

Water and Wastewater Infrastructure Planning in Phoenix

Trends and Challenges for the
Phoenix Water Services
Department (1/16/07)

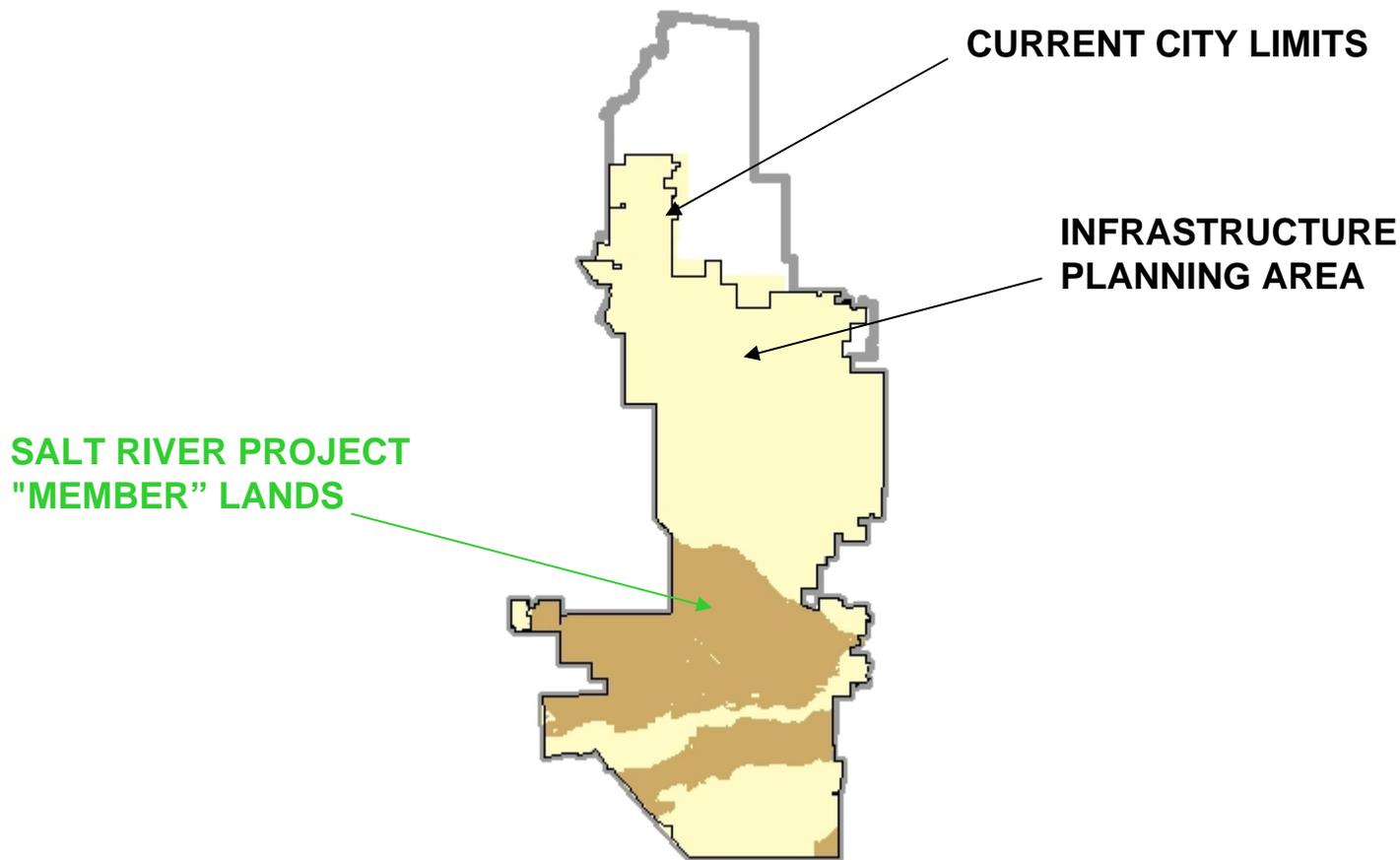
Context

- Many aspects of planning for water and wastewater
- This overview will focus on the growth-related land-use and financial aspects
- This overview will focus on northern Phoenix (only one of several growth areas)

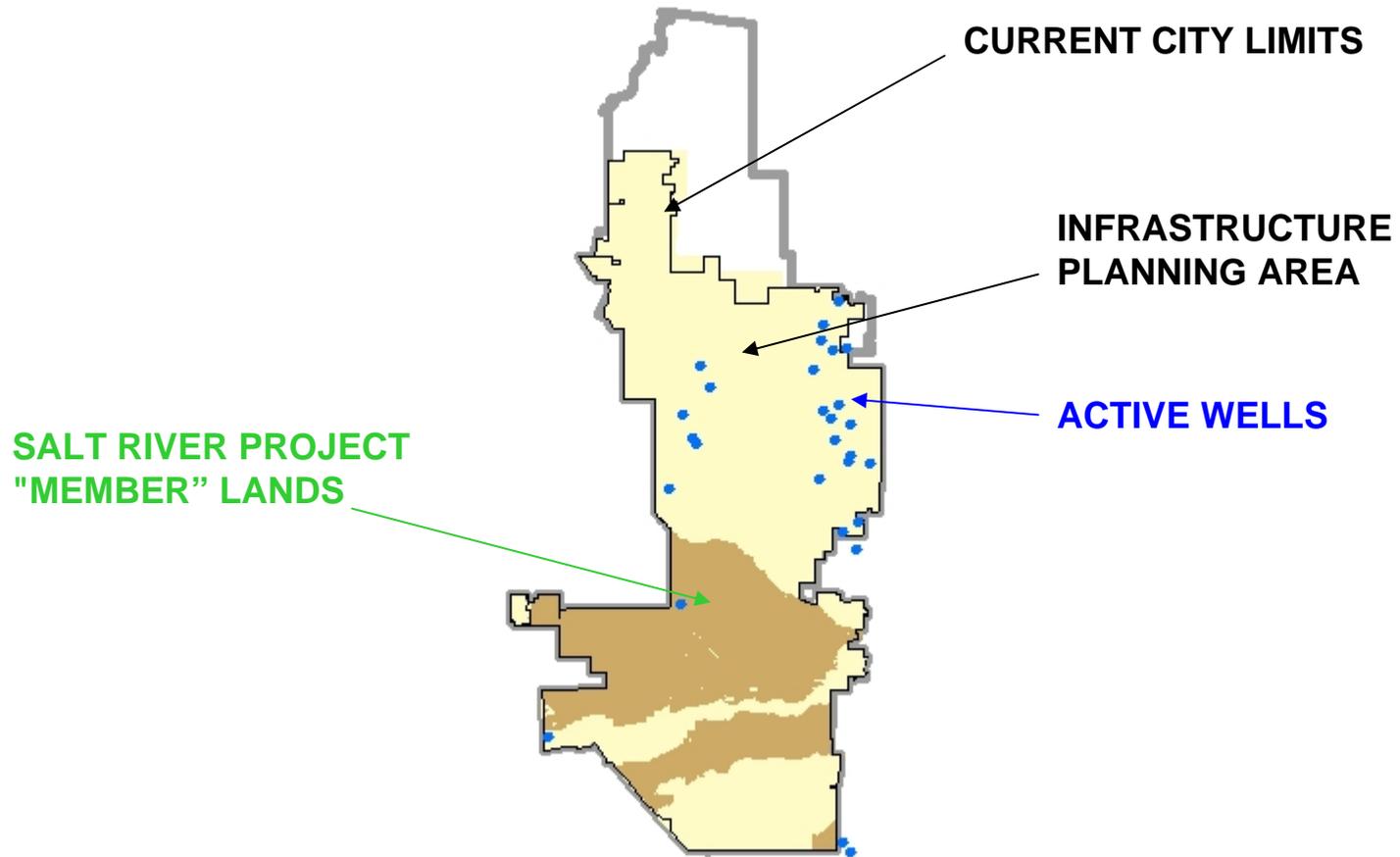
Broad Categories – Planning and Funding

- Water Resources
- Water Treatment and Distribution
- Wastewater Collection and Treatment

