

Water Supply Reliability and Catastrophic Planning Considerations

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After considerable analysis and public debate, clarity has emerged on several key issues. Presently, there is no serious water supply deficit. Water conservation recommendations in MMWD staff documents and the independent report *Sustaining Our Water Future* should be aggressively implemented and will provide adequate future water supply reliability given the historic record of drought events. A serious Citizen's Advisory Committee should also be established to address many important issues with improving supply reliability.

However, a lack of consensus remains regarding many important issues. There is a clear lack of consensus on the need to move forward with further effort and investment in developing a desalination facility. Continued investment in desalination with the present lack of consensus will result in further conflict with a large portion of ratepayers which will create a diversion from focusing resources on viable water supply reliability and infrastructure improvements that have widespread consensus.

Key Questions Affecting Policy for the MMWD Board and a Citizen's Advisory Committee to Resolve:

- ◆ What is the future water supply deficit and what future growth projections are reasonable for MMWD and NMWD?
- ◆ Is the \$1,631/af marginal cost use in the MMWD conservation master plan a valid comparison point for conservation planning compared to the \$2,900 to \$4,400 marginal cost of desalination?
- ◆ What is the definition of conservation first? Does this really mean simultaneous with desalination?
- ◆ What is basis of a potential decision to move forward with desalination despite compelling evidence it is not needed?
- ◆ Should carbon footprint reduction be used to offset large new energy uses or the existing footprint?

These issues have significant bearing on water supply reliability planning and each should be specifically addressed before moving forward with a decision on desalination.

What About Climate Change?

The issue of climate change is often cited as justification for immediately moving ahead with a desalination facility.

As previously noted, the Intergovernmental Panel on Climate Change published a study that averaged the various global climate change forecast models. The result projected that the region containing Marin County would experience an average of 5% to 10% more annual rainfall.

Furthermore, storm events are predicted to be more frequent and intense, which would lead to greater runoff into local reservoirs.

But an important question remains, what if Marin experiences a 3+ year severe drought event that far exceeds any drought event on record or detected in the 400 year tree ring analysis of local weather conditions? Is this a potential catastrophic event the MMWD Board should be considering and is it justified to approve a major capital investment of hundreds of millions of dollars for a desalination facility only needed for this type of unprecedented event?

Catastrophic Event Planning

Consideration of potential catastrophic events is advisable, but should include comparison of a full range of relevant possibilities including:

- ◆ 3+ year severe drought event
- ◆ Major earthquake
- ◆ Serious floods
- ◆ Major fire/conflagration spreading between wildland/urban interface

What are the relative probabilities of these events in the next 20 years or 50 years? What are the relative risks to public health and safety? What are the relative potential economic impacts? And, of course, what are the relative liabilities for MMWD?

Furthermore, will financial resource limitations require a difficult decision over priorities? It is clear, particularly during the present financially stressed times, that ratepayers do not have endless financial resources to provide for addressing all the many things that could be done on these important issues. Therefore, a serious and credible comparison analysis is warranted as the basis for understanding appropriate priorities and decision-making on the use of limited financial resources.

First it is important to briefly define and examine each type of catastrophic event. Then the individual events should be ranked for each category of risk and impact. Finally, the four types of catastrophic events should be ranked against each other.

3+ Year Severe Drought Event

Marin has experienced many multi year droughts that were relatively mild and in retrospect would not have necessitated rationing. The existing water supply and environmentally friendly options available to improved supply reliability can easily prepare us for mild multi year droughts. During the 1976-77 drought, MMWD received 22 inches and 25 inches in each respective year. A tree ring study, cited in MMWD planning documents, indicates that the two year 1976-77 drought of record is the most severe event in over 400 years. To cause serious problems, a future drought would need to consist of three consecutive years more severe than any three-year period in the 400-year tree ring record. It would also need to occur without occasional intense runoff events that are beneficial for collecting water into the local reservoirs and would provide benefits to customers practicing rain collection.

Unlike the other catastrophic events under consideration, a multi year drought would develop slowly allowing ample time for water users to adjust water use behavior. Per capita rationing allotments are unlikely to be less than 30 to 50 gallons per capita per day. Residents equipped with modern, water efficient fixtures can reduce their consumption to this level without extreme

difficulty. With the recently enacted revised California graywater standards, it will be easier for residents to reuse some of their rationing allotment as graywater on their landscape.

While an unprecedented severe three-year drought event would provide much inconvenience and loss of high-water-use landscaping, it would not pose an immediate major risk to public health and safety.

Major Earthquake

Marin is located in a major earthquake prone region. There is consensus among seismologists that the region is due, if not overdue for major earthquakes on both the Hayward and San Andreas faults, both of which are sited very close to the MMWD service area and facilities. Numerous other faults exist in the region that could also produce a major earthquake event. A major earthquake could strike at any time with virtually no advance warning and result in major damage.

