Agenda Item No. 9

File Code No. 540.13

CITY OF SANTA BARBARA

COUNCIL AGENDA REPORT

AGENDA DATE: October 30, 2012

TO: Mayor and Councilmembers

FROM: Water Resources, Public Works

SUBJECT: Technology Selection For Recycled Water Treatment Plant

RECOMMENDATION:

That Council hear a report from staff on the proposed technology for treating recycled water and provide policy direction regarding the preferred project.

DISCUSSION:

The City of Santa Barbara Recycled Water Treatment Plant (Plant) was completed in 1989. It is located at the El Estero Wastewater Treatment Plant (WWTP) and consists of a filtration unit, a chlorine contact basin, a storage reservoir, and a distribution pump station. The Plant treats effluent from the WWTP to meet standards for reuse. Recycled water is used for irrigation and toilet flushing at a number of locations throughout Santa Barbara.

The technology currently used for recycled water filtration is Gravity Deep Bed. Treated wastewater percolates through four feet of anthracite coal, and the coal acts as the filter media removing suspended solids. Unfortunately, in recent years, wastewater effluent has fluctuated in its quality and to meet water quality standards, the recycled water has been blended with potable water. Recent operation of the Plant has required that the finished recycled water is actually approximately 80 percent potable water. Blending with potable water also helps reduce the salt concentration in recycled water, and is a practice that staff has followed during summer months. Blending for salt reduction is not needed in the winter as rainfall moves the salts through the soils.

The recycled water filter is 23 years old and many of the filter components have reached the end of their useful life. In assessing the best approach to rehabilitating the filter, staff asked for proposals to evaluate the recycled water filtration approach and make recommendations for the future treatment of recycled water. CDM Smith was selected to provide a preliminary design for the Plant, and evaluated four alternatives. During their evaluation, CDM Smith identified that it would be very challenging to rehabilitate the existing filter building for recycled water because of constraints related to safely operating and maintaining the facility. Accessing the filter under drains

requires entering a “double confined space”, which is a dangerous condition and severely limits the ability to maintain the system. Based on this and other existing design constraints, CDM Smith recommended that any approach should replace the existing filter building.

To meet the City’s objectives for reliable production of recycled water, CDM Smith is recommending changing the technology from a Gravity Deep Bed filtration to a microfiltration technology. This technology is a low pressure membrane where water is pushed through a permeable membrane that blocks turbidity. This type of technology removes many pollutants, including bacteria and some viruses, that cannot be removed by deep bed media filtration, and importantly, is better able to handle the variable quality of the wastewater effluent.

Another advantage of this technology is that it also produces water of a quality that can be subsequently treated through reverse osmosis filters. Adding a reverse osmosis system in the future, as an additional treatment step, would allow staff to treat a portion of the recycled water to remove salts, and then use that water to blend with the bulk of the recycled water to reduce salt concentrations, thus eliminating the need for blending with potable water. One of the Long Term Water Supply Plan policies is to develop a plan to eliminate the need for blending by the year 2020. Microfiltration of recycled water is an important first step to being able to eliminate blending.

The selection of the microfiltration technology for treatment of the recycled water is an important decision to implement a policy of maximizing recycled water production. The filter technology decision was presented to the City of Santa Barbara Board of Water Commissioners on May 14, 2012 and the Council Sustainability Committee on June 7, 2012, both of which supported the recommendation for a microfiltration treatment plant for the recycled water.

BUDGET/FINANCIAL INFORMATION:

The capital cost for constructing the microfiltration plant is estimated to be $6.5 million. The cost for replacing the existing filtration system with a similar technology is estimated to be $6.6 million. This project has been identified in the 6-year Capital Improvement Plan (CIP). The estimate is higher than projected in the CIP prior to the analysis by CDM Smith. Funds are available to support this change and staff will pursue grant funds, if available. The annual operating cost for the microfiltration plant is estimated to be about $60,000 per year more than for the traditional filtration process, but the increased reliability of the microfiltration plant will significantly reduce or eliminate the amount of blending water; thereby, allowing the City to avoid having to purchase water. Recycled water is also an important part of our strategy to comply with state water conservation regulations.

