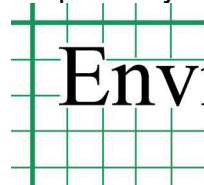

**City of Portland
Report of the
Mt. Tabor Reservoirs
Independent Review Panel**

May 2004



Prepared by:



EnviroIssues

Technical and Policy Decision Consultants

Table of Contents

1.0	Introduction and Charge to Panel	1
2.0	Panel Process – Learning and Deliberating.....	2
3.0	Public Outreach and Public Testimony Received	3
4.0	Materials and Presentations Provided to Panel	3
5.0	Options Considered and Set Aside	3
6.0	Deliberations on Final Set of Options	3
7.0	Findings, Conclusions and Recommendations of Panel	4
7.1	Risk Mitigation Approach Recommended: Majority Opinion	4
7.2	Reservoir Burial Recommended: Minority Opinion	11
	Appendix A: City Council Resolution Establishing Independent Review Panel....	14
	Appendix B: Biographical Information on Panel Members	19
	Appendix C: Stakeholder Contact List	23
	Appendix D: Panel Meeting Agendas, Meeting Summaries, and Presentation Materials	25
	Appendix E: Public Meeting Agendas, Meeting Summaries, and Materials Submitted by the Public for Panel Consideration	648
	Appendix F: Problem Statement and Evaluation Criteria	649
	Appendix G: Cost Information on Final Options	651

1.0 Introduction and Charge to Panel

In May 2002, the Portland Water Bureau decided to move forward with burial of two of the Mt. Tabor Reservoirs, and abandonment of one of the reservoirs. Concerns cited included recontamination of finished water by birds and animals, security risks, earthquake vulnerability, growing operations and maintenance costs, and pending federal regulations. The reservoirs are contained on approximately 50 acres within the 200-acre, widely used Mt. Tabor Park. The reservoirs were built between 1894 and 1911, and have been nominated to the National Register of Historic Places. The reservoirs feature gatehouses of Romanesque architecture, parapet walls with wrought-iron fencing, and early applications of reinforced concrete. Public concern about the Water Bureau's burial decision led to a pause in the project, and reconsideration of the burial decision.

Resolution 36196 of the Portland City Council (See Appendix A), adopted on January 14, 2004, created an Independent Review Panel to examine five options for addressing public health and drinking water protections, including:

1. Installation of buried reservoirs with park improvements above
2. Installation of buried reservoirs without making park improvements
3. Installation of water treatment facilities where drinking water exits the reservoir outlets
4. Removal of the reservoirs from use and finding replacement storage in the drinking water system
5. Creation and implementation of specific state-approved risk mitigation plans that will address physical access, surface water runoff, and contamination risks to the reservoirs as well as security issues raised in vulnerability assessments

The resolution directed the Panel to produce a report to Council 90 days following its first meeting, with a consensus recommendation of a preferred option. If a consensus recommendation was not possible, findings on all of the options listing the advantages and disadvantages of each were to be provided.

Panel members were appointed by Council to take on this task, as listed below. Brief biographical notes about each member are included as Appendix B.

- Ogden Beeman, Chair
- Eileen Brady
- Vanessa Gaston
- Dr. William Glaze
- Representative Steve March
- Dave Mazza
- Steffeni Mendoza-Gray
- Sandra K. McDonough
- Dr. Gary Oxman
- Frank Ray
- Captain James Spitzer
- Tiffany Sweitzer
- Tom Walsh

The Panel was empowered and funded to select and manage an independent technical advisory to assist in Panel deliberations, and a facilitator to assist in the Panel process. Both selections were made through regular City of Portland Request for Qualifications procurements. Selected firms were:

- McGuire Environmental Consultants – independent technical advisor
- EnviroIssues – facilitation

2.0 Panel Process – Learning and Deliberating

The Panel’s first formal meeting was on February 17, 2004. Prior to that time, the Panel chair and facilitation team made contact with a range of stakeholders with potential interest in the issue (See Appendix C for list of those contacted). In many cases, telephone or personal interviews were conducted by the facilitation team and/or the chair to learn more about the issues important to those groups. Also in preparation for the Panel’s work, the team held a site tour of the Mt. Tabor Reservoir system on February 13. Information was provided to Panel members by the Portland Water Bureau and a group called Friends of the Reservoir concerning operation of the facilities and their historical and park use significance.

Regular Panel meetings were held on the following dates, with the noted areas of emphasis. All meetings began at 4 pm in Council chambers, and were televised on Portland Community Media as well as made available on a web-cast link (www.taborirp.org). Meeting agendas are included in Appendix D, along with summaries of each meeting.

- February 17 – Introductions and process review; basics of the water system; identification of needed background information
- March 2 – Technical presentations on Options 1, 2 and 4
- March 16 – Technical presentations on Options 3 and 5; review of Friends of the Reservoir proposal for Mt. Tabor Reservoirs
- March 30 – Debrief on public workshop; definition of problem statement and evaluation criteria
- April 13 – Water Bureau’s proposal for Mt. Tabor Reservoirs burial; key issues for water quality; Panel discussion on water quality and system reliability
- April 27 – Presentation on Mt. Tabor Park Master Plan, Public Advisory Committee, and design competition; Panel discussion of responses to water quality issues and increasing security; cost summary for options; discussion by Panel
- Special Meeting May 4 – Panel discussion of options
- May 11 – Panel discussion of options and development of recommendations; followup assignments

3.0 Public Outreach and Public Testimony Received

Hearing from the public was a key part of the Panel’s work. Based on stakeholder outreach undertaken at the beginning of the process, opportunities for public input and comment were included at each step in the Panel’s process. (See meeting summaries in Appendix D for issues raised, and Appendix E for materials and testimony submitted.) Those opportunities included:

- Public input/comment sections of each Panel meeting agenda
- Full-day public workshop on March 20 for Panel and interested members of public, focusing on park experience and uses, capital and operating costs of the options, health risk and security, historic preservation, reliability of the water system, and water quality and pending regulations
- Public meeting set aside for public testimony on April 20
- All Panel materials posted on project website with availability of comment mechanism; comments shared with Panel

4.0 Materials and Presentations Provided to Panel

All materials developed on behalf of the Panel and presented to it by its Independent Technical Advisor, the Water Bureau, or various public groups and individuals, are included as Appendices D and E to this report (in CD form).

5.0 Options Considered and Set Aside

The Panel provisionally adopted a problem statement and set of evaluation criteria for the options, which guided their deliberations. They are included in Appendix F to this report. Based on those criteria and in consideration of the problem as defined by the membership, they set aside several of the options from further consideration. These included Option 2, buried reservoirs without park improvements; Option 3, treatment at the reservoir outlets; Option 4, removing reservoirs from use and seeking replacement storage; and Panel-proposed Option 7, the option to “do nothing” with the reservoir system. The rationale for setting these options aside is more fully described in the Majority Report, below.

6.0 Deliberations on Final Set of Options

As the Panel approached its completion, it focused its deliberations on two remaining “families” of options – Option 1, consisting of burial of Reservoir 6 North, decommissioning of Reservoir 6 South, burial of two tanks beneath Reservoir 5 with replication of historic structures on top, and decommissioning of Reservoir 1 with a reflecting pool on top; and some version of Option 5, a risk mitigation approach. A “hybrid” option was also on the table, consisting of burial of Reservoir 6 North, decommissioning of Reservoir 6 South, and risk mitigation for Reservoirs 1 and 5. Summary-level cost information was prepared by the Water Bureau for these three options for the last Panel meeting (see Appendix G), and served as an input for Panel discussions and deliberations on its recommendations.

