

Appendix I

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Introduction

This appendix discusses how past, current, and future work by the San Diego Association of Governments (SANDAG) and other regional partners enhance the resilience and reliability of the transportation system as it confronts the consequences of climate change and natural hazards - and, how work is underway to mitigate the impacts that surface transportation can have on stormwater runoff. Pursuant to 23 CFR 450.306(b)(9), this must be addressed in the planning process for metropolitan transportation. The Federal Highway Administration (FHWA) defines resilience as *“the ability to prepare for changing conditions and withstand, respond to, and recover rapidly from disruptions”* (FHWA Order 5520)¹. This concept can be applied to numerous topics, some of which are discussed in this appendix, that enhance the resiliency and reliability of the transportation network, and also the social resilience of the region.

Resiliency to Climate Change and Natural Hazards

The San Diego region is already experiencing the impacts of climate change. The San Diego Region Report for the Fourth Climate Change Assessment² (2018) cites increases in temperature and extreme heat events, wetter winters and longer droughts, higher sea levels, an increased rate of sea level rise, and increased wildfire severity compared to historical averages. These climate impacts exacerbate existing natural hazards and responding to these hazards is a key component of resiliency. A broader discussion of climate change impacts in our region is included in the SANDAG Climate Change White Paper³(2018), which summarizes previously completed and ongoing climate resilience efforts managed by local and regional partners.

The SANDAG resilience work can be divided into two categories: mitigation and adaptation. This Appendix defines *“mitigation”* as *“a human intervention to reduce the human impact on the climate system; it includes strategies to reduce greenhouse gas (GHG) sources and emissions and enhancing GHG sinks”* (Safeguarding California Plan: 2018 Update⁴). This Appendix defines adaptation as an *“adjustment in natural or human systems to a new or changing environment...in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities”* (Safeguarding California Plan: 2018 Update).

Mitigation

The SANDAG mitigation efforts allow the agency to meet broader federal and other regulatory requirements as they relate to transportation planning efforts. These efforts help mitigate GHG emissions, biological impacts, and other environmental stressors. For example, in 2010 a collaboration between SANDAG and San Diego Gas & Electric (SDG&E) led to the creation of the Roadmap Program, which initially provided free energy assessments and energy management plans, or “Roadmaps”, to SANDAG member agencies. In 2016, the Roadmap Program was expanded into two service areas: energy engineering (e.g., energy audits of municipal facilities, project management support for energy efficiency retrofits, and feasibility studies) and climate planning (e.g., Climate Action Plan development, GHG inventories and projections). The assistance provided via the Roadmap Program’s two service areas has helped reduce energy consumption, while also making municipal facilities more efficient and reducing GHG emissions. The Roadmap Program is funded primarily by a Local Government Partnership with SDG&E to support the energy efficiency-related aspects of GHG emissions reduction efforts, with SANDAG supporting the transportation-related aspects through its own funding.

In addition to the Roadmap Program, SANDAG also helps to mitigate climate impacts through energy and climate planning across the region. By reducing future GHG emissions, the impacts associated with climate change on the transportation system will be lessened. This can make it easier for the system to withstand, respond to, and recover rapidly from disruptions.

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 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 can help protect watersheds and provide a wide array of other benefits.

As of October 2019, the EMP has helped acquire more than 8,700 acres of natural open space within the San Diego region. This acreage is about 10.5 times the size of Central Park in New York City. Preserving native habitats in a watershed can help strengthen the watershed overall – and functioning watersheds in our region can help better manage stormwater runoff, in addition to providing additional environmental benefits.

Furthermore, SANDAG coordinates with the California Department of Transportation (Caltrans) to improve roadway. Caltrans has an integrated stormwater 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 Total Maximum Daily Loads for local watersheds. These steps are taken during construction and during routine maintenance once the State Regional Quality Control Board issues the National Pollutant Discharge Elimination System permits. For SANDAG, projects within the Los Angeles-San Diego-San Luis Obispo and SPRINTER rail corridors are subject to similar requirements detailed in the North County Transit District's MS4 permit. For SANDAG Active Transportation projects, requirements are dictated by the local jurisdiction.

Adaptation

SANDAG began considering the resiliency of the region's coastline in the 1980s with the formation of the Shoreline Preservation Committee. This committee was created to advise the SANDAG Board of Directors during sand replenishment projects at the region's beaches, which continue to suffer erosion challenges. Since then, SANDAG has managed two regional beach sand replenishment projects, which have collectively placed more than 3.5 million cubic yards of sand on the region's sediment-starved beaches. Beach replenishment is an important adaptation tool to preserve the region's beaches, and also to protect vulnerable coastal transportation facilities from erosion and sea-level rise. To further this work, SANDAG received a Caltrans' adaptation planning grant funded by Senate Bill (SB) 1, the Road Repair and Accountability Act of 2017. This grant has provided SANDAG with funding to conduct a sea-level rise vulnerability and risk assessment of regional transportation facilities and to craft an adaptation toolbox with recommendations on policies, projects, and funding sources to address sea-level rise impacts. The FHWA's Vulnerability Assessment Scoring Tool was used to perform the risk analysis portion of this project. It is anticipated that this effort will encourage the use of future living shoreline projects and adaptive engineering approaches. These might include those being incorporated into the design of the North Coast Corridor improvements (San Diego Region Coastal Sea Level Rise Analysis, 2013), in order to bolster the adaptive capacity of coastal transportation facilities in the region.

