

Orange County Sanitation District Climate and Catastrophic Event Resilience Policy

Summary Policy Statement

The Orange County Sanitation District (OC San) aims to design, maintain, and operate valuable wastewater assets that withstand or adapt to adverse conditions in a reasonable manner that is both cost-effective and sustainable for present and future generations. These adverse conditions include heavy rains, flooding, sea level rise, earthquakes, tsunamis, extreme heat, wildfires, and electrical grid interruptions.

Background

OC San owns and operates extensive wastewater collection and treatment facilities valued at nearly \$11 billion. OC San 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.

OC San'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. OC San has invested significantly over the last 50 years to improve the soils, foundations, and structures to mitigate 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. OC San 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.

OC San understands that climactic factors we face change widely over time. OC San'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. OC San generally designs for historical and expected "average conditions" for optimal performance but must also assure operations for extreme weather events.

OC San 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. OC San has significant capacity to self-supply critical energy requirement for extended periods.

Current Situation

OC San 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 OC San 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 OC San'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 flooding 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, OC San will be reasonably prepared for flooding caused by extreme storm events and conservative sea level rise estimates at Plant No. 2 and pump stations in the City of Newport Beach.

OC San has also expended 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. OC San 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.

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

Policy Statement

OC San 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 risks 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. OC San 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. OC San 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.

OC San facilities are designed to meet industry codes. 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. OC San will accept some incremental risk in having some facilities that are not necessarily compliant with latest building codes or subject to increased greater risks until a project to rehabilitate or replace these facilities is developed. All of OC San'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.

OC San will continue to aspire to energy independence which will help mitigate vulnerabilities to loss of electrical and gas utilities. In addition, OC San 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.