The Panel did not reach consensus on the option to be recommended. A majority of members (eight) supported a recommendation of a risk mitigation strategy. This included Panel members Eileen Brady, Vanessa Gaston, Representative Steve March, Dave Mazza, Steffeni Mendoza-Gray, Sandra McDonough, Frank Ray, and Tiffany Sweitzer. A minority group (five) preferred a recommendation of reservoir burial. The minority group included Ogden Beeman, Panel Chair, Dr. William Glaze, Dr. Gary Oxman, Captain James Spitzer, and Tom Walsh. Both positions are fully characterized by those members in the following section containing findings and conclusions about what is being recommended.

7.0 Findings, Conclusions and Recommendations of Panel

7.1 Risk Mitigation Approach Recommended: Majority Opinion

Proposal Summary: The Mt. Tabor Independent Review Committee considered a number of issues related to the Mt. Tabor reservoirs, including their role in Portland's water system and possible threats to their integrity. Maintaining safe and reliable water supplies was the Panel's overriding concern. Affordability of water supplies also was a critical consideration.

Major findings discussed in depth below include:

- Water quality in Portland is very good and meets all current federal regulations.
- There is a very low risk that a terrorist act would harm the City's water supplies.
- Vandals can access the water supplies, but are not likely to introduce an agent that would undermine the health of system users.
- Water rates are expected to rise steadily over the next decade, well ahead of the rate of inflation.
- Water usage in Portland is declining.
- There is no current federal or state regulation requiring that the reservoirs be buried.
- New federal regulations are in development, but are not yet complete. They could impact many aspects of the Portland water system, not just Mt. Tabor, but are not expected to ban open reservoir systems.
- The reservoirs are a critical part of the history and character of Mt. Tabor Park.

A majority of the Panel's members have determined that there is no compelling reason to bury the reservoirs at this time, nor may there ever be a compelling reason to bury them. Some members of the Panel majority believe all plans to eliminate open storage should be rejected permanently. Other majority members acknowledge that regulatory changes or other factors may lead to a decision to eliminate open storage in the future, but there is no compelling reason to eliminate it now.

In light of this determination, the Panel majority recommends:

- The City Council should adopt a risk mitigation strategy to ensure the safety and quality of drinking water supplies at Mt. Tabor Park.

- Since a specific mitigation plan was not provided in the Council resolution, a risk mitigation plan will need to be determined and considered by the public prior to City approval.
- A risk mitigation strategy should preserve the historic character of Mt. Tabor Park and adhere to the Mt. Tabor Park Master plan.
- The City Council should revisit this issue in the future, potentially when new federal rules are finalized, or state rules enacted.
- Deferred maintenance at the reservoirs and elsewhere in the water system should be reviewed, and work completed where it is necessary to maintain the integrity of the reservoirs and the water delivery system.
- Potential changes to Mt. Tabor should not be considered in isolation. Rather, the City should consider all upgrades necessary as a result of any new regulation in a holistic manner, calling upon experts and community representatives to assist the city in devising a plan that meets regulatory requirements, maintains safe and reliable supplies and assures long-term affordability of the City's water services.
- Rate impacts should be minimized.

Background: Portland and the surrounding communities benefit from high-quality water supplies originating in the Bull Run region of Mount Hood. Maintaining safe, reliable and high-quality water for Portland residents should be a top priority for the City. At the same time, however, ensuring the long-run affordability of water must also be a key concern of the City Council. Portlanders already have suffered rate shock resulting from steep increases in the sewer/storm water portion of the combined water and sewer bill. Additional increases could prove an economic hardship for many residential and business customers, and impede the City's ability to achieve economic recovery. As the City Council considers capital improvements in its water system, it should consider how those investments fit in with the other city priorities in terms of capital availability and cost to consumers.

The potential burial of the Mt. Tabor reservoirs has been discussed in this city for several years. Portland is one of the few remaining municipalities to have an open reservoir system, and there are strong proponents for covering them, as well as vocal opponents who believe the historic nature of the existing infrastructure should be maintained absent a compelling health-related argument for changing the structures.

The Independent Review Panel was appointed by the City Council in late 2003 to assess the Mt. Tabor reservoirs and determine whether measures should be taken at that site to ensure the safety and quality of the city's water supplies. Specifically, the Panel was asked to advise the City Council on whether the Water Bureau's proposal to bury Reservoir 5 and half of Reservoir 6 and to abandon Reservoir 1 and the remaining portion of Reservoir 6 had merit, or whether other options to mitigate risk at the reservoirs should be pursued. The Panel hired outside consultants with expertise in water systems to assist with its assessment of the options presented by the City. Formal meetings were held February through May, and two public workshops were conducted to ensure all interested parties had an opportunity to express opinions.

Panel Findings: The Panel received information from consultants, the Portland Water Bureau, the Friends of the Reservoirs, the Mt. Tabor Neighborhood Association and several other

members of the public on issues related to the safety of Portland's water supply, and potential threats to water quality. They included:

- **Terrorism.** The overwhelming consensus among presenters to the panel, as well as members of the public who testified, was that there is a very low risk of a terrorist act aimed at Portland's water supply.
- **Vandalism.** There are documented incidents of vandalism at the open reservoirs. Generally, these involve individuals throwing objects into the reservoirs. The Panel determined that vandalism at the reservoirs is a risk that should be mitigated. However, while these acts are problematic for the Water Bureau, and undesirable for water quality, there was no evidence that they have had a significant impact on water quality or have caused health problems among water users.
- **Water Quality.** Information presented to the Panel indicated that water quality in Portland is very good, despite the open reservoir system. The Panel agreed that maintaining high-quality water was the top priority in its considerations. Testimony demonstrated that open reservoirs generally provide more opportunity for contamination from natural and manmade sources. However, the Panel also heard that no water storage system can guarantee absolute protection from problems. The Panel learned that, while water from Mt. Tabor reservoirs meets federal standards, there have been issues related to turbidity, atypical coliforms and other contaminants, both natural and manmade. Problems have been identified particularly in Reservoir 6. However, these contaminants have not been documented at levels that create a health risk for water users.
- **Reliability.** Mt. Tabor plays a key role in the city's water system; 70 percent of the water available for city users passes through the three active reservoirs, primarily using a gravity-fed system. The Panel found that storage should be maintained at Mt. Tabor to ensure reliable water supplies. However, the Panel also found that all of the currently available capacity is not necessary. Half of Reservoir 6 could be retired, and Reservoir 1 is needed primarily as back-up for Reservoir 5.
- **Water Usage.** The Panel received information that water usage in the city of Portland has declined in recent years. This trend is expected to continue. Panel members also received information that suburban water districts were exploring the purchase of water from sources other than Portland. This would also greatly contribute to a lower water consumption rate. Members expressed concern about the potentially adverse impact of rising costs on water usage.
- **Regulation.** Drinking water supplies from the open reservoirs meet current federal regulation.
- **Pending Regulation.** The U.S. Environmental Protection Agency is developing an extensive new rule, commonly referred to as LT2, relating to water quality. That rule has not been finalized, and there is no assurance of when it will be. Additionally, state action may also be considered along with the federal rules. The Panel recognized that the city may be required to perform additional source water treatment as a result of that regulation, but the scope of those requirements will not be clear until a final rule is promulgated. Current drafts indicate that cities

will not be explicitly required to cover open finished water reservoirs. The draft proposed LT2 rule does require that cities, at a minimum, implement a risk mitigation plan that addresses a security and potential contamination of stored water. Until the rules are finalized, its ultimate impact on the Mt. Tabor reservoirs, and the rest of the Portland Water Bureau system, remains unknown.

