



PFAS Technical Memorandum

Washoe Regional Transportation Commission &
Nevada Department of Transportation

Lemmon Drive Traffic Improvements and Resiliency Project



LEMMON DRIVE

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SUBJECT

Evaluation of the Lemmon Drive Project in Relation to the Presence of PFAS in Swan Lake



Introduction

Project Overview

The Regional Transportation Commission of Washoe County (RTC Washoe), in cooperation with the Nevada Department of Transportation (NDOT) and the Federal Highway Administration (FHWA) are proposing improvements to Lemmon Drive in the City of Reno, Washoe County, Nevada. The Lemmon Drive Traffic Improvements and Resiliency Project involves realigning Lemmon Drive to reconstruct a safer and more resilient roadway between Fleetwood Drive and Ramsey Way. The project proposes to realign Lemmon Drive to the west on an existing berm, elevating the roadway to mitigate flooding impacts. The project also includes the reconstruction of a shared use path within the project limits and the construction of a new path connecting Lemmon Drive to Lemmon Valley Elementary School. Additionally, the project would eliminate residential driveway connections to a regional road, implement required earthwork balancing to avoid altering the base flood elevation, and stormwater improvements, including the construction of retention and equalization basins. These comprehensive measures collectively enhance safety, connectivity, and transportation resiliency in Lemmon Valley.

The purpose of this technical memorandum is to document the existing conditions, impacts, and mitigation for visual resources and aesthetics. It also includes a description of applicable laws and regulations.

Purpose and Need of the Project

Why is the Project Needed?

In 2017, Lemmon Drive was overtopped by floodwaters and faced emergency closures and an extensive mitigation response which disrupted the community's access highlighting the need for a more resilient roadway. Washoe County has limited financial and human resources to continuously provide flood mitigation for Lemmon Drive and private property. The total cost for maintenance, HESCO barrier placement, and continuous pumping for the 2017-2019 flood event was \$11.6 million (Washoe County, 2022).

In addition, multimodal enhancements were identified as a community need in the RTC's North Valleys Regional Transportation Study.

What is the Purpose of the Project?

The purpose of the project is to provide a safe and reliable regional road with at least one dry lane in each direction of travel during a 100-year flood event and provide safe access for all multi-modal users.

Proposed Action and Alternatives

Build Alternative

The Build Alternative would reconstruct and raise the profile of the existing roadway from Fleetwood Drive to Palace Drive along the existing alignment. The section of roadway would provide two through lanes in each direction with a raised median. Dedicated left- and right-turn lanes would be provided at the intersections of Fleetwood Drive, Patrician Drive, and Palace Drive.

As the roadway extends to the north it would transition to provide one lane in each direction with a raised center median. In the northbound direction, dedicated right turn pockets would be provided at Arkansas Street, Chickadee Drive, Arizona Street, and Oregon Drive. Just north of Deodar Way the roadway alignment would shift west of the existing roadway. This realigned segment of roadway would run along the east side of an existing berm allowing the roadway to be constructed above the existing Federal Emergency Management Agency (FEMA) 100-year flood elevation. Arkansas Street, Chickadee Drive, and Arizona Street would be extended to tie into the new, realigned roadway. Near Oregon Drive the roadway alignment would tie into the existing roadway alignment with full reconstruction extending to Ramsey Way. **See Figure 1.**

The Build Alternative would also involve modifications to cross-street direct access realigned Lemmon Drive at Nectar Street, Tupelo Street, Waterash Street, Idaho Street, Pompe Way, and Dillon Way. Pompe Way and Dillon Way would be connected via a new frontage road which provides access to Lemmon Drive at Ramsey Way. Idaho Street and Waterash Street would utilize rehabilitated existing Lemmon Drive as local frontage road access to Arizona Street or Chickadee Drive which would then provide access to the realigned Lemmon Drive. A new connection from the Matterhorn Drive and Tupelo Street intersection to Chickadee Drive would provide access to the realigned Lemmon Drive also.