A major earthquake could severely damage MMWD facilities. Without warning, residents could face complete loss of water service from severely damaged water facilities conceivably for weeks or even months on end. If MMWD's dams were damaged or failed, severe damage to downstream areas could result and it could take years to repair the damage. If water storage tanks situated above neighborhoods failed and cascaded down hillsides this could also cause major additional local damage and require many months to repair and restore water service. Fire is a serious risk following a major earthquake. With a severely damaged water distribution system, water would not be easily available to respond to outbreaks of fire nor for public health and safety.

Many water agencies have heavily invested in seismic retrofits to prepare their facilities to better withstand an inevitable earthquake. MMWD has also done some seismic retrofits. However, MMWD has much old distribution piping already plagued with frequent breaks and a high leakage rate and it is unclear if MMWD is adequately prepared for a major earthquake event.

This type of event poses major health and safety risks for not only the initial earthquake event, but also the aftermath. In addition to personal safety risk and property damage, without warning residents could be facing severe damage to MMWD facilities, an inability to respond to outbreaks of fire, and a complete lack of water service for extended periods. A thorough seismic risk assessment should be conducted along with the costs of adequate retrofits.

Serious Floods

Low lying regions of Marin have experienced many serious floods and recurring flood interval ranges around every 10 to 20 years. Most climate experts predict increased flood risk for much of California. If climate change results in more frequent and intense storm and runoff events, as is predicted by many climate change models, more frequent and severe floods will become an increased problem for Marin.

MMWD is not a flood management agency charged with flood management responsibilities. However, MMWD could operate Phoenix Reservoir in a manner that would reduce flood risk in the flood prone Ross Valley area while also increasing water supply reliability. MMWD could also support the widespread implementation of rain gardens and rain harvesting in areas that would help reduce flood risk in downstream flood prone areas while also improving the reliability of the local water supply.

Furthermore, flood risk to MMWD facilities from both increased frequency and intensity of storm events and sea level rise is an important consideration. More wet winters with increased storm intensity may pose serious risks to some dam facilities and may also pose serious risks to hillside water tanks that could fail due to mudslide events. If Phoenix dam, an earthen dam, failed during an intense storm event it would be a serious catastrophe to developed downstream areas. Water tanks sliding down hillsides into neighborhoods could also cause major damage and safety risk without warning. In some cases, pump stations and treatment plants may be threatened. A serious evaluation of the flood and major storm risk to MMWD facilities, the potential for loss of water service to portions of the service areas, and the costs of adequate measures to address the problems should be conducted.

Major Fire/Conflagration Spreading Between Wildland/Urban Interface

Major fires/conflagrations comprise an ongoing serious risk in California and the MMWD service area. MMWD owns a large watershed with an extensive urban/wildland interface. Wildfire emanating from the watershed or spreading along the urban/wildland interface is a major risk for the service area. The risk increases over time as fuel load (woody debris and combustible organic material) accumulates in the watershed and along the interface. Suppression of small, low-intensity fires, practiced for many decades in the region, has contributed to the growing risk of a high intensity fire/conflagration.

Many experts indicate the risk is already very high and it is not a matter of if a major wildfire strikes this area, but when. A major wildfire poses serious threat to public safety, property and local natural systems. By denuding hillsides, a major wildfire could also contribute to future flood and mudslide risk. A serious fire could occur with little or no warning. Adequately addressing this issue in advance is a costly, but important undertaking.

Comparing Catastrophic Risks

All of these potential catastrophes pose varying degrees of risk and impacts for MMWD and its ratepayers. All are expensive to address. However, comparative costs for adequately addressing these issues has not been developed or considered by MMWD. In the interest of responsible policy planning and decision-making it is important to conduct thorough comparison analysis for informed prioritization. The table below compares the probability of each event occurring within the next 20 years or 50 years. It also assesses the relative public safety risk, economic impact and liability risk to MMWD.

	Probability w/in 20 yrs	Probability w/in 50 yrs	Safety Risk	Economic Impact	Liability Risk
Major Fire/Conflagration	High	Very High	Very High	Very High	Very High
Serious Floods	High	Very High	High	Very High	Low
Major Earthquake	Moderate	High	High	Very High	Moderate
3+ Yr Severe Drought	Low	Moderate	Low	Moderate	Low

The risk and impacts posed by an unprecedented 3+ year severe drought pales in comparison to other catastrophic risks faced by MMWD and its ratepayers. Focusing effort and resources on desalination would represent a serious diversion of resources needed for infrastructure improvements. Clearly, a more thorough analysis on this subject, with considerable public input and the assistance of a Citizen’s Advisory Committee should be carefully considered. This should occur before a decision by the MMWD Board to further invest in development of a desalination facility.