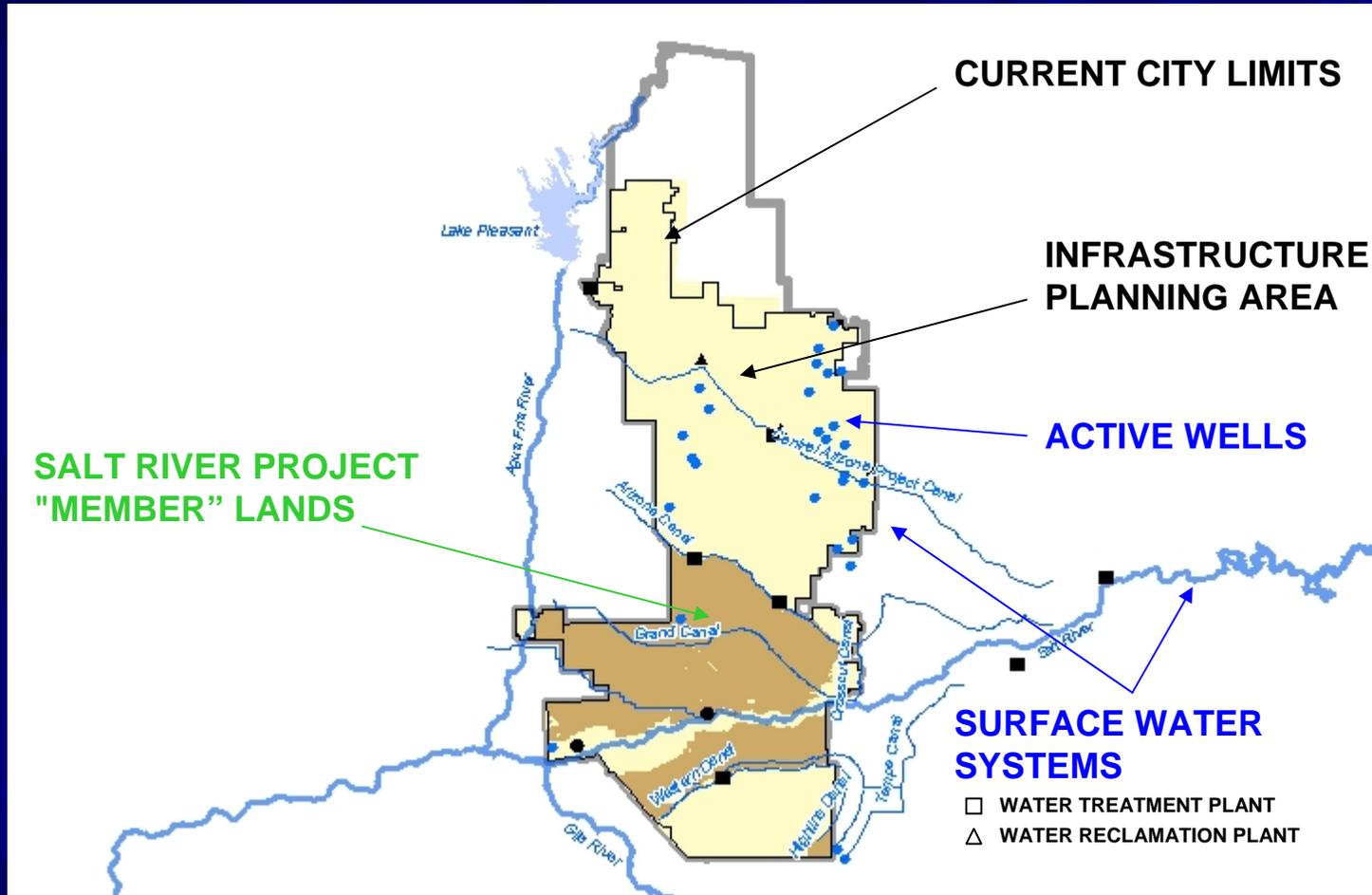
Phoenix Water Planning Boundaries



Phoenix Water Planning Boundaries

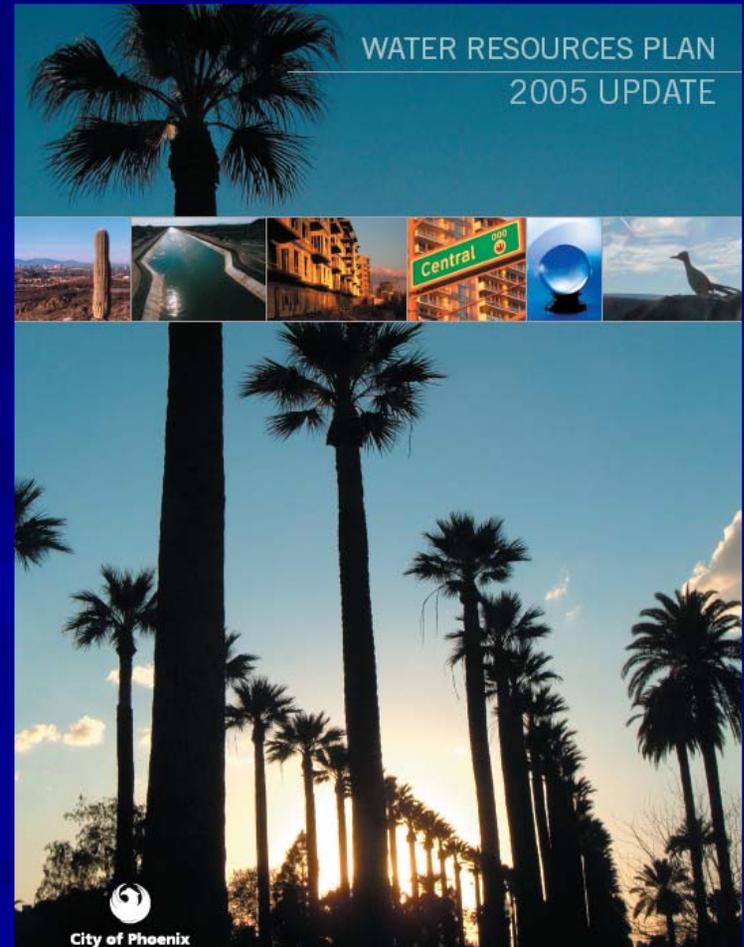


Phoenix Water Planning Boundaries



Water Resources

- Focus on obtaining adequate water supplies for treatment plants or wells
- Historically supplies have tended to come from surface water systems (SRP, CAP) or groundwater
- More expensive solutions on horizon
- Understanding of weather and climate cycles is critical
- Understanding demand and growth patterns is critical



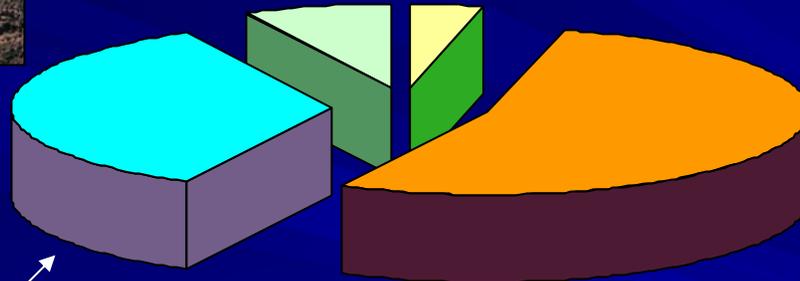
Phoenix Water Sources

Typical Year

Reclaimed Water - 7%



Groundwater (from Phoenix wells) - 3%



Salt/Verde Surface Water - 54%

Colorado River - 36%



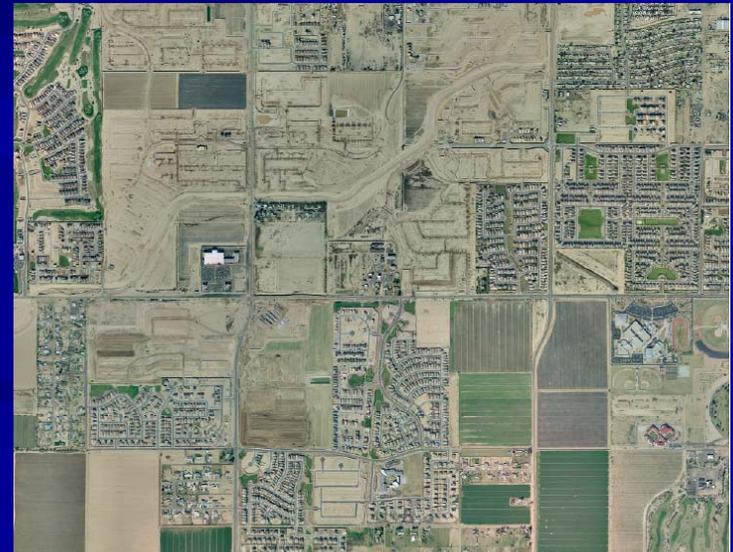
Supply Uncertainties

- Surface water shortages on major systems
- Access to local groundwater
- Access to additional sources (reclaimed water, McMullen Valley groundwater, etc.)