- **Infrastructure.** There are substantial deferred maintenance issues for both the reservoirs and the valve and piping systems connected to them, as well as elsewhere in the system. Some maintenance was deferred as a result of the Water Bureau's expectation that the open reservoirs would be replaced with underground storage. The reservoirs at Mt. Tabor require maintenance.
- **Seismic Concerns.** Discussion of seismic implications came up very late in the Panel's review process, effectively limiting discussion and investigation of that issue. There may be seismic concerns related to the dam structures, valves, piping and other infrastructure. The Panel also learned that seismic issues could impact other key components of the Water Bureau's overall water delivery system. The Federal Energy Regulatory Commission has found that there would be no catastrophic loss of life due to water from the failure of the reservoirs or infrastructure. However, in the event of a major earthquake, the Water Bureau asserted that firefighting efforts could be impacted by water loss at the reservoirs. Other witnesses, however, stated that the reservoirs are not located in an area of high seismic concern creating potential risk to the reservoirs. The Panel did not have opportunity to bring in geologists and other experts to assess the risks in depth. The Panel majority believes the City should assess potential seismic concerns related to the Mt. Tabor reservoirs, as well as other parts of the overall water system, and determine how those concerns should be prioritized among the other seismic issues affecting City infrastructure.
- **Cost.** In addition to the above issues, the Panel carefully considered the cost impacts of various options, as well as potential impacts of mitigation measures on Mt. Tabor Park. The Panel found that the cost per month of the different reservoir options was relatively small for households. However, when aggregated with other capital improvement costs anticipated for both the water system and the sewer/storm water systems, both households and industrial/commercial water users faced substantial cost increases over the next decade. Data provided by the Water Bureau showed that water rates are projected to go up 6 percent per year over the next decade as a result of the Bureau's capital improvement program and other cost increases. That amounts to almost a doubling of rates over a decade, and is in addition to the already increased sewer/stormwater rates. The Panel expressed concern about the impact of those cost increases on the City's ability to achieve job growth and economic recovery. Additionally, the Panel talked extensively about the impact of price elasticity, and the concern that higher costs could cause wholesale customers to leave the system, resulting in higher fixed costs apportioned to captive customers.
- **Historic Designation of Mt. Tabor Park.** The reservoirs and related structures at Mt. Tabor Park have been deemed to have historic significance, and protection of them has been sought under federal regulation.

- **Park Preservation.** The Panel also carefully considered the impact of any changes in the reservoirs to Mt. Tabor Park. The Panel heard extensively from the Portland Parks Bureau, as well as the Mt. Tabor Neighborhood Association. The reservoirs and related facilities are an important part of the historical character of the park. In its considerations, the Panel sought to minimize impacts on the Park and the surrounding community, and recommends strongly that any risk mitigation strategies undertaken emphasize park preservation.

Cost Analyses: Evaluating the cost and rate impacts of the various options considered by the panel was challenging because of the different level of analysis put into them by the Water Bureau and consultants.

Option 1, the burial option, has been carefully evaluated by the city, and data was provided that enabled a careful review by the Panel's consultants. Cost of that program appeared to range between \$75 million and \$105 million. The budget reportedly includes a 15 percent contingency fund.

Options 2, 3 and 4 were eliminated by the Panel for a variety of reasons including, in some cases, cost. (See below.)

Option 5 cost evaluations were more difficult, because the lack of specificity about potential security measures. That option clearly had not been investigated in depth by the Water Bureau. Costs ranged from about \$11 million to \$45 million. The higher figure included \$37 million for seismic upgrades and maintenance programs deemed necessary by the Water Bureau. Additionally, budgets for the risk mitigation option included a 30 percent contingency, because the Water Bureau had not had the opportunity to carefully analyze the cost of various options.

The Panel's majority concluded that Option 5, risk mitigation, was clearly less costly than Option 1, the burial option. However, the scale of the difference was not clear because of the lack of specificity and analysis around the risk mitigation options.

Options: The Panel considered seven options:

- Option 1 – Buried reservoirs with architectural features on top.
- Option 2 – Buried reservoirs with no park improvements.
- Option 3 – Treatment of reservoir effluents.
- Option 4 – Reservoirs off-line and retired.
- Option 5 – Risk mitigation.
- Option 6 – Risk mitigation presented by the Friends of the Reservoirs.
- Option 7 – No action.

Option 2 was eliminated because of the adverse impact on and aesthetic degradation to Mt. Tabor Park. Option 3 was eliminated because of its excessive expense to water users and the resultant cost to the Parks Bureau to move an existing maintenance yard. Option 4 was eliminated because of its potential adverse impact on system reliability. And Option 7 was eliminated because the Panel felt some action is required to ensure water safety.

Option 1, reservoir burial, was debated at some length. The Panel majority recognized that water professionals and public health experts generally agree that current “best practices” for new water systems require enclosed or covered storage tanks for finished drinking water. There is a definite trend in large cities to eliminate open water reservoirs. However, the Panel majority also found that no water system, including enclosed storage, provides 100 percent safety from contamination through natural, accidental or intentional means. The Panel majority also concluded that no serious and imminent threat to water quality currently exists at Mt. Tabor.

The Panel majority expressed concern about the cost of reservoir burial, and the impact on water users throughout the Portland-metropolitan area. Additionally, the Panel majority concluded that burial could impact the historical value of Mt. Tabor Park and its role as a peaceful enclave in an urban neighborhood.

The Panel majority also found that there is no immediate regulatory requirement that the reservoirs be buried. U.S. EPA consideration of new water regulations may lead to a need to alter the existing infrastructure, but changes before the new rules are actually promulgated would be premature and potentially more costly than will be ultimately necessary.

As a result of these concerns, the Panel majority eliminated Option 1, as it was presented for consideration.

Panel Majority Recommendation: The Panel’s majority recommends that the City Council adopt variations of Options 5 and 6 (the Friend of the Reservoir proposal) – risk mitigation measures -- for remediation of the Mt. Tabor reservoirs. The Panel majority feels that additional measures at this time are not warranted given the limited risks on the system and the high costs that would be borne by ratepayers.

The Panel’s majority also concluded that mitigation options were not fully explored and presented to the Panel for consideration. A broader look at mitigation options, in discussions that include water, parks and police personnel, as well as members of the public could produce creative, cost-efficient and effective mitigation options that would reduce access to the reservoirs while preserving the integrity of Mt. Tabor Park and adhering to the Mt. Tabor Work plan. Additionally, the Panel majority recommends that the City install the least costly and least intrusive security measures possible, adding more measures only when deemed necessary through continuing security analyses.

The Panel majority also discussed some mitigation measures the City might consider, understanding that Panel members are not experts in this field. These measures are offered solely as a starting point for discussion. They include:

- **Security.** The Panel strongly recommends that the city maintain security staff at the reservoirs up to 24 hours per day, seven days per week if warranted. The reservoirs already are monitored through 24-hour TV monitoring and taping, using 360-degree cameras. The effectiveness of this equipment could be enhanced

through additional staff training. Additionally, the security staff could be supported by additional:

Closed Circuit TV

Alarms

Lighting

- **Monitoring.** The Panel recommends that the City investigate additional water quality monitoring programs at the park, based on currently available technology. Additionally, the Panel suggests that the City continue to monitor emerging technology, including real-time monitoring of water quality. Such technology is in development and may become more readily available as regulatory requirements drive water utilities toward system upgrades. These technological advancements could prove a cost-effective means of ensuring the safety and reliability of water supplies from Mt. Tabor Reservoirs.
- **Animal Control.** The panel recommends that the city investigate a dog exclusion zone around the reservoirs, and control birds by eliminating feeding stations and roosts, and reinstating bird trapping and relocation programs.
- **Fencing.** Additional decorative fencing (consistent in character with the existing historical structures) may be appropriate around Reservoirs 1, 5 and 6, if deemed upon further review. (The Panel's majority is not unanimous about the immediate need for additional security fencing.) The Panel strongly rejects that a 40-yard perimeter is required, as recommended by the Panel's consultants. A more reasonable setback that protects the character of Mt. Tabor Park should be determined. Murase Associates wrote a technical memorandum to the City on July 22, 1998, suggesting that a fence creating an additional 20-foot buffer zone around Reservoir 5 would augment security and reduce the threat of vandalism. This technical memorandum could be a starting point for the development of an appropriate fencing strategy that would protect park characteristics and access. The Panel majority suggests that the City work with neighborhood representatives, police and park officials to establish a perimeter that creates an additional buffer zone around the reservoir to limit access to vandals, while preserving the historical character of the structures and adherence to the Mt. Tabor Work plan and guiding principles.

