Appendix R: Resilience and Stormwater

Contents

Resilience and Stormwater

This appendix describes how the 2025 Regional Plan will enhance the resilience and reliability of the transportation system. It also discusses how SANDAG and partner agencies will reduce and mitigate the impact that surface transportation in the 2025 Regional Plan has on stormwater runoff. Pursuant to 23 CFR 450.306(b)(9), this must be addressed in the metropolitan transportation planning process.

Resilience to Natural Hazards

Introduction

The San Diego region is geographically unique and as such, experiences diverse climate impacts. Stressors such as wildfires, floods, severe storms, and heat waves are already impacting the region and its transportation system.

Defining Resilience

The California Governor's Office of Planning and Research (OPR) defines resilience as the capacity "to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience."[1] Responding to natural hazards is a key component of resilience.

The 2025 Regional Plan addresses a number of elements that promote a resilient future, including planning for a healthy environment, transportation, housing, public facilities, and economic prosperity for the San Diego region. SANDAG is coordinating with other entities in the region to prepare our communities for the impacts of natural hazards to improve the resilience and reliability of the transportation system.

Regional Coordination

SANDAG believes in creating a safe future for everyone in the San Diego region. Although we enjoy one of the most temperate climates in the world, that doesn't mean we are immune from the effects of natural hazards, including frequent heat waves, prolonged droughts, destructive wildfires, degraded air quality, extreme precipitation and flooding, and destructive storm surges. Our region must adjust how we respond to natural hazards today and become more resilient for the future.

As a federally recognized Metropolitan Planning Organization, Regional Transportation Planning Agency, and a Council of Governments, SANDAG is uniquely positioned to bring all 18 cities and the County of San Diego, together along with our highway and transit service providers and other key stakeholders, to coordinate, collaborate, and promote solutions for a more resilient future.

To advance the region's resilience efforts, SANDAG works with partners to advance regional projects, offers resources to member agencies, and analyzes vulnerabilities of the transportation system, including which areas are prone to flooding and what we need to keep critical infrastructure available during an emergency.

[1] "Getting Started with Climate and Resilience," California Governor's Office of Planning and Research, accessed August 15, 2024, opr.ca.gov/climate/.

Ensuring the resilience of the transportation network to the impacts of natural hazards is an important element of the 2025 Regional Plan. To achieve this, SANDAG recognizes the importance of a collaborative, transparent, and regional approach to resilience planning because the hazards that threaten the San Diego region go beyond jurisdictional boundaries. Over the past several decades, SANDAG has worked with local governments to help strengthen our communities, natural resources, and transportation system against the impacts of natural hazards. This includes providing tools and resources to aid local governments in climate adaptation planning.

In partnership with Caltrans, SANDAG is preparing 10 **Comprehensive Multimodal Corridor Plans** (CMCPs). The CMCPs are data-driven plans to reduce congestion, generate transportation choices while preserving community character, and create opportunities for enhancement projects. Corridor enhancement and improvement projects will consider resilience and integrate strategies that reduce disruptions from natural hazards and contribute to the longevity of multimodal corridor improvement. To date, SANDAG has completed six CMCPs, covering these corridors: Downtown, SRs 52, 67, 78 and I-8 and I-805/I-5 south. The remaining five (SRs 56, 94, 125 and I-15) will be completed in future years.

SANDAG also provides grant funding to local jurisdictions for smart growth development projects through the **Smart Growth Incentive Program** (SGIP). SGIP guidelines include several site-design policies that encourage strategies to address natural hazards. SGIP helps SANDAG towards its overarching goals to increase funding opportunities, and to prioritize and expedite projects to implement strategies to address existing transportation infrastructure vulnerable to natural hazards.

In addition to regional efforts, SANDAG is working on bi-national solutions. SANDAG works with other California and Mexico agencies to regularly update the **California-Baja California Border Master Plan** (BMP), which looks to prioritize and advance transportation infrastructure to and from the land ports of entry.

