OAKLAND'S AGING SEWER SYSTEM AND HOW IT AFFECTS LAKE TEMESCAL

EXECUTIVE SUMMARY

Lake Temescal has long been considered a jewel that sits above the Rockridge and Temescal neighborhoods. Historically, the lake has been a summer go-to spot. Parents, toddlers, teens and couples lie on the sandy beaches, swim in the water, and even enroll in lifeguard camp. But the Grand Jury has found that the lake has had recurring problems about which the public has not been adequately informed.

For the past four years the lake has been closed on and off – even the lifeguard camp has been shuttered. The stated reason has been toxic algae blooms, but the Grand Jury has found that the situation is far more complicated than just algae.

Sometimes referred to as the East Bay's "hidden gem," Lake Temescal receives approximately 200,000 visitors a year.

The Grand Jury received citizens' complaints that led it to investigate practices at the Sewer Services Division of the Oakland Public Works Department, East Bay Municipal Utilities District, and the East Bay Regional Park District. During the investigation the Grand Jury found that algae blooms at Lake Temescal were a serious problem. We learned that citizens were not being adequately notified about sewage spills at the lake. We also learned of issues concerning Oakland's use of private sewer contractors and the need for more mandated technical training certification for public works employees working on sewer crews.

Sewer and water systems across the nation are in need of massive repairs, and Oakland's are no different. Because Lake Temescal is an urban watershed – a catch basin for water and sewer run off – it is especially vulnerable to contamination. Fixing the water and sewer problems that affect the lake and Oakland overall will take decades and cost millions. But the Grand Jury has concluded that fixing communications problems that often keep the public in the dark about the true health of the lake would only take recognition of the problem and a coordinated staff plan to address it.

BACKGROUND

The Sewer Services Division of the Oakland Public Works Department (OPW) is responsible for performing preventive maintenance to over 930 miles of Oakland's sewer pipes, which range in size from six inches to over 66 inches in diameter. The sewer pipes are an integral part of the city's waste water collection system, a system that includes 31,000 structures and seven pump stations. Through this system, wastewater from homes and businesses throughout Oakland is conveyed to the East Bay Municipal Utilities District (EBMUD) treatment plant. EBMUD is then responsible for sanitary sewer effluent treatment and disposal.

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Property owners are responsible for the sewer laterals, the pipes connecting a home or business to the public sewer system or sewer mains. The city of Oakland is responsible for servicing and maintaining the sewer main pipes that carry waste to the EBMUD treatment plant. EBMUD's water bills have a sewer service charge to help fund capital repairs and maintenance of the system.

The sewer division's preventive maintenance consists of cleaning the pipes, periodic inspections by closed circuit television, and performing minor repairs. Sewer division staff make recommendations to city engineers for pipe rehabilitation projects, which may include replacing pipes. The sewer division employees also clear blockages and stop spills, which typically are caused by debris, oils and grease, and tree roots that have penetrated the sewer pipes. Most of the pipes are over 50 years old and made of clay, with some sections of the system over 100 years in age. These pipes are most vulnerable to leaks caused by tree roots.

Rainwater can leak into sewer pipes, especially during winter storms. Local sewer pipes were not intended to collect storm water, yet they do. During heavy storms, storm water can enter these underground pipes through overflows and cracks in the mostly clay pipes. This "infiltration and inflow" is a common occurrence in older sewer collection systems. Locally, it may even cause occasional releases of partially treated sewage into the Bay.

EBMUD began building large storage systems in the late 1980's, called wet-weather facilities, to prevent heavy storms from causing raw sewage overflows into the Bay. Simultaneously, Oakland

began repairing leaky sewer pipes to lower the amount of storm water entering the system and reduce the chances of sewage water and rain water mixing.

In 2009, the Environmental Protection Agency filed complaints in federal court against several local cities, including Oakland, and water districts, including EBMUD. These lawsuits alleged that Bay Area wet-weather facilities were no longer able to meet the tougher standards for wastewater treatment, particularly the one precluding discharge of partially treated sewage into San Francisco Bay.

Negotiations among federal and state regulators, the cities and water districts, as well as state and local environmental groups, resulted in a federal consent decree among all parties in June 2014. The settlement gave the cities and districts until 2036 to repair and replace their aging sewer infrastructure, reduce the amount of inflow and infiltration, and reduce discharges into San Francisco Bay during heavy storms.

