation
    - Managed Recharge (stream-bed recharge)
      - with Class A+ Reclaimed Water
      - with Advanced Treatment (IPR)
    - Constructed Recharge (wells)
      - with Class A+ Reclaimed Water
      - with Advanced Treatment (IPR)
    - Surface Water Augmentation at Upper Lake Mary
- Direct Potable Reuse
- Import Red Gap Ranch groundwater

Assess Water Rate Impacts and Economic Value of Water

- Effort by West Water Research
- Evaluate funding options for future water supplies
- Estimate impacts of each alternative on water rates
- Summarize water rate impacts, funding options and recommendations
- Analyze land use classifications and water demand/reclaimed water generation for each classification
- Develop tool to estimate water resource, employment, and fiscal impacts (or other values) of proposed land use changes



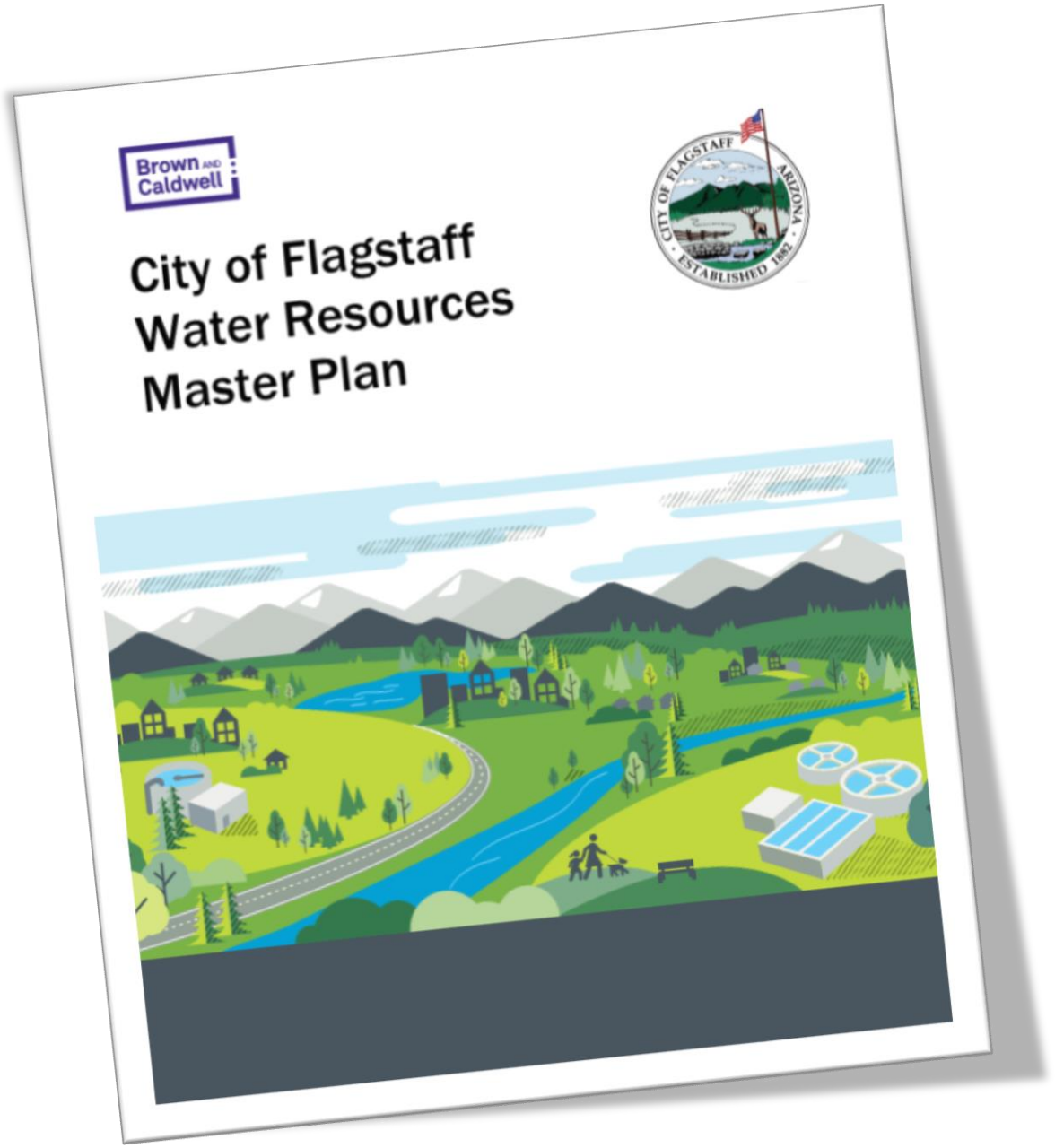
Source: Flagstaff Land Use Amendment 2018/