Fire

Much of the San Diego region is considered at high risk to fire.[2] To help communities be prepared to respond to this risk, it is important to account for evacuation needs in the transportation system. To that end, the County of San Diego's Operational Area Emergency Operations Plan coordinates the use of available resources with transportation agencies to ensure people have adequate means of transportation to assist with a timely evacuation and the County has developed agreements with regional transportation services providers, including bus, rail and paratransit operators. [3]

[2] Planning for Extreme Heat in San Diego County: Technical Assistance Panel Report," Urban Land Institute San Diego/Tijuanna, last modified September 30, 2024, **ulidigitalmarketing.blob.core.windows.net/ulidcnc/sites/30/2023/09/SDTJ-TAP-County-Heat.pdf.**

[3] "Annex Q Evacuation: Operational Area Emergency Plan," Unified San Diego County Emergency Services Organization and County of San Diego, effective August 30, 2022, **sandiegocounty.gov/content/dam/sdc/oes/emergency_management/plans/op-area-plan/2022/EOP2022_Annex%20Q.pdf.**

Additionally, the County of San Diego 2023 Consolidated Fire Code (Fire Code) includes requirements regarding access roads and ingress/egress specifications to ensure that access to roads and highways is maintained for evacuations and emergency responders.[4] Maintaining access to roads and highways further ensures that the regional economy remains vibrant with minimal impacts to goods movement. The Fire Code also includes requirements for a wide variety of wildfire-related components such as smoke detection and spark arresters, sprinkler systems and water supply, photovoltaic arrays and defensible space, construction methods and materials for wildfire exposure, as well as other policy areas that ensure people are safe and able to respond to and recover from events such as wildfire and extreme heat events.

The 2025 Regional Plan addresses a number of elements that promote resilience to the risk of wildfire. Road widening projects, such as the Otay Truck Route Widening Project, and SR 67 Widening Project would add lanes to roadways or widen shoulders for emergency vehicles including fire department access. Integrating infrastructure and services into a smart corridor system that manages multiple modes of transportation will make it possible for traffic to be managed in real time; for first responders to quickly respond to incidents; and for police, fire, and other authorities to effectively coordinate emergency evacuations.

Heat

High temperatures impact roadway infrastructure and the people who depend on it. For example, high temperatures can increase the susceptibility of roadways to rutting and of rails to buckling and transit users spending time outdoors can be at increased risk of heat-related illness. Incorporating built shade or nature-based solutions to mitigate heat such as increased tree canopy in heat vulnerable areas can help increase safety on extreme heat days. Transit facilities are built to withstand the impacts of flooding and heat waves; and incorporate features such as shade and tree cover. As a result, transportation infrastructure is built to be more resilient to these anticipated impacts.

The 2025 Regional Plan addresses several elements that will increase resilience to extreme heat. Projects to upgrade existing transportation infrastructure, such as those planned at the **San Ysidro Mobility Hub** that include the installation of shade structures, will create a more comfortable experience for travelers in the face of high temperatures. SANDAG also provides grant funding for transportation-related infrastructure improvements and planning efforts that support smart growth development through the SGIP. The SANDAG Smart Growth Design Guidelines include several site-design policies that encourage implementation of strategies to address natural hazards, which include project design features that offer shade and weather protection for pedestrians.

[4] "County of San Diego 2023 Consolidated Fire Code," County of San Diego, effective April 13, 2023, **sandiegocounty.gov/pds/docs/cosd-fire-code.pdf.**

Flooding

Heavy rainfall can lead to flooding of stormwater in roadways and create safety hazards. Stormwater flooding threatens roadway infrastructure, including increased susceptibility to rutting, washout, or other failures. Transportation assets located near streams or rivers are particularly at risk of infrastructure damage or traffic disruption, as the risk of large rain events leads to stormwater flooding in these areas. The heavy rainfall that the region experienced in January 2024 and subsequent flooding was a stark example of this. The storm damaged transportation infrastructure and caused transportation disruptions. For example, trolley lines operated by the San Diego Metropolitan Transit System (MTS) were damaged and saw delays. It also resulted in three deaths and damage or destruction to more than 800 homes in the San Diego region. Over the next several decades, the most damaging events will involve erosion and flooding caused by storm surge and wave run-up that coincide with peak high tides, particularly during El Niño winters. Many agencies across the region are working to study, plan for, and adapt to the impacts of flooding and other coastal hazards.