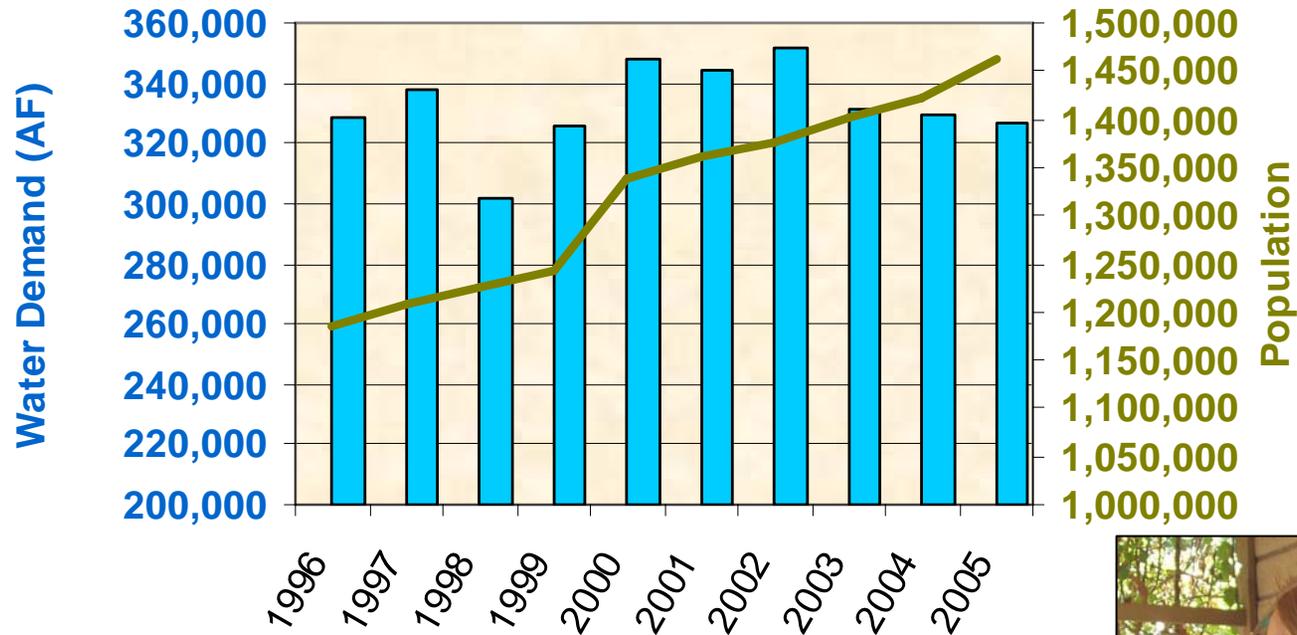
Demand Uncertainties

- Growth rate
- Population density
- Spatial distribution within service area
- Water use rate
- Types of water uses



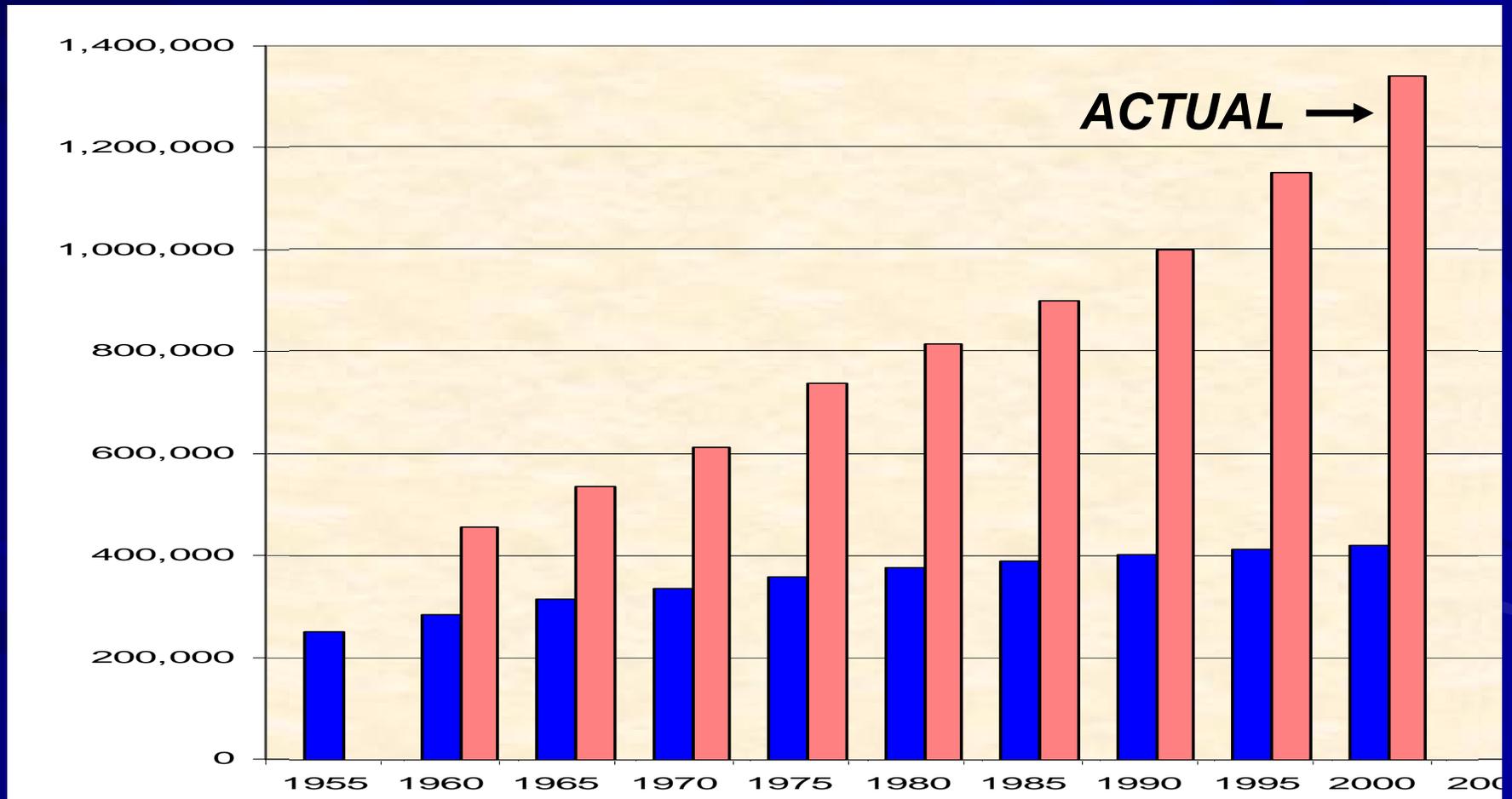
Water Consumption: 1990-2005

(acre-feet)