Witnesses explained that the consent decree is basically a long-term mandate to separate waste water collection from storm drainage. The consent decree specifically requires Oakland to:

- Rehabilitate 13 miles of sewer pipes per year.
- Clean the entire sewer system by 2018 and 140 miles of pipe per year thereafter.
- Inspect 92 miles of sewer pipes per year.
- Treat 50 miles of sewer pipes with root foam (to remove tree roots that grow in sewers and can occasionally cause blockages) per year.
- Renovate all seven sewer pump stations by 2022.
- Eliminate high priority storm water inflow sources within two years wherever found.
- Inspect and clean sewer hot spots annually.
- Require private sewer lateral rehabilitation (initiated in 2012, regional requirement).
- Report defective sewer laterals owned by local, state or federal entities to EPA.
- Rehabilitate identified sewer laterals owned by the city within 10 years.
- Notify owners of private property defective sewer laterals within 90 days.
- Enforce repairs on high priority defective sewer laterals.
- Assist EBMUD in development of a sewer lateral education program.

INVESTIGATION

Lake Temescal

Lake Temescal was created in the 1860s by damming Temescal Creek in order to provide drinking water to a growing East Bay population. In 1936, Lake Temescal opened to the public as one of the first three parks established by the East Bay Regional Park District (EBRPD). Its amenities include a beach-like shore for swimming, a well-established hiking trail around the lake, and numerous picnic tables. In addition, the lake is stocked with small game fish for fishing. Sometimes referred to as the East Bay's "hidden gem," Lake Temescal receives approximately 200,000 visitors a year.

What the public may not know is that Lake Temescal is also an "urban watershed" that collects water coming off the ridges of the Caldecott Tunnel, Broadway Terrace, and Thornhill. The lake has many sources of contaminants that have caused multiple closures in recent years. Pollutants such as oil, gas, fertilizers, and pesticides are carried with water run-off and may adversely affect fish, wildlife, plants, and people.

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A particularly troubling source of contamination is untreated sewage that periodically seeps into the lake's usual water flows. Sewage overflows can happen anytime of the year, but most frequently occur during and immediately after winter storms. The main cause is the area's aging clay pipes, which may be broken or are simply inadequate in size to manage high volumes of runoff during severe storms. Clay pipes have a reasonable life span of 75-100 years and a significant percentage of Oakland's pipes, both main and lateral lines, have reached this ripe age and need replacing. The old storm drains and sewer pipes alike are simply overloaded, resulting in contaminations.

EBRPD conducts periodic tests of the water quality. In the winter after rainstorms, on-site park managers call EBRPD headquarters to initiate testing if they perceive a problem. From April to early October, the lake's high use period, testing is done weekly at sites where streams flow into the lake and at two locations in the beach area. If the water quality tests poorly, additional and more frequent testing is done. In the absence of algae blooms, the water tests focus on E. coli

bacteria to determine if the concentration exceeds EPA recommendations for waters permitting recreational use.

The Grand Jury examined the most recent cluster of sewage issues at the lake and found numerous shortcomings. During the heavy storms of January 2017, OPW received a communication from the park district of a spike in pollutants. The responding sewer crew could not find the source of the contamination at first. Eventually the problem was tracked to a cross-connection between a storm drain and a waste water drain upslope from Lake Temescal. According to testimony, a "long-term temporary fix" was eventually installed to block the intersection. Meanwhile, substantial amounts of untreated sewage water had flowed into the lake for at least ten days according to the sewer division's overflow reports, and even longer according to some witnesses.

Since this sewage flowed into Lake Temescal during the off-season, the public was told only that the lake was closed, and was not notified of the reasons, either by EBRPD or OPW. It was not clear from testimony which public agency had the primary responsibility for such communications. The Grand Jury concluded that defined lines of responsibility and a formal process for notifying the public when the lake closes (including an accurate description of the reason for the closure) must be established. Simply informing the public that the lake is closed is insufficient.

The next set of major storms will be a stress test to this "long-term temporary fix." It was explained to the Grand Jury that an ideal permanent fix would require re-engineering the storm drain system to an entirely new route. This would involve very complex engineering, and would create prolonged inconvenience to the public because of necessary traffic diversion due to the project's proximity to Highway 13. It would also require a thorough feasibility and budget analysis. Even if feasible, the enormous scale of such a project would likely prove cost prohibitive.

Fixing communication problems that often keep the public in the dark about the true health of the lake would only take recognition of the problem and a coordinated staff plan to address it.