The Panel majority would like to stress that this should not be considered an all-inclusive list, nor is it recommended that all of these measures be implemented at once. Rather, a panel of experts and community members should be called upon to design a risk mitigation program that is effective, cost-efficient and protective of the Park's historic character.

Additionally, during Panel presentations, it became clear that significant maintenance programs at the reservoirs have been deferred over the years, apparently as a result of the Water Bureau's expectation that the reservoirs would be enclosed. The Panel majority recommends that the City carefully examine maintenance needs at the reservoirs and proceed with work necessary to maintain the safety and integrity of the water system. However, the City should minimize expenditures, pending a clearer picture of additional measures that may be necessary at the Mt. Tabor reservoirs or elsewhere in the system as a result of new federal regulations.

Finally, the Panel majority suggests that the City revisit this issue in the future, possibly when new state or federal water quality regulations are issued. The Panel majority recognizes that new regulation, federal or state, could impact operation of Mt. Tabor reservoirs and other aspects of the Portland water system. The Panel majority urges the City to consider any changes to the system holistically, rather than looking at Mt. Tabor in isolation, and that a panel of experts, including members of the public, be assembled to advise the Water Bureau and City Council on the development of a plan that will meet regulations, maintain water quality and assure affordability of the system over the long term.

Summary: High-quality water is one of Portland’s prized assets. The City Council and the Water Bureau have rightfully managed the city’s water system with an overriding goal of protecting that asset and ensuring a safe and reliable water system for current and future water users. At the same time, however, affordability must be a consideration. Recent investments in the sewer/storm water systems have resulted in large increases to the combined water and sewer bill. Capital investments in the water system will push those costs even higher. The City must balance the need to make those investments against other city priorities, including the goal of maintaining affordable city services and promoting a healthier economy.

The proposal to bury the Mt. Tabor reservoirs appears to have been driven by an expectation that new federal regulations will require closed reservoirs and other capital improvements to the system. Those regulations, however, are still in the development stage, so decisions about how to comply with them are premature. Other risk factors evaluated by the Panel – including terrorism threats, vandalism, water quality degradation, reliability – did not indicate that there is an immediate risk that justifies the large capital investment required to bury the reservoirs now.

For that reason, the Panel majority recommends a risk mitigation strategy, developed by a group of experts and community members who are charged with the task of devising a security system that is effective, affordable and respectful of the Mt. Tabor Park’s historic character and its role as an essential urban design and recreational element for Portland’s residents. When the new rules are promulgated, and compliance terms clearly understood, the future of Mt. Tabor reservoirs may need to be revisited. If that is the case, the City should consider the imperative of maintaining an affordable system that is also safe and reliable as it defines its implementation plan.

7.2 Reservoir Burial Recommended: Minority Opinion

The Mt. Tabor Independent Review Panel considered much information and many perspectives relating to the reservoir system. These included the reservoirs’ critical role in the gravity-fed Portland water system, possible threats to their integrity, as well as the importance of community values, historic resources, and the value of the park to the Mt. Tabor neighborhood and other users. The minority group focused its preference for burial on the following considerations:

- **Reservoir Condition.** The reservoirs are a fundamental part of the larger water system’s infrastructure. They have served the city well for 100 years, but are suffering from age

and neglected maintenance. Investment in the reservoirs should consider how they will be part of the water system for the next 100 years.

- **Location and Gravity Distribution.** The burial option maintains the important operational and energy conservation benefits of the Mt. Tabor reservoirs, allowing pump-free gravity feed distribution to much of the water system.
- **Industry Standard.** Enclosing reservoirs is the *de facto* industry standard. The industry standard is to contain drinking water from its point of treatment to the point of use. This has resulted in burial or covering of over 400 of the 450 open finished water reservoirs serving cities of over 100,000 people in the past 30 years. This trend was in full momentum long before 9/11/2001. It appears that among large cities, Portland has the only open finished water reservoirs in the country that are not slated for closure, burial, re-treatment, or decommissioning. In the long term, open finished water reservoirs are obsolete in light of wide adoption of the industry standard, and trends in the art and science of engineering public water systems in the United States. The Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), which includes requirements for open finished drinking water reservoirs that are not covered, buried, or fitted with downstream treatment facilities, and other regulatory responses to recognized risks to water systems in the United States, will further institutionalize the industry standard.
- **Water Quality.** Natural degradation of water quality as experienced at Reservoir 6 results in public complaints, although there have not been documented health problems. Some of this degradation has been tied to the introduction of nutrient rich well-field water into the Mt. Tabor reservoirs. While this has occurred in about one-fourth of years in the past, it is forecasted to occur in three-fourths of years in the future to meet fishery needs on the Bull Run River.
- **Intentional Threats to Water Safety.** Potential risks from vandalism, though unlikely to be life or health threatening, can have major impacts on the system operation, public trust in the City's water supply, and community values for safe drinking water.
- **Terrorism.** Though terrorism is considered to be a distant possibility, the consequences of such an act could be catastrophic. In light of these considerations, some argue that the decision to not bury the reservoirs is not responsible. Because committed terrorists could also effectively attack other parts of the water system, we believe that the threat of terrorism at the Mt. Tabor reservoirs should be considered in the context of a range of terrorist threats to the full water system.
- **Historic Preservation.** A commitment to bury the reservoirs can and should preserve important historic features present today, as well as beloved aspects of the park such as sense of solitude and views. Burial of Reservoir 5 could be done with strict preservation of the facilities existing on top. Reservoir 6 could be buried and/or partially decommissioned, because there is less storage needed in the system than exists today.
- **Enhanced Recreation and Aesthetics.** The carefully planned water features on top of the buried reservoirs 5 and 6, and the decommissioning on reservoir 1 to a natural pond would provide superior aesthetic and recreational access to the water when compared to risk mitigation options involving even minimal clearances and fences. Although the new federal regulations are not yet in place, based on the current draft of LT2 we assume that the rule's risk mitigation plan requirements for storage facilities will be stringent (i.e., requiring setbacks, fencing, bird protection, security, and other measures). We believe

that the impacts of these requirements would not be consistent with the guiding principles of the Parks master plan.

- **Cost.** The incremental cost of the investment to bury is very reasonable in light of every day expenses of homeowners and businesses, especially considering the need to invest in Mt. Tabor water storage infrastructure. Investment in burial would also address capital improvements to eliminate a backlog of significant deferred maintenance and need for seismic upgrades, which would otherwise be necessary. There is a need to invest at least \$40 million in the Mt. Tabor system in the near term to address these issues. This \$40 million investment would produce “medium” term benefits, perhaps on the order of 30 years. Burial of the reservoirs would be a much sounder long-term investment. At a cost on the order of \$80 million, burying the reservoirs would benefit the community over about a 100-year period. That represents three times the project life for twice the capital investment, and also results in reduced maintenance and added security as additional “no cost” benefits.

Therefore, a minority of the Panel’s members recommends the City of Portland:

- **Retire Reservoir 1** from use as drinking water storage, and restore and maintain the facilities on top as they currently exist, or in accordance with Parks Bureau guiding principles.
- **Bury two enclosed tanks beneath Reservoir 5** under the existing perimeter, and restore and maintain the facilities on top exactly as they currently exist.
- **Bury enough storage to provide 20 MGD beneath Reservoir 6 North**; the remainder of Reservoir 6 should be restored and maintained consistent with values and design guidelines established in the Mt. Tabor Master Plan and guiding principles.
- **Do not replace lost storage capacity** at Powell Butte or elsewhere, as it does not appear to be needed.