Assess Alternatives

- Certainty of quantity (e.g. reclaimed water availability in the future)
- Sufficient quantity to satisfy demand for how many years?
- Impact on aquifer water level declines
- Implementation challenges
- Alignment with community values
- Costs
  - Capital
  - Lifecycle cost, phased over time
  - Cost per acre-foot of water
- Regulatory challenges
- Community preference

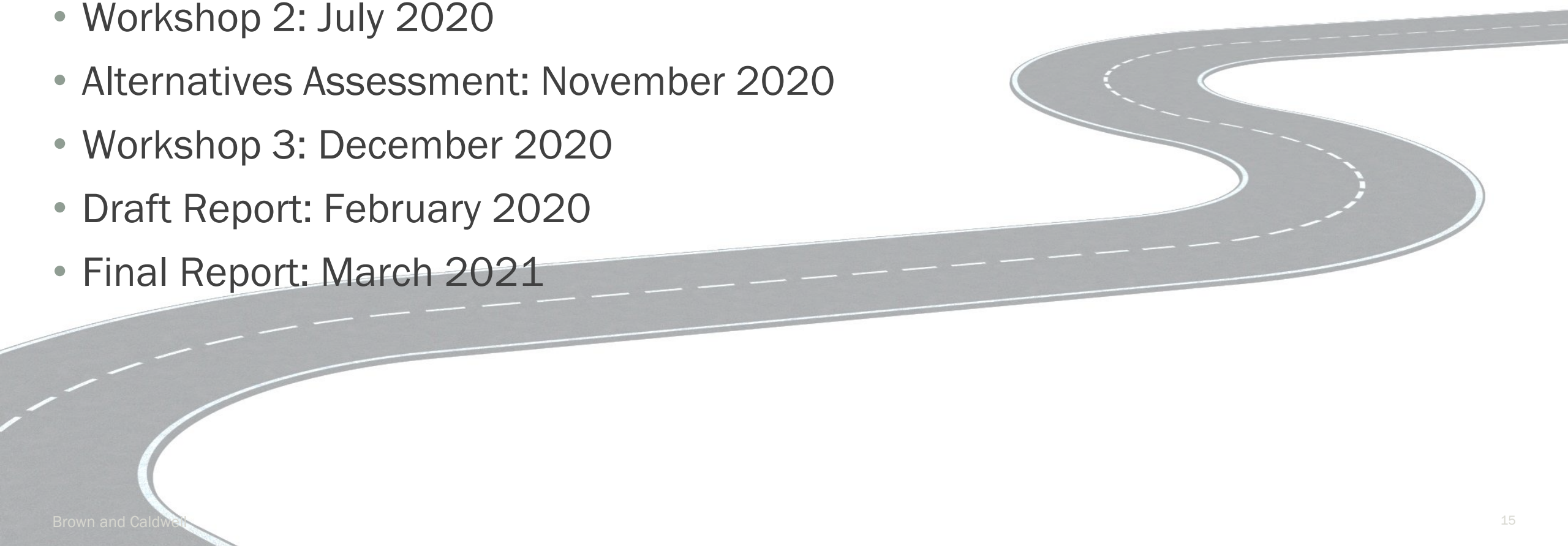
Reporting

- Draft and Final Report
- Presentation to Water Commission
- Presentation to City Council
- Report on Results from Public Forum Activities and Findings with Southwest Decision Resources



Schedule

- Kickoff: March 2020
- Workshop 1: May 2020
- Workshop 2: July 2020
- Alternatives Assessment: November 2020
- Workshop 3: December 2020
- Draft Report: February 2020
- Final Report: March 2021



QUESTIONS?

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