The 2025 Regional Plan addresses several elements that will improve resilience to flooding. Coastal hazard assessments will identify feasible design alternatives to combat impacts from flooding and storm surge. Monitoring projects, such as the SANDAG Regional Shoreline Monitoring Program, can help identify areas with significant erosion to inform where to prioritize adaptation efforts. The Regional Shoreline Monitoring Program began in 1998 and performs biannual shoreline surveys to measure beach width and shore zone volume change along with monthly photos along the San Diego beaches and coastline. SANDAG is also collaborating with agencies across the region to identify opportunities for beach replenishment and shoreline monitoring through the Shoreline Preservation Working Group. This working group was created in the 1980s to advise the Board of Directors on strategies, such as beach replenishment, to reduce erosion at the region's beaches.[5] Beach replenishment is an important adaptation tool to preserve the region's beaches and protect vulnerable coastal transportation facilities from erosion and flooding. SANDAG has managed two regional beach sand replenishment projects, which have collectively placed more than 3.6 million cubic yards of sand on the region's sediment-starved beaches.

Stormwater

Introduction

Stormwater, or urban runoff, is generated when water flows over impervious surfaces or from properties without percolating into the ground. Precipitation, irrigation, and other non-storm-related discharges of water can also lead to runoff. The impervious surfaces found in the transportation system impact the natural infiltration of water. Stormwater is often considered a nuisance because it contributes to water quality problems in urbanized areas, by carrying pollution to nearby rivers, lakes, and the ocean. Runoff can impact the quality and cost of treatment for potable water held in our reservoirs, which store the majority of water we use in our daily lives. Roads and highways are effective conduits for stormwater runoff because their impervious surfaces allow stormwater to make its way into local water bodies, carrying with it dirt, oil, grease, toxic chemicals, heavy metals, road salts, nitrogen, phosphorus, pathogens, and trash.

[5] SANDAG Info Bits: Got Sand?: sandag.org/infobitsgotsand2020

Regional Coordination

In 2009, SANDAG started a regional dialogue to identify the unfunded infrastructure needs in the region; stormwater management was included as one of the focus areas. California Senate Bill 1685 (Kehoe, 2008) authorized the use of tax revenues received by SANDAG through the San Diego Regional Transportation Consolidation Act to include regional water quality improvement and beach sand replenishment projects.[6] In 2022, California Assembly Bill 2367 (Lee, 2024) (AB 2367) expanded on this, and authorizes SANDAG to seek resources and to fund projects identified in the Sustainable Communities Strategy, including habitat conservation projects, water quality improvement projects, and other environmental mitigation projects and to exercise bonding authority to implement the Regional Transportation Plan.[7]

The impacts of urban runoff are not isolated to an individual city or municipality because runoff travels through the watersheds in the San Diego region toward our reservoirs and ocean. Within the San Diego region, the 11 watersheds are grouped into 1 of 10 Watershed Management Areas for purposes of collaborative stormwater management. The San Diego Regional Water Quality Control Board (the primary entity that regulates stormwater discharge) works with the County of San Diego, 18 incorporated cities, and the special districts of the Port of San Diego and San Diego County Regional Airport Authority (collectively known as co-permittees) who own and operate municipal separate storm sewer systems (MS4s) in the San Diego Region. Caltrans, the North County Transit District (NCTD), and MTS are regulated through separate state-issued stormwater permits. Like many of the topics addressed in the 2025 Regional Plan, stormwater management involves issues, needs, and solutions that cross municipal and jurisdictional boundaries. Even where identified needs are more localized, a regional approach to stormwater management may be more efficient, consistent, and economical than a patchwork of jurisdiction-specific solutions.