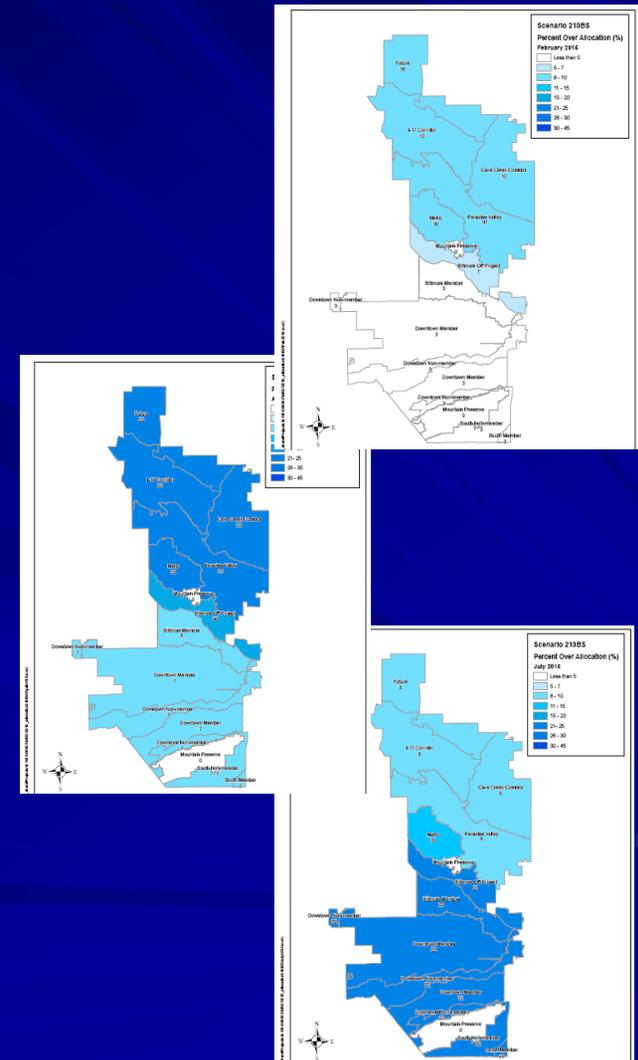
50 Year Planning Uncertainties

1951 Phoenix Population Projections and Actual Growth

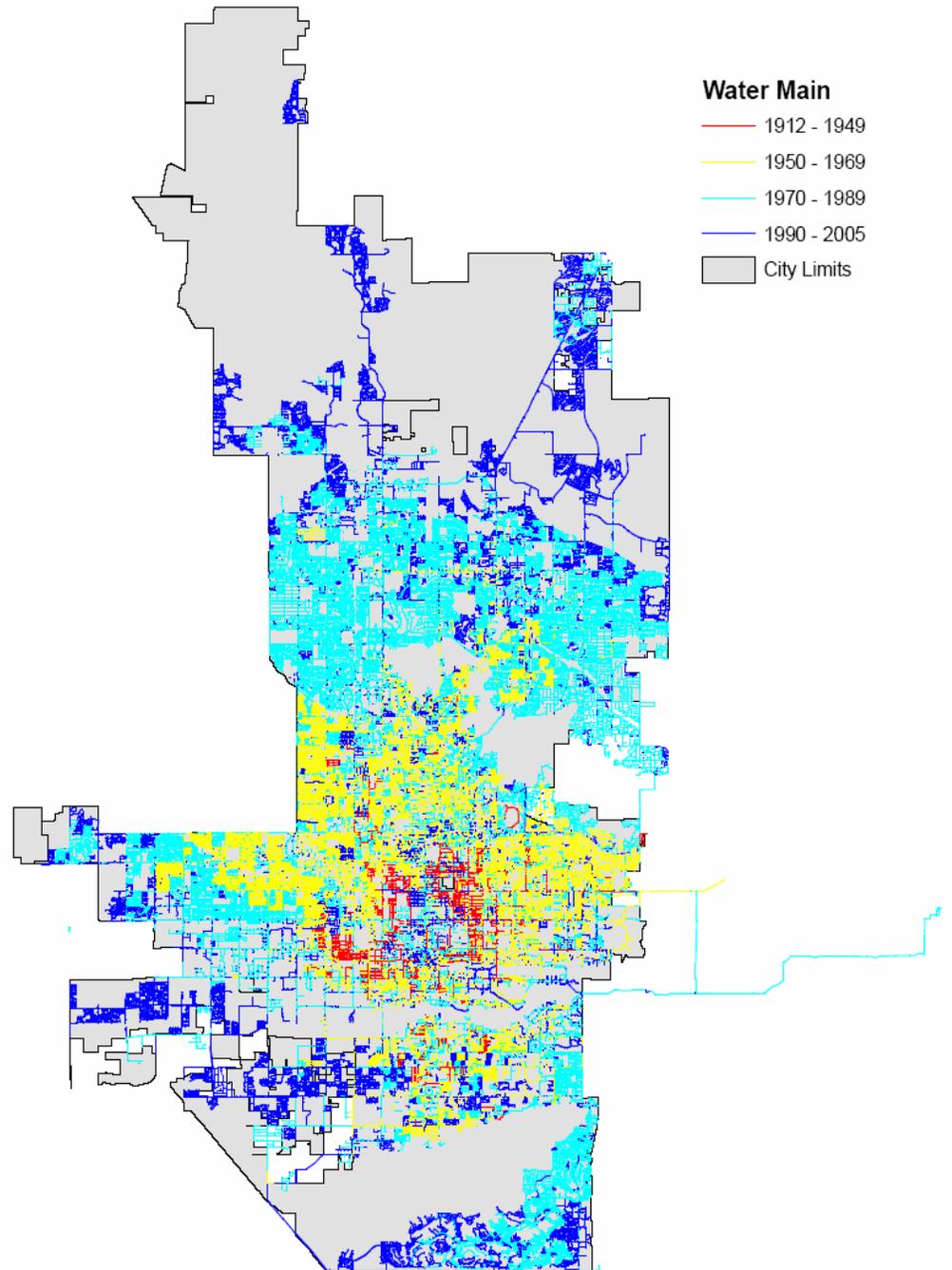


Water Treatment and Distribution

- Treatment dependent on very large, expensive plants – always WSD
- Transmission networks also expensive but can be built in pieces – WSD/developers
- Local distribution networks (12” and smaller) are routinely built by developers
- Understanding of water zones is critical



Phoenix Service Area Growth



Wastewater Collection and Treatment

- Smaller collection sewers usually built by developers
- Large sewers, interceptors, and lift stations built by WSD/developers
- Treatment done at large, expensive traditional plants or at reclamation plants
- Understanding of drainage is critical

