

Proposed Orange County Sanitation District

Climate and Catastrophic Event Resilience Policy

Summary Policy Statement

The Orange County Sanitation District (Sanitation District) will design systems and operations to withstand or adapt to adverse conditions that can reasonably be expected. These adverse events include earthquake, atmospheric river storm events, flooding, sea level rise, or electrical grid collapse.

Background

The Sanitation District is a regional governmental agency principally chartered to protect the public health through collection and treatment of wastewater. The governing Board of Directors has defined this role to include the recovery and utilization of resources from wastewater for the public good as a part of that mission. The environmental impact mitigation of the human activity of 2.6 million people and the natural drainage of the 471 square miles the Sanitation District serves is our principal concern. The Sanitation District owns and operates extensive facilities within its service area to achieve its mission. The service area faces special challenges because of the geographic location of its facilities. These challenges include: its position on and near seismic risk factors, its proximity to the Pacific coast, adjacency of its treatment facilities to the Santa Ana River, and being served by increasingly fragile energy utilities.

The Sanitation District's facilities are situated on or near several seismic risk factors. Plant No. 2 is located directly on top of the Newport-Inglewood fault. Both plants and the collection system are influenced by many adjacent major and minor faults capable of delivering damaging energy. Both of our treatment plants and the majority of our collection system sit on top of silty, alluvial soils that can have the effect of amplifying the earth motion and risk liquefaction during a seismic event. The Sanitation District has invested significantly in the last 50 years to improve the soils, foundations, and structures to resist these seismic risks. As geotechnical and structural knowledge and building codes progress, upgrades and facility replacements will be necessary.

Another seismic risk associated with having a treatment plant and several pump stations located on the Pacific Coast, is the risk of tsunami inundation. The Sanitation District has been working with and reviewing the plans of the City of Huntington Beach and the City of Newport Beach to understand and quantify this risk. The American Society of Civil Engineers (ASCE) has created a new standard, ASCE 7-16, to layout design parameters for lateral forces and inundation zone associated with potential tsunamis.

The Sanitation District understands that climactic factors we face change widely over time. The Sanitation District's systems must perform in extreme wet weather situations (atmospheric rivers), extreme dry weather conditions (drought), extreme tidal conditions (king tides, rising sea levels), as well as high and low temperature extremes. The Sanitation District generally designs

for historical and expected “average conditions” for optimal performance but must also assure operations for extreme weather events.

The Sanitation District serves a critical public health role. Its operations must be reliable 24 hours per day, 365 days a year. Electricity, and to a lesser extent natural gas, are necessary for pumping and treatment operations. Both electricity and natural gas supplies have become increasingly vulnerable to interruption. Electricity deliveries are more vulnerable due to wildfire outage criteria, loss of local generation assets, aging infrastructure and extreme weather events. Natural gas supplies are more vulnerable due to the loss of local storage capacity, aging infrastructure, line corrosion, and more stringent regulatory requirements. The Sanitation District has significant capacity to self-supply critical energy requirement for extended periods.

Current Situation

The Sanitation District has spent considerable effort quantifying its seismic, climate, and utility supply risks. Several key studies have been initiated and will be completed in the next two years. The most acute risk factor faced by the Sanitation District is seismic risk. Climate and utility supply risks are more accurately described as chronic risks.

Seismic risk factors include ground shaking, liquefaction, lateral spreading, and fault rupture. Both treatment plants are situated in historic riverbed with poor soil conditions. The collection system is vulnerable to failures during seismic events. The state of the art for seismic design has changed greatly over the Sanitation District’s history and will continue to do so. Many of our critical structures were designed or installed prior to the great learning that occurred in the earthquakes of the 1990s. Significant effort has been expended to better characterize the soil conditions under our treatment plants and pump stations. Projects to refurbish or replace existing unit processes are, or soon will be, scoped and budgeted to provide enhanced seismic resilience. These measures include soil mixing to stiffen the soil, various foundation designs and building structure improvements.