Timing of such burial need not be immediate, but should proceed with deliberation in light of emerging regulations, documented deferred maintenance, the Portland Water Bureau’s Capital Investment Program, and the imperative to maintain Portland’s high quality water supply. In the interim, until burial is completed, the City should invest in temporary risk mitigation measures that go beyond the current minimal measures, and that are contemplated to be effective in reducing specified risks. The City should not invest significantly in permanent risk mitigation measures or major deferred maintenance, which would be wasted when burial ultimately takes place.

Appendix A: City Council Resolution Establishing Independent Review Panel

RESOLUTION NO. 36196

Create and authorize an Independent Review Panel to examine options for meeting the security and regulatory needs of the Mt. Tabor open drinking water reservoirs

WHEREAS, safe drinking water and a secure and reliable drinking water system are essential to the health, safety and economic vitality of Portland and the surrounding metropolitan region; and

WHEREAS, two-thirds of the City of Portland gets its drinking water directly from highly accessible open drinking water reservoirs located in public parks; and

WHEREAS, Portland's open drinking water reservoirs and surrounding structures hold significant aesthetic and historic value to park neighbors and visitors; and

WHEREAS, Portland's open drinking water reservoirs are aging water storage facilities nearly one hundred years old with significant seismic and other large scale infrastructure issues; and

WHEREAS, two separate security vulnerability assessments of the Portland water system indicate that Portland's open drinking water reservoirs are the most vulnerable points in the water system to contamination both incidental and intentional; and

WHEREAS, the United States Environmental Protection Agency is developing new drinking water rules to address viral contamination of drinking water and requiring water systems with open drinking water reservoirs to achieve this by either covering the open reservoirs, installing water treatment facilities to inactivate viral contaminants in the water before it flows to City taps or enacting risk mitigation plans sufficient to address physical access to and contamination of the exposed drinking water; and

WHEREAS, in May, 2002, the Portland City Council approved installation of buried water storage to replace the Mt. Tabor open drinking water reservoirs and construction of park improvements above the tanks to maintain the aesthetic and historic values associated with the reservoirs; and

WHEREAS, citizens concerned with the aesthetic and historical impacts of burying the open drinking water reservoirs are interested in having further review of the City's options for addressing the security and regulatory needs of the City's reservoirs; and

WHEREAS, the Portland Water Bureau is prepared to make significant capital investments in the current approach to address the vulnerability of the open drinking water reservoirs: and

WHEREAS, an independent review of the viable options for addressing the security and regulatory issues of the open drinking water reservoirs will assist the City Council

in either maintaining its original decision to bury or choosing to implement another viable approach.

NOW THEREFORE, BE IT RESOLVED, that the City Council approves the creation of an Independent Review Panel, comprised of diverse members of the Portland community, to review and evaluate the technical merits, cost-benefits, and community impacts of the following five options for meeting the security needs and federal regulatory requirements at the Mt. Tabor open drinking water reservoirs:

1. Installation of buried reservoirs with park improvements above,
2. Installation of buried reservoirs without making park improvements,
3. Installation of water treatment facilities where drinking water exits the reservoir outlets,
4. Removal of the reservoirs from use and finding replacement storage in the drinking water system, and
5. Creation and implementation of specific state approved risk mitigation plans that will address physical access, surface water runoff and contamination risks to the reservoirs as well as security issues raised in vulnerability assessments; and

BE IT FURTHER RESOLVED, that the City Council directs the Independent Review Panel to produce a report to Council 90 days following the panel's first meeting, with a consensus recommendation of a preferred option or, if that is not possible, findings on all of the options listing the advantages and disadvantages of each; and

BE IT FURTHER RESOLVED, that following a public hearing and City Council acceptance of the Independent Review Panel Report, the City Council shall either decide to continue with the existing plan to bury the Mt. Tabor reservoirs with park improvements or to proceed with one of the other options listed above for addressing security needs, achieving regulatory compliance, and the long-term infrastructure needs of these facilities; and

BE IT FURTHER RESOLVED, that following a public hearing and City Council acceptance of the Independent Review Panel Report, the Panel's work shall be deemed complete and the Panel shall be dissolved; and

BE IT FURTHER RESOLVED, that all costs associated with the Independent Review Panel, including contracting with a facilitator and an independent technical advisor, will be funded by the Portland Water Bureau; and

BE IT FURTHER RESOLVED, that the following are appointed by Council to serve as the Independent Review Panel: Ogden Beeman (Chair), Eileen Brady, Vanessa Gaston, Dr. William Glaze, Representative Steve March, Dave Mazza, Steffeni Mendoza-Gray, Sandra K. McDonough, Dr. Gary Oxman, Frank Ray, Captain James Spitzer, Tiffany Sweitzer and Tom Walsh; and

BE IT FURTHER RESOLVED, that Ogden Beeman, Eileen Brady, Captain James Spitzer and Tom Walsh will serve as the selection committee to choose a facilitator to assist

the Independent Review Panel through a regular City of Portland Request for Qualifications procurement process; and

BE IT FURTHER RESOLVED, that Ogden Beeman, Eileen Brady, Dr. William Glaze and Captain James Spitzer will serve as the selection committee to choose an independent technical advisor to assist the Independent Review Panel through a regular City of Portland Request for Qualifications procurement process.

Adopted by the Council, January 14, 2004

Commissioner Dan Saltzman
Edward Campbell
January 8, 2004

GARY BLACKMER
Auditor of the City of Portland
By /S/ Susan Parsons

Deputy

BACKING SHEET INFORMATION

AGENDA NO. 0027-2004

ORDINANCE/RESOLUTION/COUNCIL DOCUMENT NO. 36196

COMMISSIONERS VOTED AS FOLLOWS:		
	YEAS	NAYS
FRANCESCONI	X	
LEONARD	X	
SALTZMAN	X	
STEN	===	===
KATZ	X	

Appendix B: Biographical Information on Panel Members

Commissioner Dan Saltzman Nominees to the Mt. Tabor Open Reservoirs Independent Review Panel

OGDEN BEEMAN (CHAIR)

Ogden Beeman is an independent maritime consultant and long time Northwest Portland resident and neighborhood advocate. He has served as a consultant to numerous agencies and private investors on the development and financing of navigation and port projects in the United States and abroad. Although semi-retired, he presently serves as one of a small group of international experts advising the Panama Canal Administration on possible expansion of the canal. Active in community affairs, Ogden is a past president of the City Club of Portland and of the Northwest District Association and is a former member of the City Planning Commission. He is a member and past national chairman of the Waterways Committee of the American Society of Civil Engineers. He is a graduate of Stanford University and the Technological University of Delft, Netherlands where he studied hydraulic engineering.

EILEEN BRADY

Eileen Brady, Vice President at Ecotrust, manages the Ecotrust Food and Farms Program, GIS consulting business, and Salmon Nation public education initiatives. She has twenty years experience in the natural foods retail grocery business, developing sustainable agriculture based marketing and human resource programs. She sits on the Governor's Steering Committee for Oregon Solutions, the statewide effort to develop sustainable solutions to economic issues, and is a board member of Zenger Farm, the first urban agricultural park in the nation. She is a Board member of Celilo Group Media, publisher of the Sustainable Industries Journal and Chinook Book. In addition she is the co-founder of Community Food Matters, a region-wide food network of policy and business activists and speaks regularly on "Building Regional Food Economies."