During our investigation the Grand Jury learned that communications between EBRPD and OPW could be vastly improved. While OPW was responsive to calls from EBRPD staff, the details of when OPW planned to arrive on-site and when their planned testing and maintenance was

scheduled at various sites was unknown to EBRPD staff. Witnesses told the Grand Jury there was no direct sharing of reports between the two agencies.

The park district relies on its website and the posting of signs at the lake for communicating with the public about all events at Lake Temescal, including issues of contamination. Press releases and other more pro-active messaging to the public are rarely used. Newsletters to the neighborhood and an advertising campaign are ideas that the EBRPD employees would like to implement to keep the public better informed.

Sewage contains nitrogen, phosphorus and ammonia which are suspected of producing ambient water quality conditions conducive to algae growth. Moreover, the lake is constantly becoming shallower due to sediment runoff. Shallower water experiences stronger sun penetration and warmer temperatures which are also suspected of aiding algae growth. Lake Temescal is approximately 20 feet at its deepest point today compared to 80 feet when it first opened to the public in 1936.

Prior to 2014, there were no documented cases of algae blooms in Lake Temescal according to the East Bay Regional Park District. Since 2014, the lake has experienced periodic blue-green algae blooms triggering closures of the lake with increasing frequency. Immediate closure of the lake and water testing are critical whenever a blue-green algae bloom occurs because this particular algae may produce harmful toxins. Animals can die from drinking the water, and the risk to humans comes from prolonged contact or from swallowing the water. Symptoms from ingestion can include headaches, nausea, muscular pains, diarrhea and vomiting. Severe cases could include seizures, respiratory problems and liver failure. The severity of the illness is related to the amount of water ingested and the concentrations of the harmful toxins. Paradoxically, not all blue-green algae produce these toxins, making timely and accurate testing even more critical.

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Well-informed coordination of corrective actions by the park district and OPW are key factors to a speedy containment of any problem.

Oakland's Use of Private Sewer Contractors

The Grand Jury learned that the city routinely hires private contractors to do repairs on Oakland's sewer system that are beyond the expertise of the city employees, such as water sampling, lab analysis and occasional emergency work (e.g., during the 2017 Oakland city workers strike). Service contracts are prearranged whenever possible, but monitoring of the work of these private contractors is not done thoroughly. Contractors are simply not responsible for any reporting functions, as they are not "registered users" of the California Integrated Water Quality System (CIWQS) and are not allowed to become registered users on behalf of the city. Therefore, when work is done by a private contractor, it is not well-documented. Without good records for reviewing what has been done, future problems may be hard to troubleshoot. This makes "trust but verify" supervision from OPW even more imperative.

Sanitary Sewer Overflow Volume Estimates

State law requires that the city provide comprehensive reporting to the California Water Quality Board when sewer overflows occur. OPW described its system for reporting overflows. Information from sanitary sewer overflow reports submitted by sewer division crews is input into a database. Then a legally responsible official must certify the report. OPW currently has three legally responsible officials, usually sewer division crew supervisors. While there are three methods for estimating the volume of a sanitary sewer overflow, volume estimates are very subjective and far from an exact science. First responders take still photos and videos then write field reports with preliminary volume estimates. This data is then passed on to a supervisor who certifies it and enters it into CIWQS.

Two overflow estimates by field inspectors of more than 50,000 gallons were reduced below the 50,000-gallon threshold in the final report at the sole discretion of a crew supervisor who was not on the site during the overflow.

When 50,000 gallons or more of sewage spills into surface waters, state law requires the following additional measures:

- Water quality sampling must be conducted within 48 hours after initial sewage overflow notification, and results uploaded into CIWQS.
- A technical report must be submitted within 45 calendar days after the end of the spill.

- A water quality monitoring program must be developed and implemented to assess the spill impacts.

OPW acknowledged that, on two occasions in 2017, overflow estimates by field inspectors of more than 50,000 gallons were reduced below the 50,000-gallon threshold in the final report at the sole discretion of a crew supervisor who was not on site during the overflow. As a result, OPW reported there were no sanitary sewer overflows exceeding 50,000 gallons during 2017's rainy season, so that additional state reports and testing were not required.

The Grand Jury finds this somewhat surprising given the record rainfall, the age of the sewer system, and because it is difficult, perhaps impossible, to determine exactly when sewage overflows begin, making underestimates more likely. The lack of mathematical precision in the process leads to significant differences of opinion between onsite and supervisory personnel as to the volume of a given overflow. This, in turn, makes it possible for important sewer system failures to be underreported to the State Water Quality Board. It also makes it impossible for OPW to make consistently sound decisions regarding what remedial priority to assign to a given overflow.