Tsunami resilience and rising sea level protection can go hand in hand. To a great extent, these two risk factors can be mitigated in the same way. The Tsunami guidelines for inundation in ASCE 7-16 are a reasonable peer reviewed standard. By complying with this standard for Huntington Beach and Newport Beach, the Sanitation District will be reasonably prepared for conservative sea level rise estimates at Plant No. 2 and pump stations in the City of Newport Beach.

The Sanitation District has also spent significant effort to prepare for the effects of weather extremes on its operations. Extreme wet weather impacts operations. Inflow and infiltration during intense storm activity have multiplied average dry weather flow rate by up to three times in recent years. The Sanitation District has significant wet weather capacity and will continue to maintain a 640 million gallon per day influent and outfall capacity which is roughly 3.5 times our average dry weather flow. Historically high rains as seen in 1863 and 1938 will push our systems to the limit.

The Sanitation District has also adapted its systems to perform in extreme dry weather. The Sanitation District in cooperation with OCWD operates the largest potable water reuse system in the world. This is made possible by replumbing our treatment plants and adding new smaller pump stations to deal with extreme low outfall flow rates in the morning hours. The Sanitation District also has, and continues to grow, the ability to shift influent flow between its treatment plants which creates additional resilience for risk factors.

Finally, on the topic of utility supply, the Sanitation District built redundant supplies for its most critical needs: electricity, natural gas and water. The Sanitation District has maintained three sources of electricity supply for more than 25 years. The treatment plants can be supplied with power from Southern California Edison, the Sanitation District's Central Generation Plants or on-site diesel generation systems to maintain basic operation to protect public health. In terms of natural gas, the Sanitation District has been producing bio-methane through anaerobic digestion since the 1950s with enough capacity to provide electricity and necessary process heat.

Future Policy Statement

The Sanitation District will continue to build and improve its facilities to meet the seismic, climate and energy infrastructure risks that it faces with a long-term, planned approach. Acute life-safety type issues that are identified or facilities that are damaged or fail in a catastrophic event will be addressed very quickly. However, it is not practical to update \$11 billion in facilities every time a code is updated or new climate change estimate is released. The Sanitation District will stay abreast of code and climate change estimates as they occur and will implement improvements or replacements to facilities on a long-term basis in line with its asset management practices. The Sanitation District generally plans to refurbish or replace its mechanical and electrical assets every 20 to 25 years with an average capital improvement investment of \$250 million per year.

The Sanitation District facilities meet industry codes at the time they are designed. As time goes on and codes are updated, it is not required to upgrade existing facilities to meet those latest codes unless there is a mandate to do so, or a risk in not doing so is recognized. The Sanitation District will accept some incremental risk in having some facilities that are not necessarily compliant with latest building codes or subject to incrementally greater risks until the next project comes along. All of the Sanitation District's facilities have a planned life span with two to three refurbishment cycles. Identified seismic or flooding vulnerabilities may drive a replacement versus refurbishment decision in the normal capital planning process.

The Sanitation District will continue to aspire to energy independence which will help mitigate vulnerabilities to loss of electrical and gas utilities. In addition, the Sanitation District will continue to maintain third level, diesel generator, electrical supply capability for critical loads. On-site diesel storage will provide up to three days of power to run the plants. Pump stations diesel generation will be site specific in its design based on flow risks, hydraulic storage capacity, and site constraints. Either on-site generation or quickly deployable mobile generators will provide emergency power for up to days at a time.

Initiatives to Support Progress Toward the Policy Goal:

Initiative: Complete an engineering study of the seismic vulnerabilities of the treatment plants. Incorporate necessary upgrades into future capital improvement projects.

Initiative: Complete the biannual high flow exercise to assure readiness for a high flow event. Maintain a higher level of readiness October 15 through March 15 and in advance of predicted significant rain events.

Initiative: Study the potential impact of tsunami and changing climate conditions including flooding due to high tides and heavy rain events.