VANESSA GASTON

Vanessa Gaston is the newly appointed President and CEO of the Urban League of Portland. She comes to this position after serving as the Associate Superintendent at Washington Soldiers Home & Colony in Orting, Washington, which is part of the Washington State Department of Veteran Affairs. Prior to this position, she worked for Washington State's Department of Social and Health Services in Seattle, Washington. Vanessa Gaston served from 1987 until 1995 as Legal Specialist and Office Manager for the US Army – Staff Judge Advocate offices in Germany and at Fort Lewis, Washington on both Active and Reserve Duty. She graduated in 1990 with a Certificate in Law for Legal Specialists from the Army Judge Advocate General School in Charlottesville, Virginia. Gaston completed her Bachelor of Arts in Organizational Development from Evergreen State College in 1995. She then earned her Masters in Public Administration from the University of Washington in 2001.

DR. WILLIAM GLAZE

Dr. Glaze is the Chair of the Environmental Protection Agency's Scientific Advisory Board and a professor at the Oregon Graduate Institute by way of the University of North Carolina, Chapel Hill, where he was a professor and former chairman of the Department of Environmental Sciences and Engineering. Glaze was a pioneer in studying the integration of ecological sciences with human health sciences, and in exploring sustainable technologies applied to water treatment and the energy and transportation sectors. He is known throughout the environmental science community for his 15-year tenure as editor-in-chief of the field's pre-

eminent journal, Environmental Science & Technology, published by the American Chemical Society. His education includes a Bachelor of Science from Southwestern University, a Masters of Science in Physical/Polymer Chemistry from the University of Wisconsin as well as a PH.D in Chemistry.

STEFFENI MENDOZA GRAY

Steffeni Mendoza Gray is the Executive Director of the Oregon Council for Hispanic Advancement--a private, non-profit organization serving Latino youth and their families. She has a Bachelors degree in Architecture from the University of Oregon. Her professional experience includes six years managing a small retail business and 18 years in executive non-profit management positions. Currently, Ms. Gray serves on a number of task forces, boards and committees including the Portland Parks Board and the State Department of Education Underrepresented Minority Students Advisory Committee.

STATE REPRESENTATIVE STEVE MARCH

Representative Steve March serves District 46, which covers portions of Northeast and Southeast Portland and includes the neighborhoods of Laurelhurst, Mt. Tabor, South Tabor, Center, Montavilla, Woodland Park, and parts of Powellhurst-Gilbert and Hazlewood. Recently, Steve has worked as a Policy Analyst for Multnomah County Commissioner Lisa Naito and as an adjunct professor in the Institute on Aging at Portland State University. As a Senior Management Auditor for Multnomah County during the 1990's, Steve conducted performance audits. Steve came to Oregon in 1986 and since moving to Portland has completed a Ph.D. as well as a Masters in Urban Studies at Portland State University, and received a Gerontology Certificate along the way.

DAVE MAZZA

Dave Mazza is editor of The Portland Alliance, the city's oldest progressive alternative newspaper. A former private investigator, Mazza is a long-time community activist who worked with the Sierra Club, helped build the Portland chapter of Jobs with Justice, and served as chief petitioner of the Police Accountability Campaign. He also served as an environmental representative on the citizen advisory committee for the Westside Bypass study and was a member of Mayor Katz's transition team.

SANDRA K. MCDONOUGH

Sandra McDonough is Vice President, External Affairs, for National Energy & Gas Transmission Inc. In that role, she is responsible for external relations activities supporting all of NEGTS's assets in the United States, including legislative, community relations and regulatory support. She also is a Vice President of Gas Transmission Northwest Corporation. She has worked in the energy industry for about 20 years. Before joining NEGTS, she was the federal affairs manager for PacifiCorp, working in Oregon and Washington, D.C. She later served as that company's communications director, handling programs in a seven-state service area. Earlier, she was a reporter for The Oregonian and Seattle Times. McDonough chairs the Portland Business Alliance's Natural Resources Committee and serves on the Oregon Zoo Foundation Board of Trustees. She is president of the Northwest Gas Association, a natural gas industry group, and is a senior fellow for the American Leadership Forum - Oregon. McDonough holds a Bachelors degree in journalism and German from the University of Oregon.

DR. GARY OXMAN

Dr. Oxman has served as Health Officer for the Multnomah County Health Department in Portland Oregon since 1987. From 1984 through 1987, he was Medical Director for Multnomah

County Health Department. He was raised and educated in Minneapolis, Minnesota. He received his MD degree from the University of Minnesota in 1978. Dr. Oxman served a flexible internship at Emanuel Hospital in Portland, Oregon, then worked as a General/Family Practice physician in HMO and private practice settings for about five years before entering public health. He attended the University of Washington Extended Masters of Public Health Degree Program, and received an MPH with an emphasis in health services in 1990. Dr. Oxman is Board Certified in General Preventive Medicine/Public Health. During his career, he has been involved in a variety of public health issues including prevention and control of communicable diseases, access to health care, Emergency Medical Services, drug overdose deaths, environmental health, and many others. In recent years, he has worked extensively on local emergency preparedness and bioterrorism issues.

FRANK RAY

Frank Ray is a budget analyst for the City of Gresham. His responsibilities include analysis for the Police Department, Fire & Emergency Services Department and the Department of Environmental Services (Water, Sewer, Stormwater, Transportation, Parks). He is also a member of the Portland Utility Review Board and has had a long career in finance, which included a stint as Vice President/Regional Manager for Key Bank's loan servicing center in Milwaukie, OR. He has also worked for Western Savings, Crossland Mortgage, Nationsbank and U.S. Bank as well as being a co-owner/operator of a small business for 2 years in the wholesale building products industry. His education includes a Bachelor of Science in Chemistry and Biology from Northern Arizona University and a Masters of Business Administration from the University of Utah.

CAPTAIN JAMES SPITZER

Captain Spitzer has served as the Multnomah County Health Department's first Emergency Preparedness Manager since September, 2002. He is a leader of the Department's emergency response strategy, which is designed to improve public health's capacity for emergency management. He was raised in Wisconsin and New York. Captain Spitzer received his MBA degree from the University of Oregon in 2003 and his Masters of Science in Natural Resources Policy and Management from the University of Michigan in 1981. In 2002 he retired from a 27 year career in the U. S. Coast Guard, most recently as the Port Captain for Portland. He specialized in emergency management of major maritime casualties and oil and hazardous material spills; maritime operations and safety; and the national and international regulation of the maritime industry.

TIFFANY SWEITZER

Tiffany Sweitzer is president of Hoyt Street Properties and has dedicated the last ten years to the development of the firm's 34-acre property in the Pearl District. Prior to this she was the event coordinator for the Oregon Trail Coordinating Council. She received a Bachelor of Arts at the University of Oregon. Sweitzer sits on the board of PICA, the Portland Parks Foundation, Portland Streetcar Inc., and the River District Steering Committee.

TOM WALSH

Tom Walsh is a Portland native, civic leader and businessman who is the former general manager of Tri-Met, the Portland metropolitan regional transit authority. He has served as chairman of the Oregon Board of Forestry and as vice chairman of the Oregon Transportation Commission. He is also an affordable housing advocate responsible through his construction company for continuing to generate additional affordable housing units for the region.