In addition to roadway improvements, substantial drainage improvements would also be constructed under the Build Alternative. Key drainage features would include rehabilitation of the existing drainage channel from Fleetwood Drive to Palace Drive. Equalization culverts would be constructed to replicate existing drainage between the east and west side of the existing berm during higher Swan Lake water elevations. These equalization culverts would be located at existing breaks in the berm north of Deodar Way and near Idaho Street. Volumetric mitigation basins would also be constructed between the new, realigned Lemmon Drive and existing Lemmon Drive within the FEMA floodplain. This mitigation would provide 1.3 cubic yards of basin excavation for every one 1 cubic yard of embankment placed within the FEMA 100-year floodplain.

Additional items to be constructed with the Build Alternative include a 10-foot shared use path along the reconstructed and realigned Lemmon Drive roadway, intersection lighting, signing, striping, and reconstruction of the Patrician Drive rectangular rapid flashing beacon (RRFB). Additional pedestrian enhancements would be constructed from Lemmon Drive to the Lemmon Valley Elementary School along Patrician Drive.

Figure 1. Lemmon Drive Build Alternative



No Build Alternative

The No Build Alternative would not construct any improvements to Lemmon Drive and only routine maintenance would continue. Lemmon Drive would remain below the 100-year floodplain. The No Build Alternative would eliminate the costs associated with construction of the project but would not meet the project's purpose and need.

Summary of the Lemmon Drive Project in Relation to the Presence of PFAS in Swan Lake

Since the discovery of PFAS in Swan Lake and other locations within Lemmon Valley there has been considerable discussion in the media as well as outreach from the City of Reno (City) and the Washoe County (County). While all these communications are collectively informative, the City has requested that we provide this Technical Memorandum with the main objective of clarifying concerns regarding the presence of PFAS in Swan Lake surface water as it relates to the planned Lemmon Drive Traffic Improvements and Resiliency Project (aka the Lemmon Drive Project).

Our review of the proposed project and the available PFAS data for Swan Lake surface water and Lemmon Valley soil and groundwater finds that:

1. PFAS is ubiquitous in surface water, groundwater, soil, and consumer products throughout the U. S. and the State of Nevada.
2. The concentrations of PFAS in Swan Lake surface water appear to be higher than PFAS concentrations in other surface water bodies in Nevada.
3. Potential exposure and health risks associated with PFAS in Swan Lake are likely minimal since it is not used as a source of drinking water, nor will it be directly used for construction water.
4. Potential health risks associated with PFAS in groundwater are unknown since groundwater samples have not been collected in the area to the east of the proposed project and exposure would only occur if a private well was used as a drinking water source.
5. Exposure and health risks associated with PFAS in soils in Lemmon Valley are unknown as regulatory agencies have not developed soil standards for PFAS.
6. Finally, the impact of the proposed project on these current conditions is not likely to change following completion of the project. The project will have no impact on current concentrations of PFAS in Swan Lake surface water or Lemmon Valley groundwater and soils.

Overview of the Project

We first provide a brief description of the Lemmon Drive Project followed by a brief summary of the Lemmon Valley PFAS studies, and finally discussion focused on the implications of PFAS presence in soil, groundwater, and surface water to community concerns following completion of the project.

The Lemmon Drive Project will realign Lemmon Drive to the west of its current location where it will be reconstructed over the existing natural berm along the eastern edge of Swan Lake. The project includes increasing the elevation of the natural berm (and thus the new Lemmon Drive) above the 100-year flood plain.

As stated in RTC's May 2024 Fact Sheet:

"The project would:

- Provide safe and reliable access to Lemmon Valley area during flood events
- Provide a new multi-use path for walking and biking
- Build the road in a way that doesn't cause more flooding
- Build water-retention basins near the road to help with future flooding mitigation
- Allow first responders to access homes more quickly during flood events

The project would not:

- Reduce flooding or make it worse
- Provide additional land for residential development
- Increase emergency-response times for medical emergencies/structural fires"

The Lemmon Drive Project is currently in the environmental review phase.

What are PFAS?

PFAS is the common abbreviation for the group of chemicals known as Per- and Polyfluoroalkyl Substances. According to the National Institute for Occupational Safety and Health (NIOSH; 2022) there are over 9,000 individual PFAS compounds. Historically, PFAS has been used in the manufacture of many consumer products since the early 1950s including such products as grease-resistant paper, fast food containers/wrappers, microwave popcorn bags, pizza boxes, candy wrappers, stain and water-repellent used on carpets, upholstery, clothing, and other fabrics, cleaning products, non-stick cookware, paints, varnishes, sealants, shampoo, dental floss, and cosmetics. Much attention has recently focused on its historical use in firefighting foams.