SUSTAINABILITY IMPACT:

Use of recycled water limits the amount of potable water that must be used. The use of microfiltration to treat the recycled water also removes many contaminants not removed by conventional filtration.

PREPARED BY: Rebecca Bjork, Water Resources Manager/ec

SUBMITTED BY: Christine F. Andersen, Public Works Director

APPROVED BY: City Administrator's Office

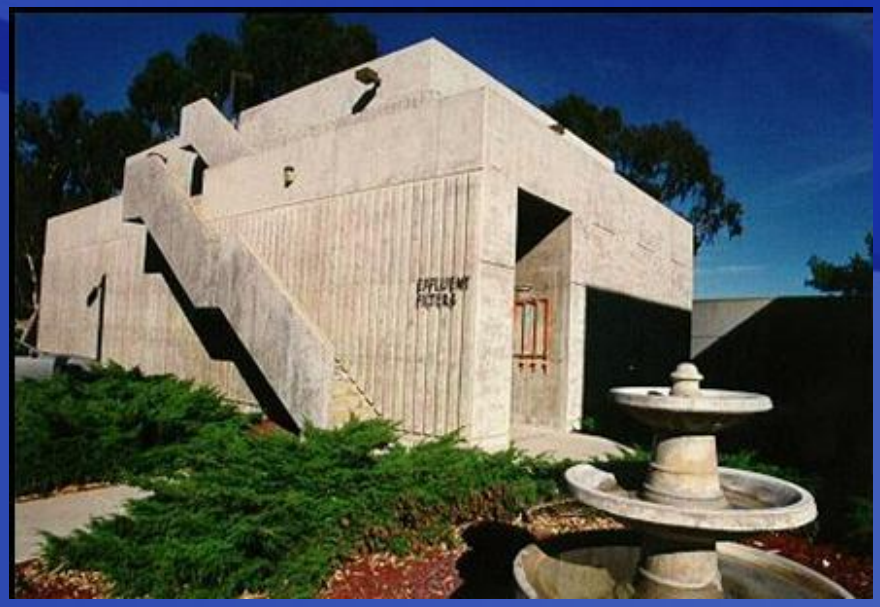
Recycled Water Treatment Plant Rehabilitation