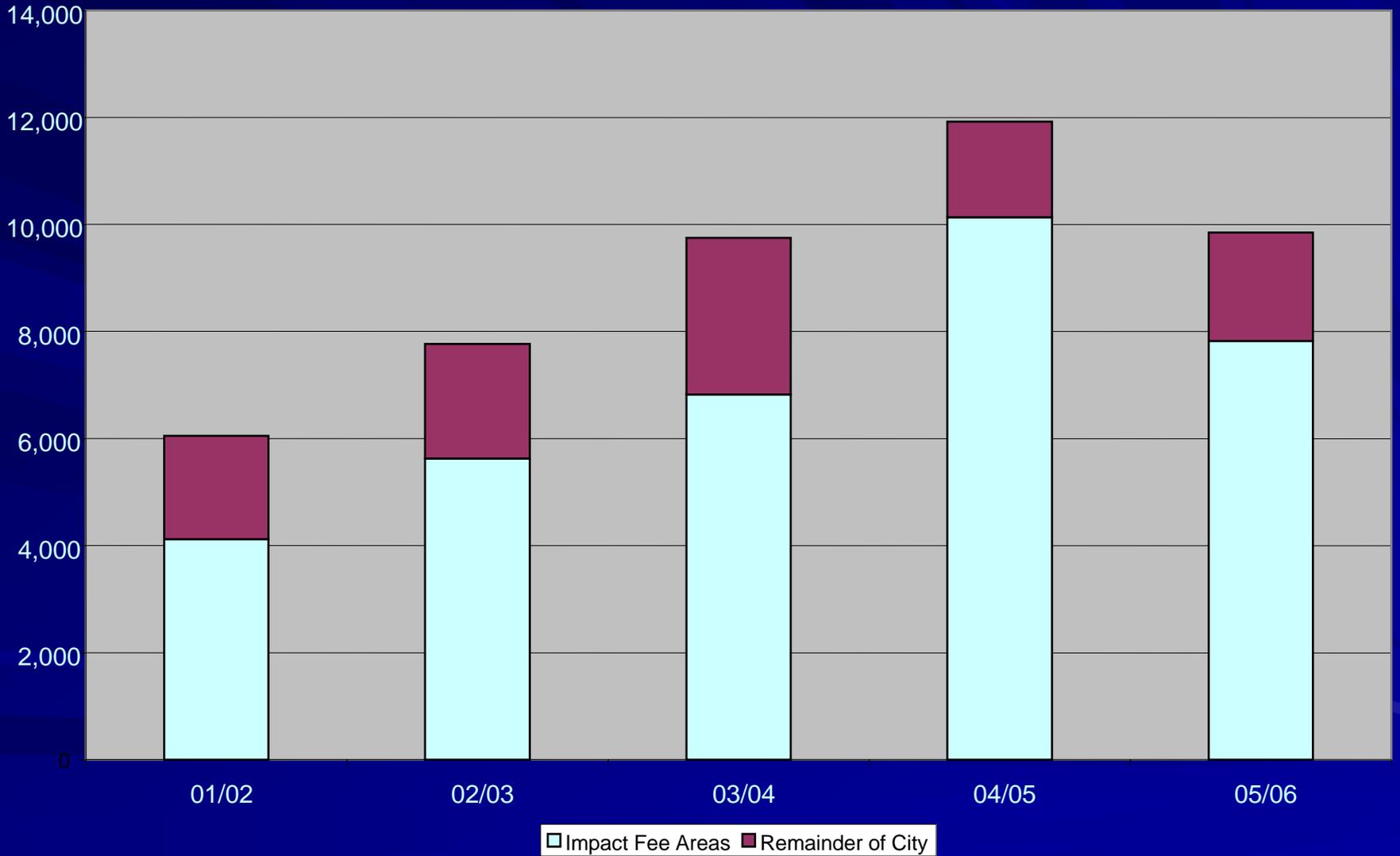
Recent WSD Milestones

- Water and WW Master Plans completed
- Modeling done for Tatum E/W, PR, DR
- Operational modeling underway
- Water and WW impact fees updated
- New WRAF Study done, to Council next
- Groundwater study underway
- Prelim sequencing study done; big one next

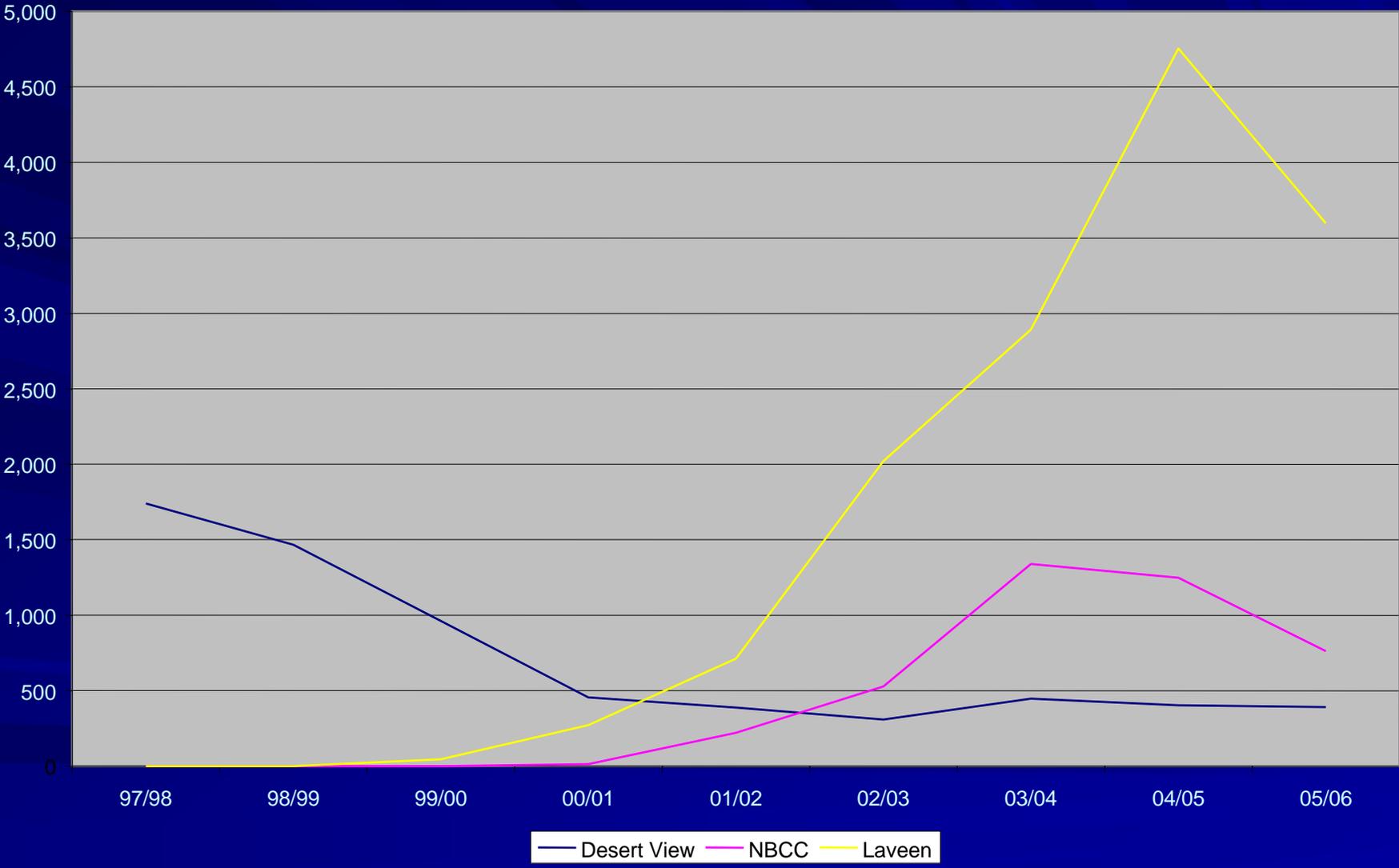
Trends (1)

- Extremely busy time for entitlements
- Actual permit activity not as strong
- Land is owned primarily by ASLD
- ASLD trying to adapt/evolve
- Numerous ASLD auctions recently
- Evolution of infra req letters
- ASLD recognizing sequencing critical