Appendix C: Stakeholder Contact List

Citywide Stakeholders Group

Tom Koehler, 503 490-1070

Portland Business Alliance

Greg Peden (503) 552-5633

Citizen's Crime Commission

Maggie Miller 503 228 9736 (x238)

Mt. Tabor Neighborhood Association

Laura Gordon 503 234-4430

Large Water Users "Coalition"

Charles Porcelli, Kohldkist Ice 503-285-2800

Existing and Former PURB Members

Jay Formick 503-612-3770

1000 Friends of Oregon

Bob Stacy 503-497-1000

Friends of the Reservoirs

Floy Jones floy21@msn.com

Appendix D: Panel Meeting Agendas, Meeting Summaries and Presentation Materials

A separate set of PDF files have been prepared for Appendix D due to the large size of the documents it contains. These PDF files are available on the compact disk version of the IRP Final Report which can be requested from the Portland Water Bureau through the bureau's public record request process. Call 503 823-7404 to obtain a public record request form or download the form from the Water Bureau's website:

<https://www.portlandonline.com/water/index.cfm?&a=28499&c=29389C>

The materials contained in Appendix D can also be accessed at the City of Portland website at www.TaborIRP.com. If you have questions concerning current web location, email the Water Bureau's webmaster at wtr-webmaster@water.ci.portland.or.us or call 503-823-7404.

Appendix E: Public Workshop Materials and Materials Submitted by the Public for Panel Consideration

A separate set of PDF files have been prepared for Appendix E due to the large size of the documents it contains. These PDF files are available on the compact disk version of the IRP Final Report which can be requested from the Portland Water Bureau through the bureau's public record request process. Call 503 823-7404 to obtain a public record request form or download the form from the Water Bureau's website:

<https://www.portlandonline.com/water/index.cfm?&a=28499&c=29389C>

Appendix F: Problem Statement and Evaluation Criteria

Mt. Tabor Reservoirs - IRP
Objective Statement as Provisionally Adopted March 30, 2004

The objective is to maintain safe, secure, high-quality finished water storage at Mt. Tabor under normal and emergency situations. Solutions should be designed to minimize rate impacts to water users, and also minimize impacts to historic and aesthetic resources and existing park uses and character.

Evaluation Criteria as Provisionally Adopted March 30, 2004

Water Quality

1. Minimize potential to degrade water quality.
2. Comply with regulations.
3. Meet proposed LT2 regulation when it is finalized.

System Reliability

1. Maintain adequate storage at Mt. Tabor to ensure system reliability including peak water use and fire fighting needs.

Historical and Park Characteristics

1. Maintain historic features, views, existing character, and safe, accessible park uses.
2. Minimize neighborhood impacts and changes to neighborhood characteristics.

Cost

1. Minimize additional expense to ratepayers and taxpayers.
2. Solutions should be cost effective.

Appendix G: Cost Information on Final Options

Assumptions for Remaining Options Under Consideration by the IRP

Option 1: Tom Walsh Proposal

- Reservoir 1 retired from use-- facilities restored and maintained as they currently exist
- Two enclosed tanks (approximately 50 MG) buried below Reservoir 5 under water within its existing perimeter-- remaining facilities restored and maintained as they currently exist
- 20 MG of enclosed storage buried below Reservoir 6 North under water— remainder of Reservoir 6 restored and maintained consistent with values and design guidelines established in Mt. Tabor Park Master Plan and Guiding Principles process
- No replacement storage at Powell Butte
- Park improvement budget estimated as the same as previously developed by City based on reflecting ponds at Reservoirs 5 and 6 North

Option 5: Risk Mitigation (Complete)

- Fenced setback and vegetation clearing from reservoir edges to address security needs and draft LT2 requirements (fencing material high quality consistent with existing park design)
- Motion detection devices, additional lighting, security cameras and security personnel.
- Bird wires and barriers to prevent access by mammals to meet LT2
- Reservoir 1 remains online to enable Reservoir 5 cleaning and future upgrades
- Facility upgrades performed on all three reservoirs to address regular and deferred maintenance and seismic vulnerability

Option Hybrid: Jim Spitzer Proposal

- 20 MG of enclosed storage buried below Reservoir 6 North under water — remainder of Reservoir 6 restored and maintained consistent with values and design guidelines established in Mt. Tabor Park Master Plan and Guiding Principles process
- Risk Mitigation measures for Reservoirs 1 and 5 consistent with full set of Option 2 assumptions described above.

Cost and Rate Comparison for Burial, Risk Mitigation and Hybrid Options

	Burial		Open (Risk Mitigation)		Burial/Open Hybrid	
	Cost	Rate	Cost	Rate	Cost	Rate
Capital 1) Infrastructure, Seismic* and WQ Upgrade	\$65.40 million	\$1.56/mo	\$37.30 million**	\$0.89/mo	\$50.50 million	\$1.20/mo
Capital 2) Security	\$0.50 million	\$0.01/mo	\$7.50 million	\$0.18/mo	\$6.70 million	\$0.16/mo
Capital 3) Park Improvements/Restoration	\$13.70 million	\$0.33/mo	\$0.00 million	\$0.00/mo	\$6.20 million	\$0.15/mo
Total Capital	\$79.60 million	\$1.90/mo	\$44.80 million	\$1.07/mo	\$63.40 million	\$1.51/mo
Annual O&M 1) Infrastructure, Seismic and WQ Upgrade	\$0.02 million	\$0.004/mo	\$0.30 million	\$0.07/mo	\$0.23 million	\$0.05/mo
Annual O&M 2) Security	\$0.00 million	\$0.00/mo	\$0.26 million	\$0.06/mo	\$0.18 million	\$0.04/mo
Annual O&M 3) Park Improvements/Restoration	\$0.50 million	\$0.12/mo	\$0.00 million	\$0.00/mo	\$0.20 million	\$0.05/mo
Total Annual O&M	\$0.52 million	\$0.12/mo	\$0.56 million	\$0.13/mo	\$0.61 million	\$0.14/mo
TOTAL RATE IMPACT		\$2.02/mo		\$1.20/mo		\$1.65/mo

Capital Rate Impact Assumptions:

- Calculation is for Monthly Cost Increment to 8ccf Residential User
 - Capital Costs Financed by 20 yr Revenue Bonds
 - Assumes All Costs to Be Paid from Future Rates (Ignores Revenues Raised to this Point)
- 20 yr O&M Rate Impact Assumptions:
- Calculation is for Monthly Cost Increment to 8ccf Residential User
 - O&M Costs Paid Directly from Rates

* The seismic upgrade costs built into Risk Mitigation and Hybrid Projections are for partial upgrades. Full seismic upgrades for both options would include basin replacement for the remaining open reservoirs. Estimated additional capital costs for this would be \$12.5 Million (\$0.30 / month) for Risk Mitigation and \$5.9 Million (\$0.14 / month) for the Spitzer Hybrid.

** No Water Quality Improvement is Assumed for Risk Mitigation Option

Option 1: Buried Reservoirs with Reflecting Pools Costs ⁽¹⁾

	<i>Capital Costs</i>		<i>O& M Costs</i>
Item	Costs (Millions)	Item	Costs (Millions)
-			
Infrastructure, WQ, LT2 & Seismic			
Buried reservoirs & piping construction	\$55.60		
Rehabilitation Costs for historic features Reservoirs 1, 5 & 6 (gate houses, fences, light fixtures), Excerpted from Benchmark Maintenance Program (2002)	\$2.30		
Design and Construction Management for infrastructure, WQ & seismic improvements	\$7.50		
<u>Total Infrastructure, WQ, LT2 & Seismic</u>	<u>\$65.40</u>	<u>Infrastructure, WQ, LT2 & Seismic O&M</u>	<u>\$0.02</u>
Security			
-			
Alarms and electrical/signal conduits/power ⁽²⁾	\$0.00		
Camouflage for access points	\$0.03		
Security Lighting	\$0.05		
CCTV with IR lighting, recorders, fiber optic extensions	\$0.16		
Secure vault access as appropriate (improve locks/hatches/vent covers), ⁽²⁾	\$0.00		
Card readers at Gatehouses and hypochlorite	\$0.02		
Securing gate houses and hypochlorite building - doors, windows mesh, interior partitions, locks (harden control center)	\$0.04		
Access control for vehicles on Dam S. side of 6 and Lincoln access	\$0.13		
For Dam at Reservoir 6S: Bollards along SE 60th St to prevent approach to dam	\$0.05		
<u>Total Security & Fencing</u>	<u>\$0.50</u>		
<u>Park Improvements</u>	<u>\$13.70</u>	<u>Park and water feature O&M</u>	<u>\$0.50</u>
		<u>Total Annual O& M</u>	<u>\$0.52</u>
<u>Total Capital Costs</u>	<u>\$79.60</u>	<u>O&M Net Present Worth ⁽³⁾</u>	<u>\$7.10</u>