City Council

October 30, 2012

Purpose

- Council Direction on Recycled Water Treatment Technology Selection



Presentation Overview

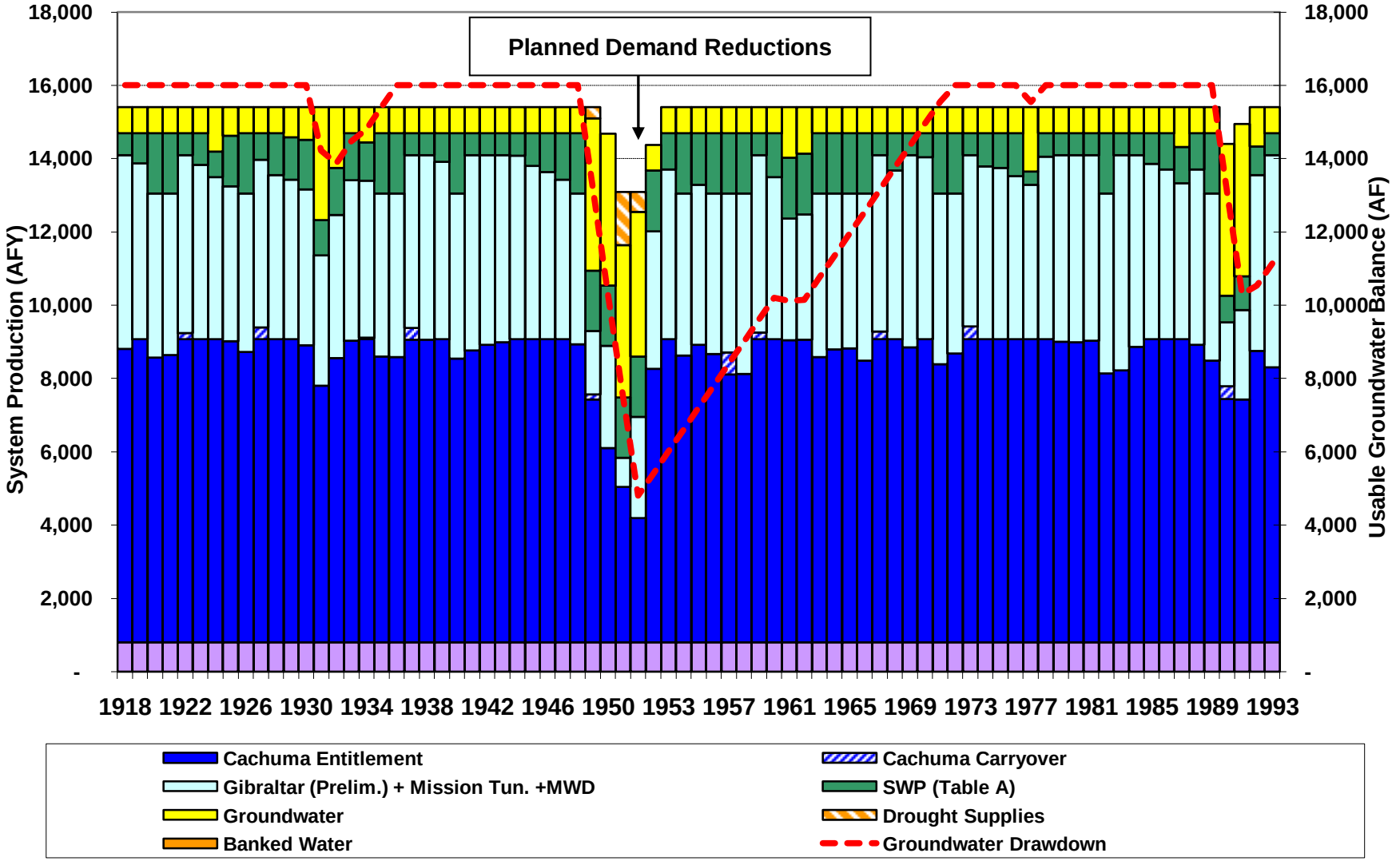
- Role of Recycled Water
- Overview of Recycled Water System
- Recycled Water Quality
- Alternative Technologies for Treatment
- Proposed Treatment Technology
- Council Direction