SF Permits by Fiscal Year

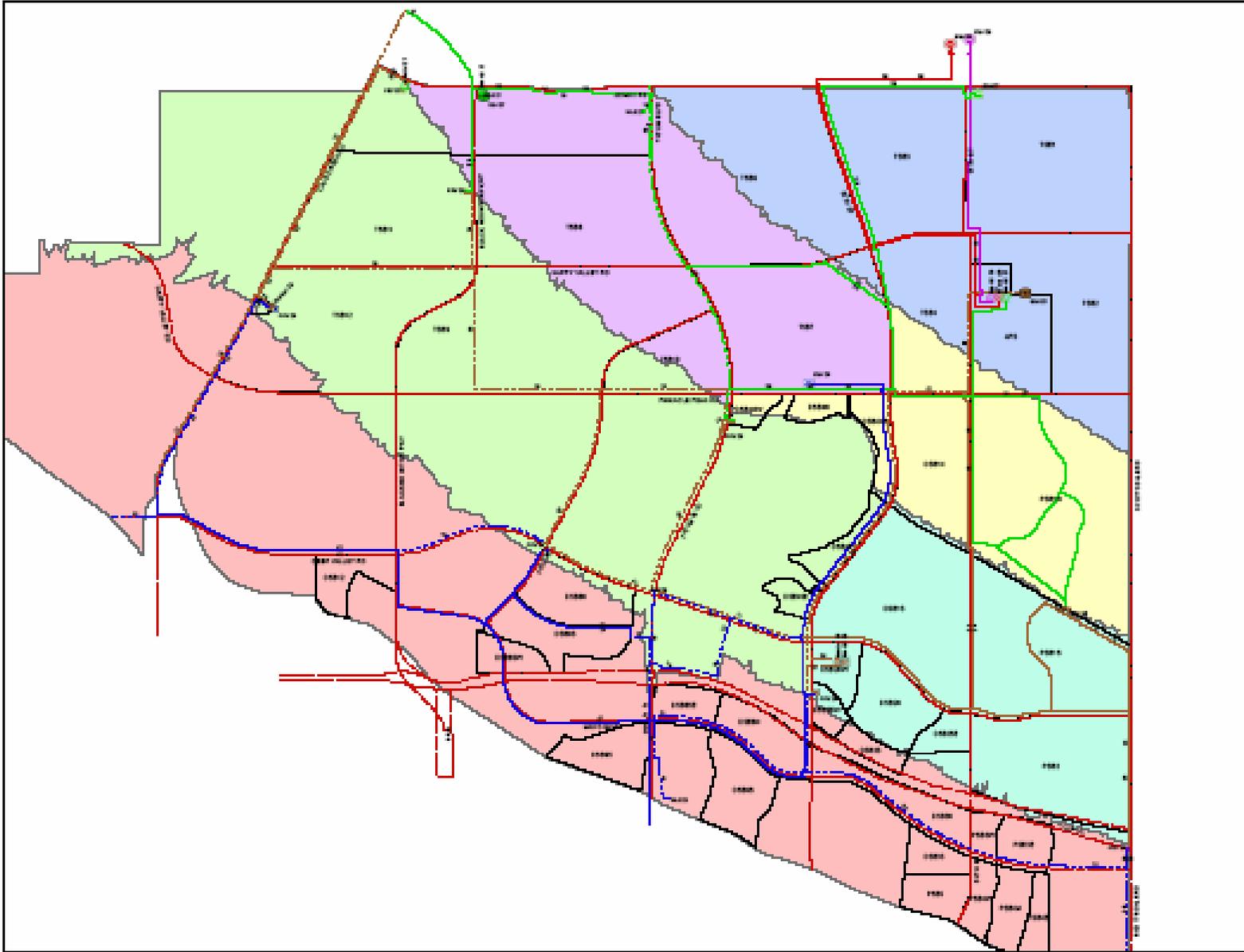


Single Family Permits by Area, 97/98 - 05/06



Trends (2)

- North Desert View – largely built out
- South Desert View – big near term potential
- City North, 9 S, Aviano, SB 1S & 2, Etc.
- NBCC – first phase building out
- Tramonto, Sonoran, DMR SF almost done
- West of I-17 – significant investments needed



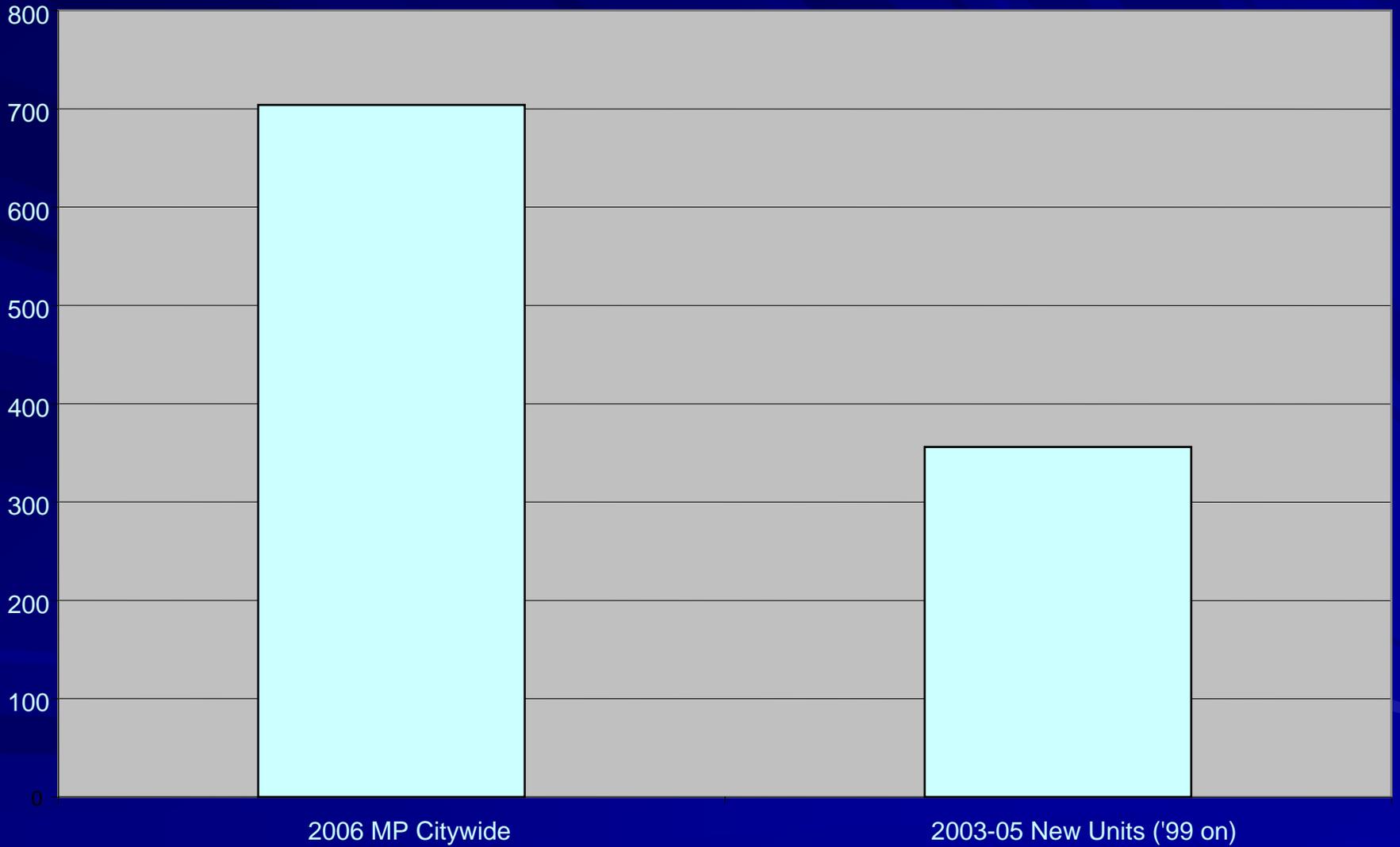
- Legend**
- Transmission**
 - Blue line: 1000' - 10000'
 - Green line: 1000' - 10000'
 - Red line: 1000' - 10000'
 - Purple line: 1000' - 10000'
 - Black line: 1000' - 10000'
 - Service Area**
 - Red fill: 1000' - 10000'
 - Green fill: 1000' - 10000'
 - Purple fill: 1000' - 10000'
 - Yellow fill: 1000' - 10000'
 - Blue fill: 1000' - 10000'
 - Other Features**
 - Black dashed line: 1000' - 10000'
 - Black solid line: 1000' - 10000'
 - Black dotted line: 1000' - 10000'
 - Black dash-dot line: 1000' - 10000'
 - Black long-dash line: 1000' - 10000'
 - Black short-dash line: 1000' - 10000'
 - Black solid line with dots: 1000' - 10000'
 - Black solid line with dashes: 1000' - 10000'
 - Black solid line with dots and dashes: 1000' - 10000'
 - Black solid line with long dashes and dots: 1000' - 10000'
 - Black solid line with short dashes and dots: 1000' - 10000'
 - Black solid line with long dashes and dashes: 1000' - 10000'
 - Black solid line with short dashes and dashes: 1000' - 10000'
 - Black solid line with long dashes and dots and dashes: 1000' - 10000'
 - Black solid line with short dashes and dots and dashes: 1000' - 10000'
 - Black solid line with long dashes and dots and dashes and dots: 1000' - 10000'
 - Black solid line with short dashes and dots and dashes and dots: 1000' - 10000'
 - Other Symbols**
 - Blue triangle: 1000' - 10000'
 - Green triangle: 1000' - 10000'
 - Red triangle: 1000' - 10000'
 - Purple triangle: 1000' - 10000'
 - Black triangle: 1000' - 10000'
 - Black circle: 1000' - 10000'
 - Black square: 1000' - 10000'
 - Black diamond: 1000' - 10000'
 - Black star: 1000' - 10000'
 - Black cross: 1000' - 10000'
 - Black plus: 1000' - 10000'
 - Black asterisk: 1000' - 10000'
 - Black hash: 1000' - 10000'
 - Black percent: 1000' - 10000'
 - Black at: 1000' - 10000'
 - Black dollar: 1000' - 10000'
 - Black copyright: 1000' - 10000'
 - Black registered: 1000' - 10000'
 - Black trademark: 1000' - 10000'
 - Black service: 1000' - 10000'
 - Black registered service: 1000' - 10000'
 - Black copyright service: 1000' - 10000'
 - Black registered copyright: 1000' - 10000'
 - Black trademark service: 1000' - 10000'
 - Black registered trademark: 1000' - 10000'
 - Black copyright service: 1000' - 10000'
 - Black registered copyright service: 1000' - 10000'
 - Black trademark service: 1000' - 10000'
 - Black registered trademark service: 1000' - 10000'