With a second round of Caltrans SB 1 funding, SANDAG is now developing a Regional Adaptation Needs Assessment (Needs Assessment). With the support of the San Diego Regional Climate Collaborative, SANDAG is identifying adaptation planning needs for the region, facilitating information-sharing and collaboration on adaptation and transportation planning, and building capacity within local jurisdictions to address climate adaptation. The Needs Assessment will increase regional understanding of what is required to move forward with adaptation planning, including research, planning, and/or implementation. The Needs Assessment will focus on multiple climate impacts (e.g., wildfire, extreme heat, flooding, sea-level rise) and will be multi-disciplinary. It will be designed to inform ongoing and future regional and local planning efforts at the nexus of transportation and other local priorities.

In addition to the SB 1-funded adaptation projects, SANDAG provides grant funding for transportation-related infrastructure improvements and planning efforts that support smart growth development through the Smart Growth Incentive Program. The goal of this program is to fund comprehensive public infrastructure projects and planning activities that facilitate compact, mixed-use, transit-oriented development and increase housing and transportation choices. The SANDAG *Designing for Smart Growth* (2009) guidelines include a number of site design policies that encourage adaptation to climate and natural hazard stressors. These guidelines encourage using trees and shade structures over sidewalks and parking areas to reduce heat and create a more pleasant pedestrian environment; discourage the use of plants that are highly combustible or create large amounts of fuel for fires; and promote design features such as cisterns and stormwater retention features that capture, store, and reuse stormwater or minimize runoff into streets.

Other Local Efforts

Outside of SANDAG-led efforts, the San Diego region is very active in resiliency planning. As a coastal region, much work is being done to study the impacts of sea-level rise and plan for adapting to the anticipated climate impacts. There are seven coastal jurisdictions in the region, and all of them are preparing, have prepared, or have adopted vulnerability assessments and Local Coastal Program amendments to incorporate best available sea-level rise science into their land use planning documents. Other agencies, such as the Port of San Diego, San Diego County Regional Airport Authority, and U.S. Navy, are also engaged in sea level rise analysis, and they are assessing impacts to the infrastructure and assets that they manage.

A previous effort that has shaped the region's current understanding of sea-level rise and its associated impacts is the Resilient Coastlines project⁵, funded by a grant from the National Oceanic and Atmospheric Administration. The project completed an analysis of economic impacts to the San Diego region caused by sea-level rise, as well as legal, policy, and planning tools that local agency staff can use. Throughout the project's lifespan (2015-2018), capacity building and educational opportunities were provided through workshops, working groups, and webinars.

While San Diego's coastal communities are planning for the impacts of rising seas along the region's coastline, the region's inland communities are preparing for wildfires that also could impact the region's transportation network. The risk for wildfires driven by Santa Ana winds will likely increase as a result of drier, warmer autumn seasons. To address this risk, SDG&E has established a comprehensive fire-risk mitigation program to help protect utility customers and local communities. This program includes a system of high-definition cameras that improve fire detection through a live-streaming view of San Diego's most fire-prone areas; a team of meteorologists who analyze weather data and provide microclimate forecasts to electric system operators; and a comprehensive vegetation management plan that maintains clearances around power poles. Likewise, the 2017 Consolidated Fire Code includes requirements regarding access roads, ingress/egress specifications, defensible space, and other policy areas to ensure that people are safe and able to respond to and recover from events such as wildfire and extreme heat events.

The 2017 Consolidated Fire Code requirements also ensure that access to roads and highways is maintained for evacuations and emergency responders. Maintaining access to roads and highways further ensures that the regional economy remains vibrant with minimal impacts to goods movement.

In addition, partner agencies in the San Diego region have come together to study and plan for impacts to the water supply under future climate scenarios. The San Diego Basin Study, jointly led by the City of San Diego and Bureau of Reclamation, assesses the region's water supply and demand and determines the potential climate change impacts. The study also analyzes the region's existing infrastructure and includes adaptation strategies that can help address the uncertainties associated with climate change. In addition, the County of San Diego's Stormwater Capture and Use Feasibility Study evaluates the feasibility of planning, constructing, operating and managing facilities that capture and use stormwater beneficially. The study will provide data that may inform future stormwater management decisions that reduce or mitigate stormwater impacts of surface transportation.

Next Steps

A focus of the SANDAG San Diego Forward: The 2021 Regional Plan will be on the resilience of the transportation network to the impacts of climate change and natural hazards. Much of the mitigation and adaptation work that SANDAG has completed and is undertaking will inform the projects and policies in the 2021 Regional Plan.

Endnotes

- ¹ <https://www.fhwa.dot.gov/legsregs/directives/orders/5520.cfm>
- ² <https://www.energy.ca.gov/sites/default/files/2019-07/Reg%20Report-%20SUM-CCA4-2018-009%20SanDiego.pdf>
- ³ https://www.sdforward.com/docs/default-source/default-document-library/climate-change-white-paper-march-2-2018.pdf?sfvrsn=c0d4f965_0
- ⁴ <http://resources.ca.gov/docs/climate/safeguarding/update2018/safeguarding-california-plan-2018-update.pdf>
- ⁵ <https://www.climate-science-alliance.org/resilient-coastlines-project>