Role of Recycled Water

- Base load
- Urban Water Management Plan Conservation Requirements

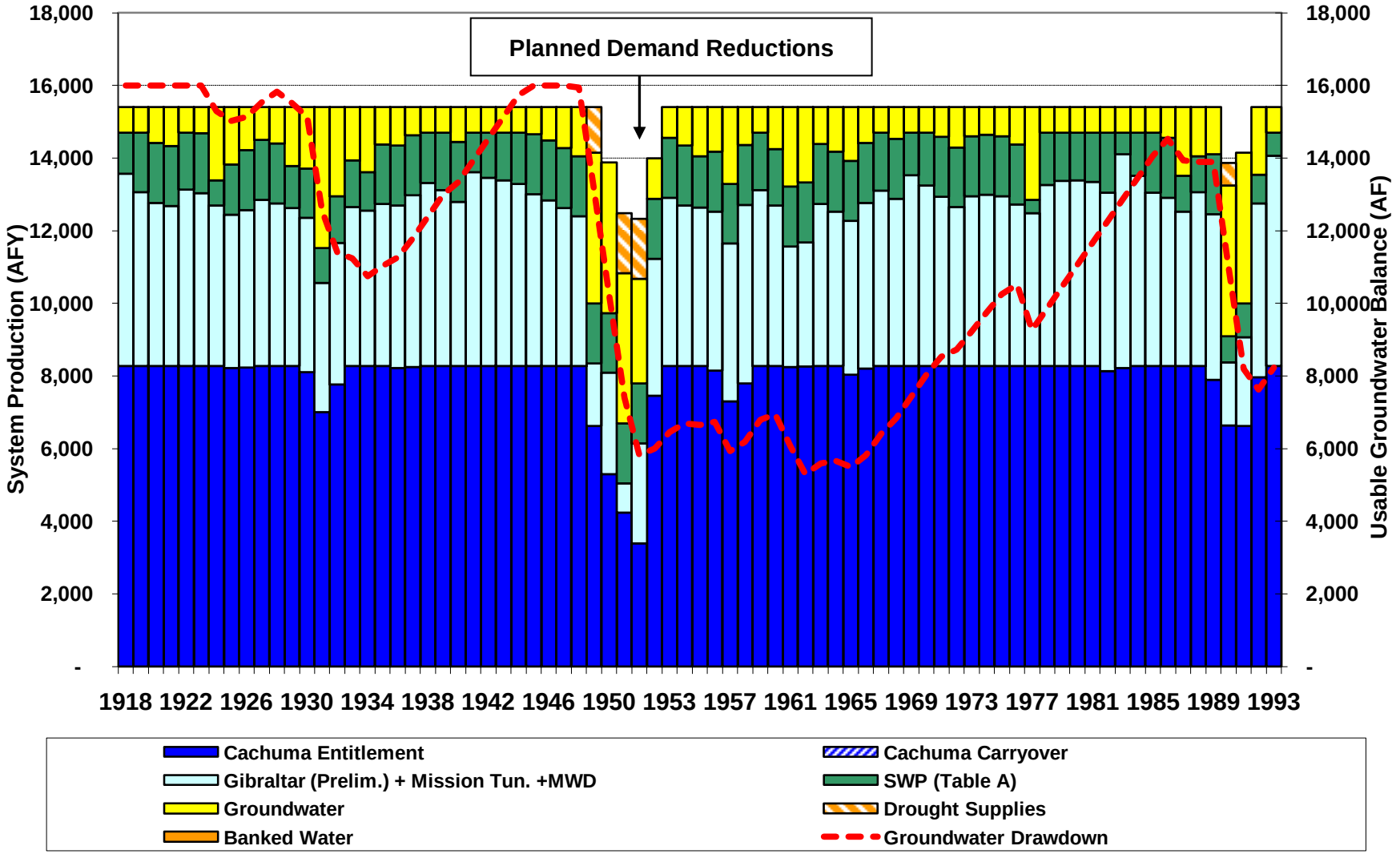
Water Supply Performance: Scenario B - Near Term

Projected System Demand (AFY):	**14,000**	Water Supply Target (including Safety	**15,400**		
Cachuma Yield Assumption:	**Current Entitlement**	Planned Demand	Stage	Stage	Stage 3
Total Critical Period Drought Supplies Required	**2,302**		**10%**	**15%**	**15%**



Water Supply Performance: Scenario B - Near Term

Projected System Demand (AFY):	**14,000**	Water Supply Target (including Safety	**15,400**		
Cachuma Yield Assumption:	**Current Entitlement**	Planned Demand	Stage	Stage	Stage 3
Total Critical Period Drought Supplies Required	**4,551**		**10%**	**15%**	**15%**



RW System Overview

- Constructed 1989
- Tertiary Filters
  - 4.4 MGD Capacity
- Disinfection
  - 2.1 MGD Capacity
- Distribution Piping & Pump stations
- Reservoirs

RW System Overview (cont.)

- Major Customers
- System Limitations

Recycled Water Requirements

- Meet anticipated future recycled water demands
- Meet El Estero recycled water quality permit requirements per Order No. 97-44 (RWQCB)
- Meet Title 22 requirements (CDPH)
- Meet recycled water user needs
- Long Term Water Supply Policy

LTWSP Policy Statement

- A contingency plan for eliminating the need for blending will be developed for implementation based on economic, regulatory or water supply requirements.
- The City's goal is to be able to deliver recycled water to its customers, without blending, by the end of the planning period.