Water System

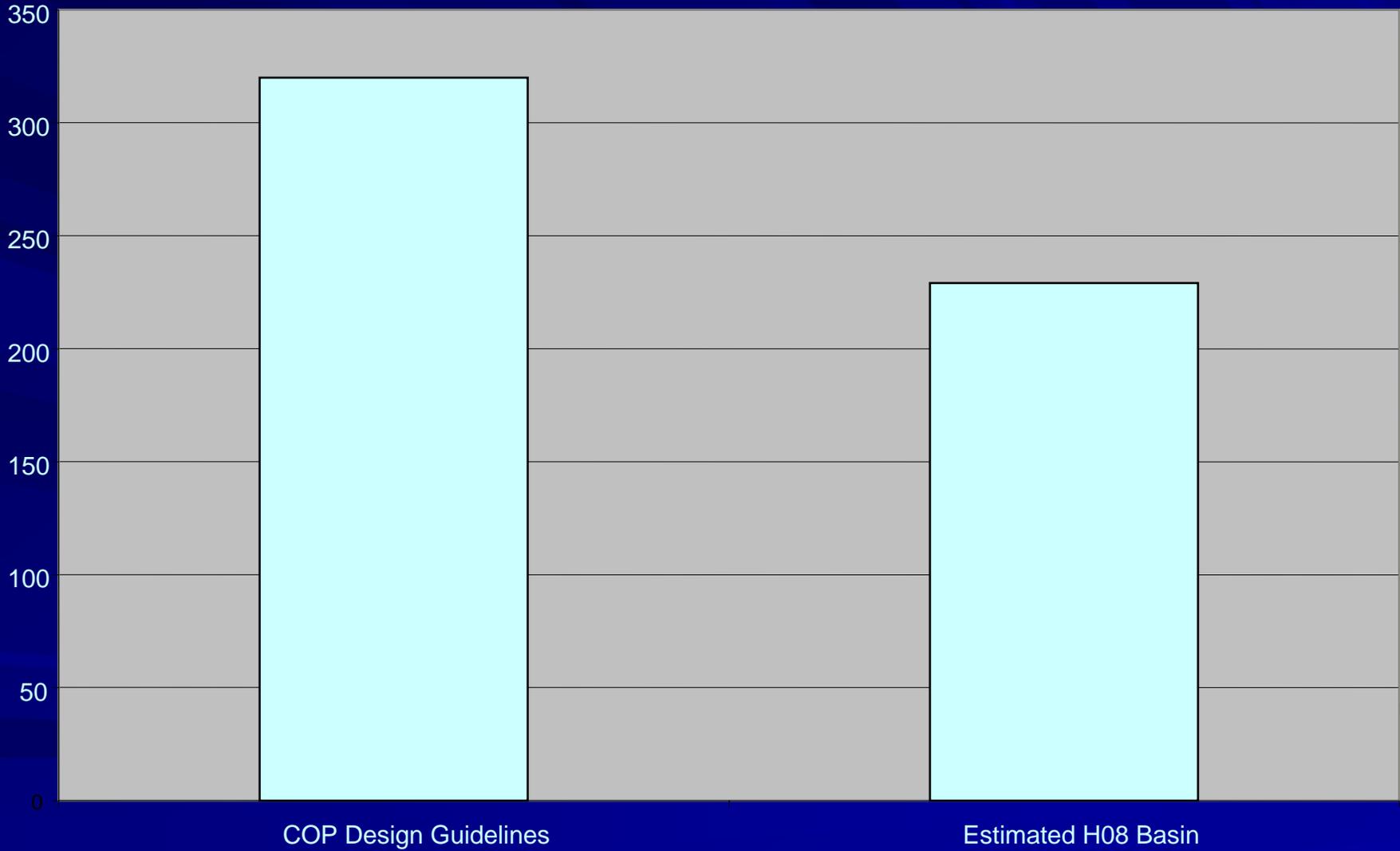
Trends (3)

- Water demand per unit falling
- Wastewater generation per unit falling
- SF densities lower than anticipated
- MF densities higher than anticipated
- Residential market was strong but has peaked
- Commercial market still strong

Average Water Demand per Day per SF Unit (Gallons)



Average Wastewater Generation per Day per SF Unit (Gallons)



Trends (4)

- Capacity available in much of NBCC & DV
- DV zones 5 & 6 need new main & tank
- SB 1S and 2 likely will build much of remaining zone 5 & 6 water facilities
- Current situation precarious – recent auction cancelled, developers cautious
- Tremendous construction cost escalation recently

Trends (5)

- Remaining z 5 main & reservoir in CIP – funding from bonds + impact fees
- Next big projects are east/west from Lake Pleasant
- NBCC ww now sent to CC Rec Plant
- Next big ww issue is Cave Creek Reclamation plant expansions