[6] California "State Water Resources Control Board Office of Legislative Affairs 2007-2008 Legislative Summary," California Water Boards, effective January 2009, **https://waterboards.ca.gov/publications_forms/publications/legislative/summaries/legsum0708.pdf**

[7] "AB 2367 Regional transportation plans: implementation authority: San Diego Association of Governments," California Legislative Information, last modified July 21, 2022, **leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB2367.**

To support regional collaboration, Project Clean Water was initiated in July 2000 by the region's MS4 co-permittees to provide a broad and inclusive forum for exploring water quality issues of regional significance.[8] Much of the focus during the first two years was on establishing a visible forum to discuss issues of shared concern, to build consensus on solutions to priority problems, and to characterize baseline conditions in the region's watersheds. Today, Project Clean Water serves as both a countywide initiative dedicated to protecting water quality in San Diego County and the co-permittees' Regional Clearinghouse for regulatory plans and data. The initiative fosters greater awareness of everyday actions people can take to reduce runoff and stormwater pollution. The goal is to support the region's water quality on behalf of healthy communities and thriving ecosystems. Project Clean Water offers a centralized point of access for water quality information and resources and houses all ten of the region's watershed Water Quality Improvement Plans (WQIP). The WQIPs include descriptions of the highest priority pollutants or conditions in a specific watershed, goals and strategies to address those pollutants or conditions, and time schedules associated with those goals and strategies.[9]

SANDAG coordinates with Caltrans District 11 to improve highways in the San Diego region. Caltrans has an integrated stormwater management program designed to protect water quality by installing devices that capture and treat stormwater, incorporating water quality measures into the early planning and design process, and partnering with local jurisdictions to meet water quality goals and regulatory requirements such as Total Maximum Daily Loads for local watersheds. In addition, Caltrans has a comprehensive program for preventing water pollution during construction activities on the state highway system. These include guidance on how to prepare a Storm water Pollution Prevention Plan and Water Pollution Control Program, as well as State Water Resources Control Board approved best management practices for preventing water pollution during construction.

Transit projects are subject to similar requirements detailed in the MS4 permits held by MTS and NCTD. For SANDAG active transportation projects and local streets and roads, requirements are governed by the local jurisdiction MS4 permits and can include use of green stormwater infrastructure features such as permeable pavements, bioswales, and rain gardens, that will increase stormwater infiltration on site. Transportation infrastructure development projects also comply with section 404 of the Clean Water Act, which regulates discharge into waters of the U.S.[10] Beyond transportation projects, SANDAG is assisting the co-permittees in meeting their stormwater permit requirements by identifying areas where regional approaches to stormwater management would promote a holistic and sustainable future.

[8] "About Project Clean Water," (Project Clean Water), projectcleanwater.org/about/.[8] "Project Clean Water: About," Project Clean Water, accessed August 15, 2024, **projectcleanwater.org/about/.**

[9] "Water Quality Improvement Plans," (San Diego Regional Water Quality Control Board, last modified May 12, 2023, **waterboards.ca.gov/sandiego/water_issues/programs/stormwater/wqip.html**

[10] "Permit Program under CWA Section 404," United State Environmental Protection Agency, last modified April 2024, **epa.gov/cwa-404/permit-program-under-cwa-section-404**

SANDAG partners with regional transportation infrastructure owners and operators to manage stormwater from roads and highways in the region. SANDAG also provides grant funding for transportation-related infrastructure improvements and planning efforts that support smart growth development through the SGIP. The SANDAG Smart Growth Design Guidelines include a number of site-design policies that encourage adaptation to natural hazard stressors. The Guidelines promote project design features such as cisterns and stormwater retention devices that capture, store, and reuse stormwater or minimize runoff into streets.

SANDAG also manages the **TransNet Environmental Mitigation Program** (EMP), which purchases, conserves, and restores native habitats in order to mitigate the potential impacts of transportation projects. The program has multiple benefits, including preserving habitat for endangered species, conserving open space for visual and passive recreation, and protecting water quality by restoring and protecting watersheds. Urbanization within natural watersheds pollutes stormwater runoff, accelerates erosion and sedimentation, degrades water supplies, and increases pollutants in aquatic and marine ecosystems. Preserving native plant communities and restoring wetlands can help protect watersheds and provide a wide array of other benefits.

As of January 2024, the EMP has helped acquire more than 9,215 acres of natural open space within the San Diego region. This acreage is about 11 times the size of Central Park in New York City. In addition, the program has created and restored over 200 acres of wetland habitat helping to maintain and enhance flood protection benefiting existing infrastructure and development. Preserving native habitats in a watershed can help strengthen the watershed overall—and functioning watersheds in our region can help better manage stormwater runoff and provide additional environmental benefits.