Existing Tertiary Filters

- Performance
  - Turbidity routinely exceeds 2.0 NTU, blending water required to meet permit limit
- Safety & Access
  - Confined space entry issues
  - Double confined access to underdrain system is inaccessible for cleaning
  - Compromised structural integrity of operations platform has resulted in shutdown of process

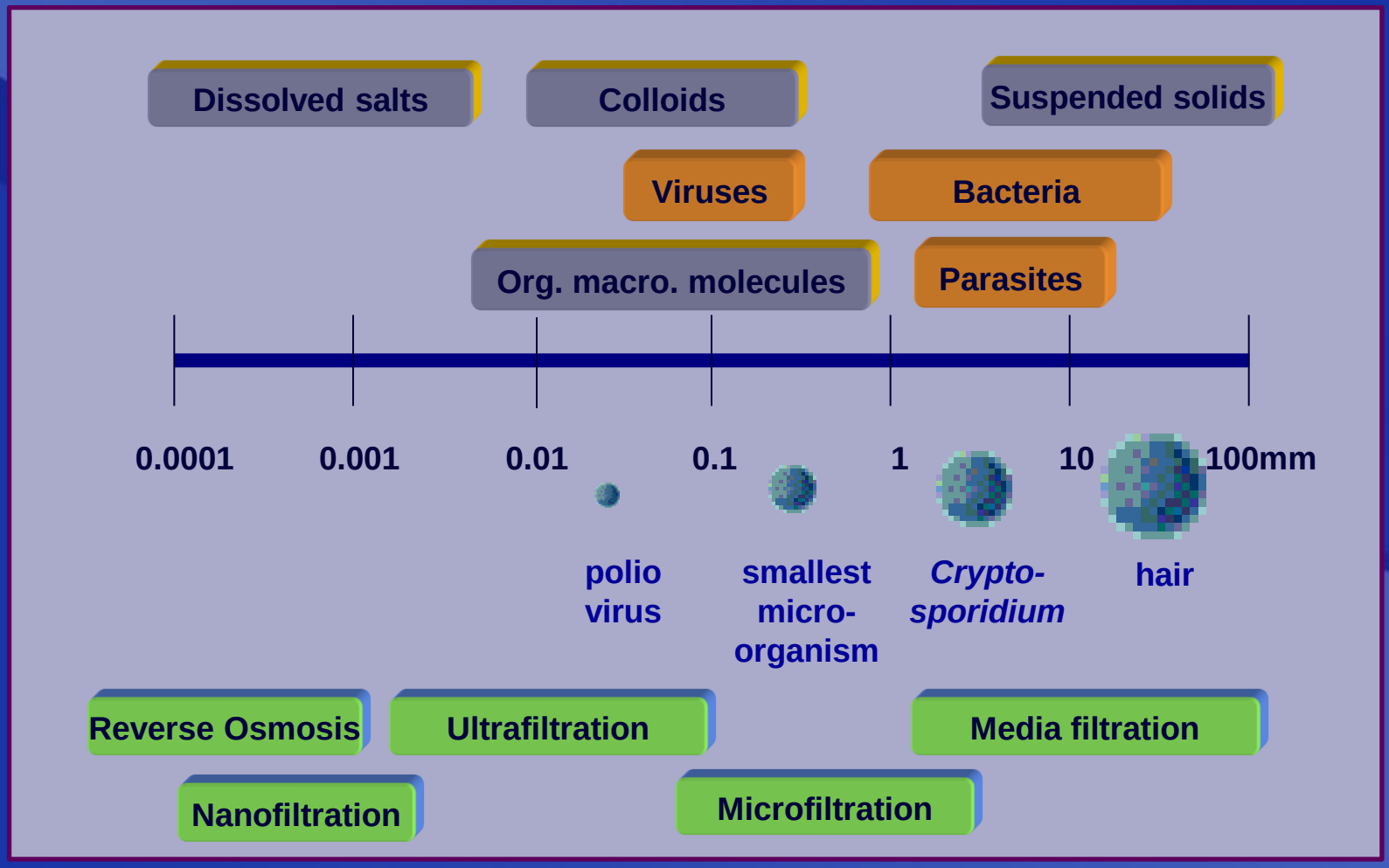
Water Quality

- High TDS (salts)
- Pathogens
  - Multiple barrier
- Emerging Contaminants
  - Endocrine Disrupters
  - Pharmaceuticals