Notes:

(1) Tom Walsh proposal to place reflecting pools over reservoirs instead of GGN park improvements

(2) Security including hatch and door alarms, motion sensors, and electrical and signal conduit included in reservoir construction

(3) Net Present Worth = Annual cost X 20 yrs @ 4% discount

Option 5: Risk Mitigation Costs

Item	Capital Costs		O&M Costs	
		Costs (Millions)	Item	Costs (Millions)
Infrastructure, WQ, LT2 & Seismic				
Rehabilitation of reservoirs & piping		\$36.84	Reservoir Maintenance	\$0.05
<u>Subtotal</u>		<u>\$36.84</u>	Environmental Costs	\$0.02
Mammal Control Barriers (LT2)		\$0.11	Water Quality/ Treatment	\$0.13
Bird Wires (LT2)		\$0.24	Water Quality Monitoring	\$0.02
Water Quality Monitoring (LT2)		\$0.15	Regulatory Compliance	\$0.04
<u>Subtotal LT2</u>		<u>\$0.50</u>	Cl2 Booster Process Costs	\$0.04
<u>Total Infrastructure, WQ, LT2 & Seismic</u>		<u>\$37.30</u>	<u>Infrastructure O&M</u>	<u>\$0.30</u>
Security				
Fence 8-ft high tubular steel security with security cap/concrete base		\$1.75		
Fence: Additional low wall/ resistant barrier or additional reinforcement where setback < 120' (Res 6 sides)		\$0.90		
Fence - Heavy duty sliding gates for vehicles (2 @ Res 1, 2 @ Res 5, 1 Res 6 approach)		\$0.27		
Fence - Pipe gates - 2 on dam at 6, 1 at Res 1		\$0.04		
Fence - Microwave perimeter detection		\$0.65		
Fence - Card readers at sliding gates		\$0.09		
Fence - Clear Zone preparation		\$0.07		
Fence - Tree removal		\$0.41		
Fence - Microphone on fence or alternate (extra wall where road near Reservoir 5)		\$0.09		
Fence Bollards on 60th		\$0.18		
Relocate Trails		\$0.13		
Relocate Road (or alternative at NW corner Res 5)		\$0.18		
<u>Subtotal Fencing</u>		<u>\$4.76</u>		
Alarms and electrical/signal conduits/power		\$0.50		
Security Lighting		\$0.27		
CCTV with IR lighting, recorders, fiber optic extensions		\$0.41		
Card readers at Gatehouses and hypochlorite		\$0.06		
Securing gate houses and hypochlorite building - doors, windows mesh, interior partitions, locks, vent camouflage		\$0.10		
Real-Time Gas Chromatograph		\$0.36		
Sampling and System Components		\$0.22		
Redundancy in System (at SE 67th & Holgate)		\$0.77	Enhanced Security Patrols (3 FTE)	\$0.26
<u>Subtotal Security</u>		<u>\$2.69</u>		
<u>Total Security & Fencing</u>		<u>\$7.50</u>	<u>Security O&M</u>	<u>\$0.26</u>
<u>Total Park Improvements</u>		<u>\$0.00</u>		
			<u>Total Annual O&M</u>	<u>\$0.56</u>
<u>Total Capital Costs</u>		<u>\$44.80</u>	<u>O&M Net Present Worth</u>	<u>\$7.60</u>
Seismic upgrades		\$12.50		
additive amount to rehabilitation of reservoirs & piping				
<u>Total Capital Costs with Full Seismic</u>		<u>\$57.30</u>		

Notes:

(3) Net Present Worth = Annual cost X 20 yrs @ 4% discount

Option: Hybrid ⁽⁴⁾

	<i>Capital Costs</i>		<i>O& M Costs</i>
Item	Costs (Millions)	Item	Costs (Millions)
Infrastructure, WQ, LT2 & Seismic			
Bury Reservoir 6 north (20 MG)	\$16.68	Tank Maintenance	\$0.02
		Reservoir Maintenance	\$0.03
<u>Subtotal</u>	<u>\$16.68</u>	Regulatory Compliance	\$0.03
Mammal Control Barriers (LT2)	\$0.09	Water Quality Monitoring	\$0.02
Bird Wires (LT2)	\$0.20	Environmental Costs	\$0.02
Water Quality Monitoring (LT2)	\$0.16	Water Quality/ Treatment (2 res's)	\$0.09
		Cl2 Booster Process Costs	\$0.02
<u>Subtotal LT2</u>	<u>\$0.45</u>		
Rehabilitation of reservoirs & piping	\$33.40		
<u>Total Infrastructure, WQ, LT2 & Seismic</u>	<u>\$50.50</u>	<u>Infrastructure O&M</u>	<u>\$0.23</u>
- Security			
Fence 8-ft high security with security cap/concrete base	\$1.03		
Fence: Additional low wall/ resistant barrier or additional reinforcement (2/3 Reservoir 5 perimeter and 1/3 Reservoir 1, and gates)	\$1.35		
Fence - Heavy duty sliding gates for vehicles (2 @ Reservoir 1, 2 @ Reservoir 5, 1 @ Reservoir 6 S)	\$0.27		
Fence - Pipe gates - 1 at Reservoir 1, 2 on Reservoir 6	\$0.03		
Fence - Microwave perimeter detection	\$0.40		
Fence - Card readers at sliding gates	\$0.09		
Fence - Clear Zone preparation	\$0.07		
Fence - Tree removal	\$0.33		
Fence - Microphone on fence or alternate (extra wall where road near reservoir 5)	\$0.09		
Fence Bollards on 60th	\$0.18		
Relocate Trails	\$0.09		
Relocate Road	\$0.17		
<u>Subtotal Fencing</u>	<u>\$4.11</u>		
Security			
Alarms and electrical/signal conduits/power	\$0.50		
Security Lighting	\$0.27	Enhanced Security Patrols (2 FTE)	\$0.18
CCTV with IR lighting, recorders, fiber optic extensions	\$0.41		
Card readers at Gatehouses and hypochlorite	\$0.06		
Securing gate houses and hypochlorite building - doors, windows mesh, interior partitions, locks	\$0.11		
Real-Time Gas Chromatograph	\$0.36		
Sampling and System Components	\$0.14		
Redundancy in System (at SE 67th & Holgate)	\$0.77		
<u>Subtotal Security</u>	<u>\$2.63</u>		
<u>Total Security & Fencing</u>	<u>\$6.70</u>	<u>Security O&M</u>	<u>\$0.18</u>
Park Improvements			
Reflecting pond on Reservoir 6 N	\$6.20		
<u>Total Park Improvements</u>	<u>\$6.20</u>	<u>Park and water features O&M</u>	<u>\$0.20</u>
<u>Total Capital Costs</u>	<u>\$63.40</u>	<u>Total Annual O& M</u>	<u>\$0.61</u>
Seismic upgrades	\$5.90		
additive amount to rehabilitation of reservoirs & piping			
<u>Total Capital Costs Option Hybrid with Full Seismic</u>	<u>\$69.30</u>	<u>O&M Net Present Worth ⁽³⁾</u>	<u>\$8.30</u>

Notes:

(3) Net Present Worth = Annual cost X 20 yrs @ 4% discount

(4) Jim Spitzer proposal