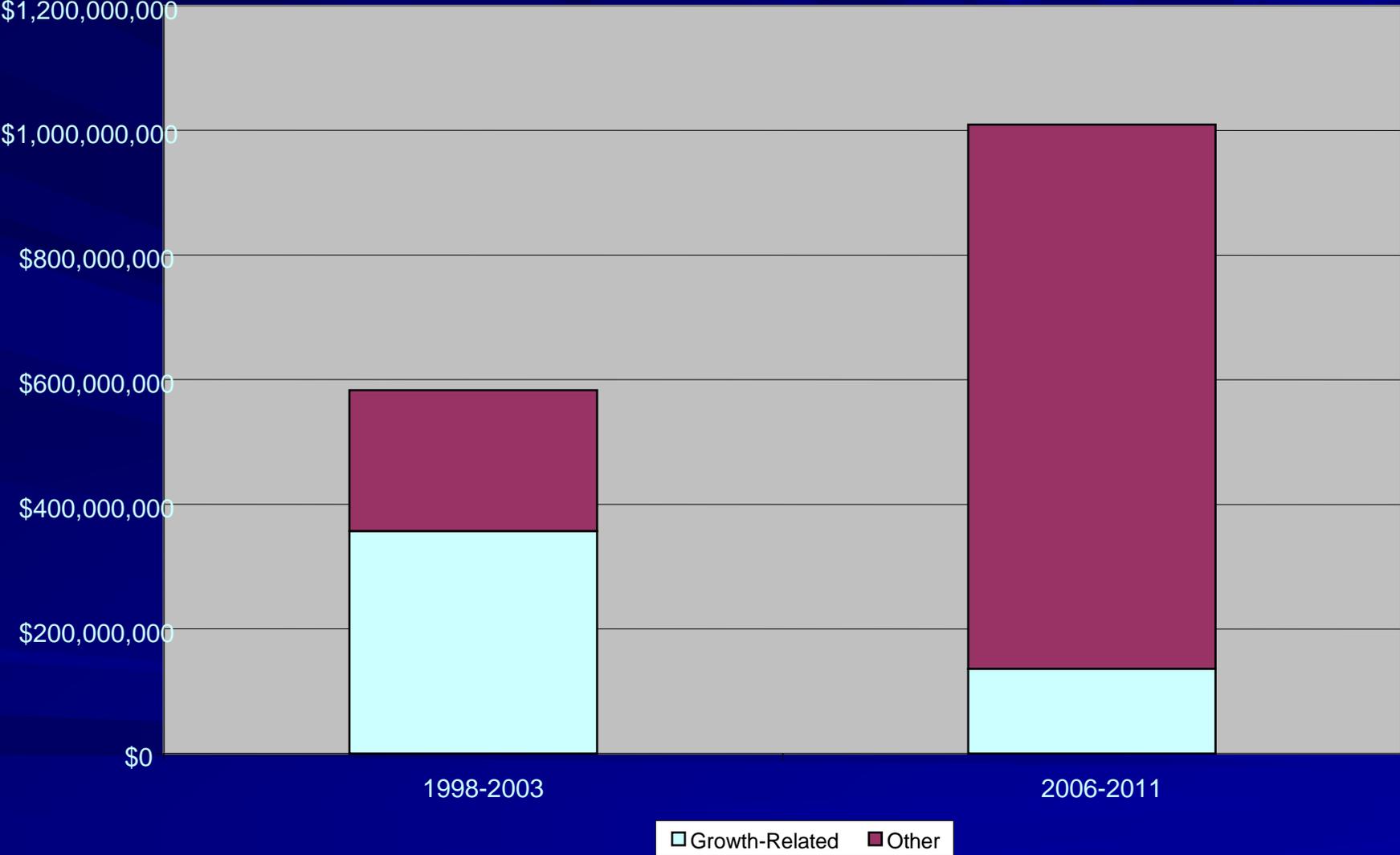
Trends (6)

- Total water demand City-wide has grown slowly but steadily
- Cheap, easy CAP allocations will be used up soon
- ASLD still holds 12,000 acre-feet CAP
- Major issues associated with reclaimed water distribution system

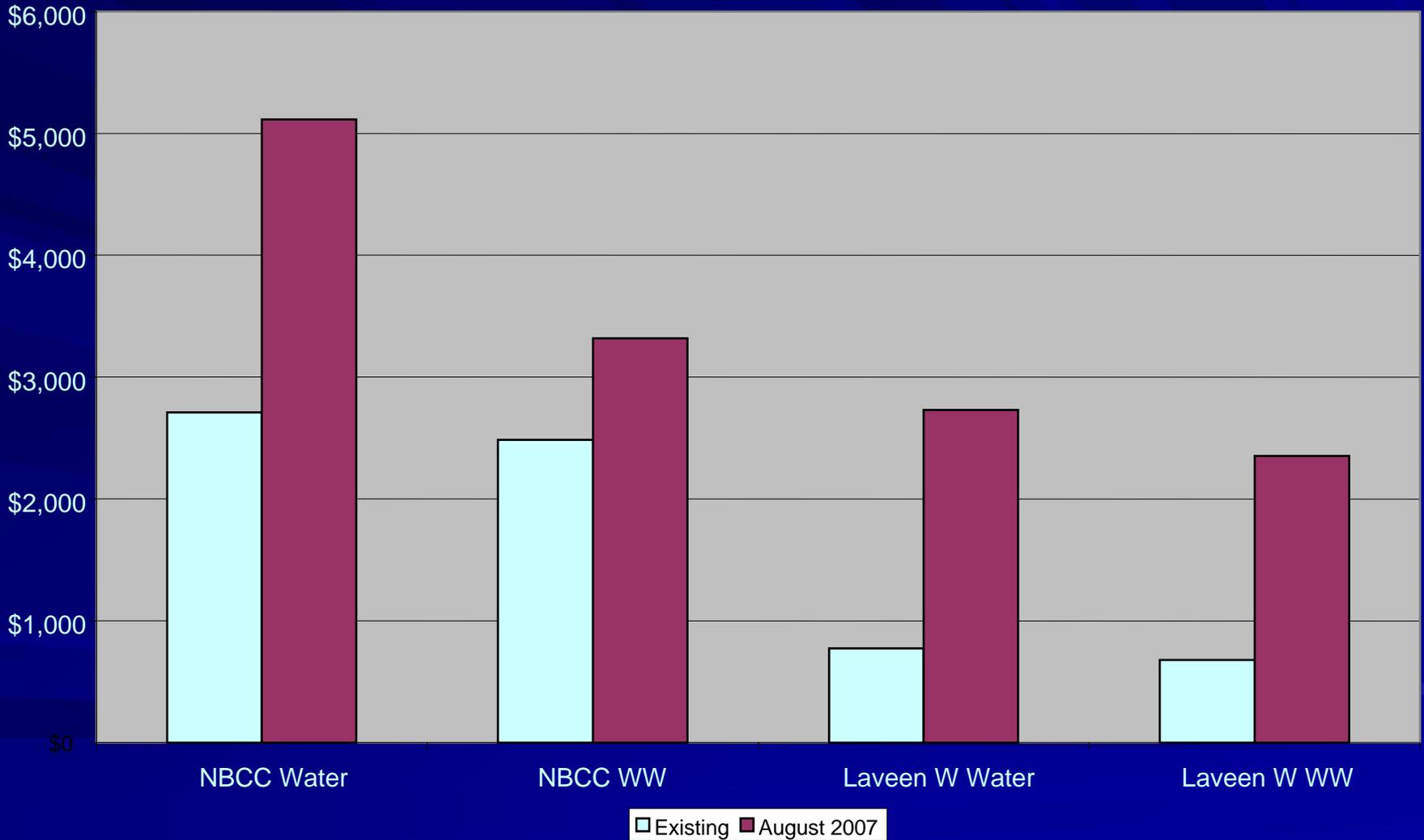
Trends (7)

- Rising rehab and environmental costs pressuring CIP
- Rates already rising with reduced spending on growth projects
- Impact fee structure & cost basis revised
- Com & MF EDUs revised; fees per EDU increased

Water 5 Year CIP - Growth v. Rehab/Environmental/Other



Net Single Family Unit Water & Wastewater Fees, Net of Offsets, Current and Revised (Standard Lot 3/4" Meter)



Challenges - Overall

- Identify critical facility costs & timing and secure funding/financing
- Reduce reliance on water rates for growth
- Work with ASLD & developers to maximize utilization of infrastructure assets
- WW network depends on rec plants; location of rec plants depends on water strategy

Challenges – Projections

- Estimate up-to-date water demands and ww generation for new development
- Factor in effect of rising rates on water use
- Apply revised factors to specific ‘super blocks’ to obtain realistic networks
- Estimate when start dates and build rates for ‘super blocks’

Challenges – Facility Planning

- Determine when/where reclamation plant expansions are required
- Determine when large mains from Lake Pleasant to Desert View will be required
- Identify other critical ‘lynch pin’ facilities in networks (and associated timing)
- Indicate when various water resources (including reclaimed) are needed

Challenges – Financial

- Identify cash flow associated with new water/ww/WRA fees
- Identify difference between fee revenues and project expenditures
- Identify long-term alternative funding or short-term financing measures
- Develop combined facility/funding plan that reduces reliance on water rates

What's Next?

- Sequencing/financing study
- Groundwater study
- Need to identify reclamation plant & recharge & well sites/timing
- Refine water acquisition/treatment strategies, including rec water system
- Adjust CIP to reflect priorities & include water/ww impact fee/WRAF revenues

FINAL THOUGHTS....