Filtration Alternatives

Technology	Advantages	Disadvantages
Gravity Deep Bed	• Commonly used technology • Effective for filtration	• Shutdowns for backwash • Retrofitting existing structures would require structural, instrumentation, and process improvements • Can be problematic with poor secondary effluent quality
Upflow continuous backwash media filters	• Small site footprint • Commonly used technology • No shutdowns for backwash • Few ancillary components (compressor only for backwash) • Effective for filtration	• Historic concerns with backwash mechanism • Plugging • Can be problematic with poor secondary effluent quality
Cloth or disk filters	• Commonly used technology • Small site footprint	• Can be problematic with poor secondary effluent quality
Microfiltration	• Best effluent quality • Easily shut down and restarted for intermittent operation • Pretreatment for RO	• Higher capital and O&M cost

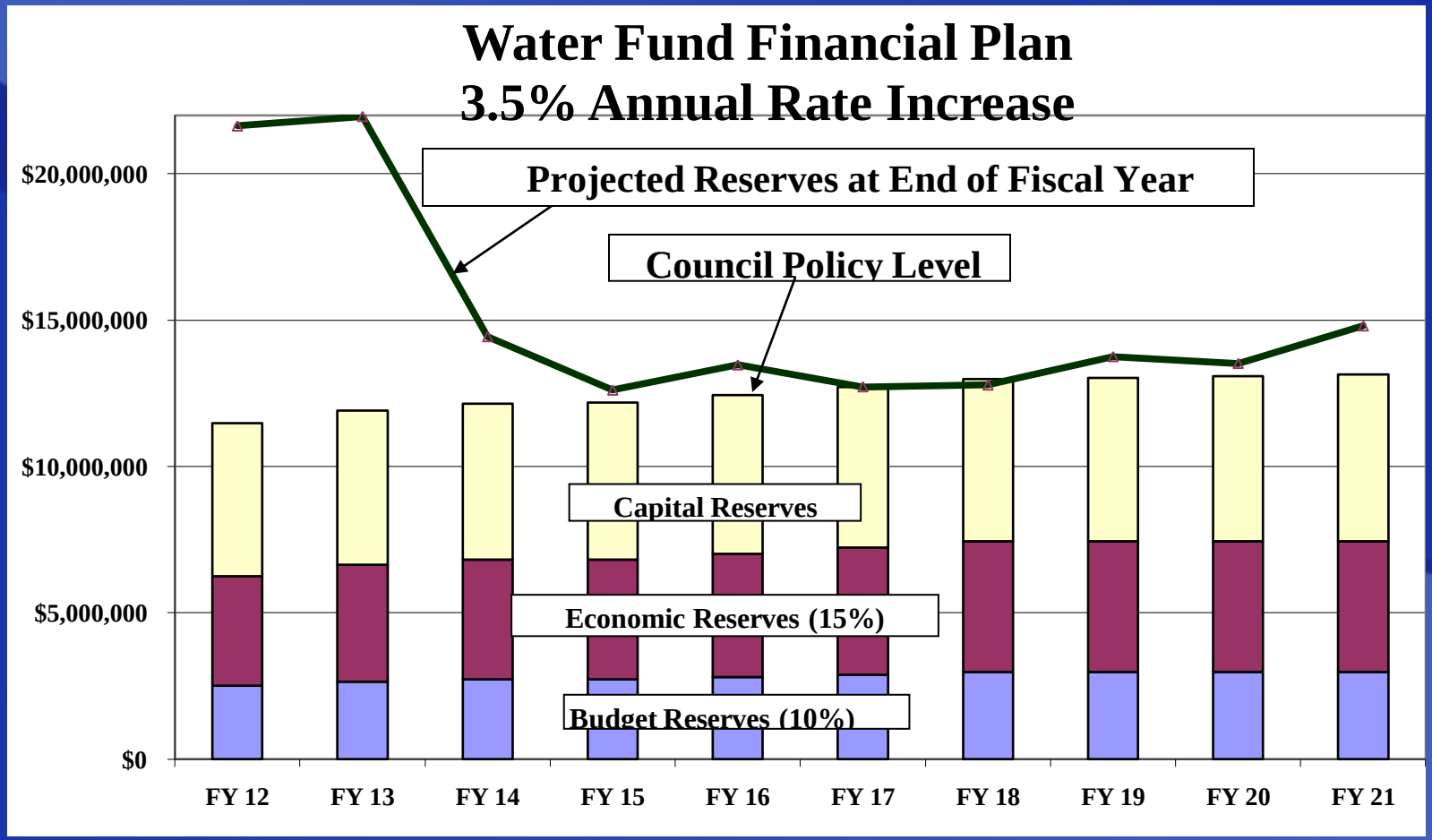
Contaminant Removal



Filtration Assessment

	Rehab Existing Filters/ Sidestream MF	Upflow in Existing / Sidestream MF	New Upflow/ Sidestream MF	Disk Filters in Existing/ Sidestream MF	Full MF
Capital Cost	$4.9M	$4.8M	$6.6M	$4.6M	$6.5M
Yearly O&M Cost	$0.08M	$0.08M	$0.08M	$0.08M	$0.1M
20-Year Life-cycle cost	**$6.1M**	**$6M**	**$7.8M**	**$5.8M**	**$7.9M**