Certifications of Sanitary Sewer Division Employees

Within OPW's sanitary sewer division, field crews consist of: (1) lead operators, licensed to operate large maintenance equipment and (2) crew workers, who must work with a lead operator. The Grand Jury learned that high employee turnover is a major problem within the agency.

Crew workers are encouraged to get enhanced technical training and certifications to prepare for advancing to lead operator positions. The certificates, however, are not required as a condition of employment, and not many employees take advantage of the additional training. In addition, city policies and tight budgets, union-mandated work conditions and administrative hurdles make hiring difficult and time-consuming. This makes it even more difficult to maintain well-trained teams and knowledgeable candidates for advancement.

The Grand Jury is concerned that the sewer department has not developed appropriate succession planning. If operators leave OPW, or otherwise become unavailable, there are insufficient numbers of trained crew workers capable of jumping into next level roles to ensure

operational continuity and flexibility. Only mandated continuous education programs focusing on the necessary technical skills can make this kind of "bench strength" possible across all sanitary sewer division crews.

CONCLUSION

Lake Temescal was designed in the mid-1880s to collect water that flows off the nearby Oakland hills. Dense urbanization, however, has made the job far more complex by significantly expanding the types of liquids that could flow into the lake. A substantial portion of the area's sewer and drain pipes were laid during the 1920s when residential neighborhoods were first being developed in the Temescal area. Preserving the integrity of this drainage system is challenging, and natural phenomena such as heavy rains, tree root incursions, and seismic activity can easily push the aging clay pipes beyond their limit.

The Grand Jury believes that these shortcomings can be managed. Doing so, however, requires OPW and EBRPD to focus on organizational fundamentals such as modern communication strategies, inter-agency partnerships, and staff training and development. In addition, these improvements must be supported by improved record-keeping.

Lake Temescal's popularity with the public and the potential health hazards from contamination make corrective actions absolutely necessary. With the public's interests in mind, the Grand Jury offers the following findings and recommendations for immediate consideration and action.

FINDINGS

Finding 18-30: The lack of clear lines of responsibility and communication between Oakland Public Works and the East Bay Regional Park District in notifying the public about Lake Temescal closures and the reasons for those closures gives the perception that public agencies are keeping important information from the community.

Finding 18-31: Failure to supervise third party contractors repairing Oakland's sewer lines and failure to require them to submit detailed reports of their repairs impede compliance with state reporting requirements and make it difficult to troubleshoot when future problems occurs on the same sewer lines.

Finding 18-32: Oakland Public Works' current sewer related training and technical certifications focus on only a few key employees, resulting in its sewer crews lacking broad technical knowledge. This lack of depth limits operational flexibility and succession planning.

Finding 18-33: The Grand Jury learned that in two cases during 2017, onsite estimates that sewage overflows exceeded 50,000 gallons were later reduced below 50,000 gallons by a supervisor back at the office, giving the perception that the volume was reduced to avoid additional testing and reporting required by the state.

RECOMMENDATIONS

Recommendation 18-26: Oakland Public Works and the East Bay Regional Park District must establish clear lines of responsibility between both agencies, and establish a clear written protocol for communications with the public concerning sewage spills or lake closures, including reasons for the closures.

Recommendation 18-27: Both Oakland Public Works and the East Bay Regional Park District must study the feasibility of using push alerts to nearby neighborhoods in the event of a spill or closure, and explore use of the web and social media for emergency communications for implementation in the winter of 2019.

Recommendation 18-28: Oakland Public Works must improve its reporting requirements and record-keeping systems for sewer system repairs by third party contractors, and must fully supervise all contractors working on city sewer lines.

Recommendation 18-29: Oakland Public Works must establish a system of mandatory continuous training and education for all its sewer crew workers.

Recommendation 18-30: Oakland Public Works must provide comprehensive training for all field crews regarding techniques for estimating sewer overflows.

Recommendation 18-31: Oakland Public Works must improve its overall process for handling sewage overflow reports that exceed 50,000 gallons. A second-level manager independent of Oakland Public Works' sewer crews must review such reports to ensure accuracy, and to ensure that operational expediency never interferes with protecting the environment from large sewage overflows.

RESPONSES REQUIRED

Oakland City Council
Findings 18-30 through 18-33
Recommendations 18-26 through 18-31

Mayor, City of Oakland
Findings 18-30 through 18-33
Recommendations 18-26 through 18-31

Board of Directors, East Bay Regional Park District
Finding 18-30
Recommendations 18-26 and 18-27