Built Reserves For Project



TDS Control

• **Blending with Potable Water**	• **Source Control**	• **Demineralization**
• High long term cost	• Numerous uncertainties; potential resistance in water softener elimination	• Flexibility to target desired TDS
• Reliance on imported water; Regulatory challenges with meeting 20 by 2020 water reduction requirements	• Unknown costs	• Reduces imported water demands

Demineralization Cost Comparison

	NF	EDR	RO	Blending**
Capital Cost	$5.8M	$3.5M	$3.0M	$0
Yearly O&M Cost	$0.39M	$0.37M	$0.22M	$0.7 - 1.2M
20-Year Life-cycle cost	**$11.3M**	**$8.8M**	**$6.1M**	**$10 - 17M**

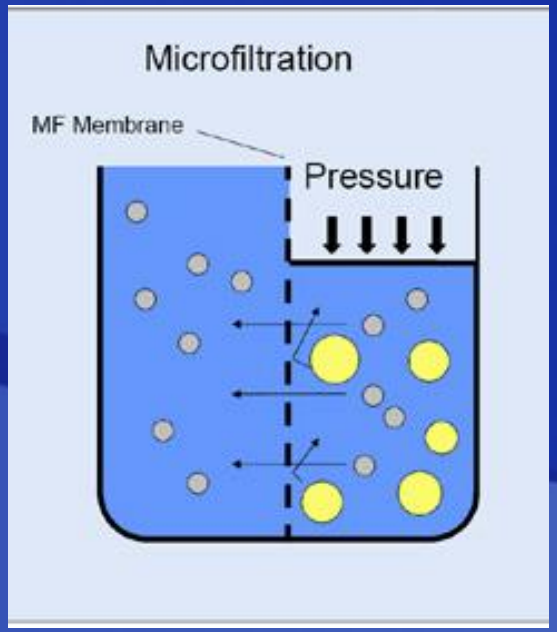
** Based on water cost of $350 - $600/AF

Comprehensive Assessment

	New Upflow Continuous Backwash Filter + Blending	Full MF and Partial RO Demin
Capital Cost	$4.7M	$9.5M
Yearly O&M Cost	$1.27M	$0.32M
20-Year Life-cycle cost	$15-23M	$14M

Advantages of MF

- More reliable with variable effluent quality
- More effective removal of contaminants
- Easier to operate
- Allows subsequent technologies to be used (RO/UV)



Recommendation

- Full MF/RO
  - Consultant Recommended
  - Staff Recommended
  - Water Commission Recommended
  - Sustainability Committee Recommended

Council Direction