PFAS Detected in Lemmon Valley Soil, Groundwater, and Surface Water

The first environmental sampling for PFAS within Lemmon Valley took place in August 2021 when University of Reno (UNR) graduate student Michael DeNicola collected two samples. One sample was collected from the surface of Swan Lake near its eastern shore and one sample was collected from effluent from the Reno Stead Wastewater Treatment plant (RSWRF) prior to its discharge to Swan Lake. Nineteen different PFAS compounds were analyzed in these two samples. In addition, DeNicola (2023) collected an additional 62 water samples from various other surface waters including 15 lakes and 10 rivers throughout the Northwestern Great Basin of Nevada. The author concluded that PFAS are ubiquitous throughout the Northwestern Great Basin with the lowest concentrations measured in alpine lakes, the Lake Tahoe basin, and the headwaters of the Sacramento and American Rivers, whereas the highest concentrations were measured in terminal lakes, including Swan Lake.

In addition to the Swan Lake surface water sample collected by DeNicola (2023), in June 2023, the City in collaboration with the County collected 5 groundwater samples, 9 surface water samples, 9 soil samples, and 2 plant samples in Lemmon Valley. Of the 9 surface water samples collected, one was collected from Swan Lake.

Note on Analytical Methods

Over the past several years USEPA-approved analytical methods for PFAS have evolved rapidly. In 2021 when the DeNicola study was conducted, it was only possible to analyze for 19 PFAS. When the City and County conducted their study in 2023, they were able to analyze for 40 PFAS using the most current USEPA Method 1633.

Is the Presence of PFAS in Lemmon Valley Unique to this Area?

No, PFAS are present in soil, groundwater, and surface water throughout the United States. Brusseau et al (2020) compiled PFAS data reported in numerous scientific studies, in total comprising over 30,000 samples collected from more than 2,500 sites throughout the world. The authors note that PFAS was detected in soils from almost every site sampled. Between 2016 and 2021 the U. S. Geological Survey (USGS) collected drinking water samples from 716 locations (269 private-wells; 447 public supply) throughout the US (Smalling et al 2023). The authors estimated that PFAS would likely be detected in about 45% of all U.S. drinking-water samples. Kurwadkar et al (2022) critically reviewed research conducted over the past decade on the presence of PFAS in the aquatic environment and found that PFAS were routinely detected in groundwater, surface water, and wastewater treatment plant effluents throughout the U.S. In a more recent review study published in September 2024, Coates and Harrington reviewed five

recent studies reporting on the presence of PFAS in rainwater in the U.S. PFAS were detected in nearly all rainwater samples typically at low concentrations relative to regulatory drinking water criteria. The authors noted that PFAS concentrations were higher in rainwater samples collected near potential sources (Coates and Harrington 2024).

In 2023, the Nevada Division of Environmental Protection (NDEP), in coordination with the U. S. Environmental Protection Agency (USEPA), collected samples from 43 surface water bodies throughout the State of Nevada. PFAS were not detected in 58% of those water bodies. The maximum detected concentration of any individual PFAS in the NDEP study was 36 ng/L for PFPeA (perfluoropentanoic acid). For context, the concentration of PFPeA measured by the City and County in Swan Lake was 307 ng/L. While PFAS are clearly ubiquitous throughout the U.S. and throughout Nevada, the concentrations of PFAS in Swan Lake surface water are clearly much higher than in other surface waters in the State.

What are the Potential Health Implications of PFAS in soil, groundwater, and Swan Lake?

The potential health implications to residents of Lemmon Valley, and in particular those residents located in proximity to Swan Lake and the Lemmon Drive Project, are unknown. Currently, the USEPA has only developed drinking water Maximum Contaminant Levels (MCLs) for five PFAS.

These are:

- PFOA (Perfluorooctanoic acid) – MCL = 4 ng/L
- PFOS (Perfluorooctane sulfonic acid) – MCL = 4 ng/L
- PFHxS (Perfluorohexane sulfonic acid) – MCL = 10 ng/L
- PFNA (Perfluorononanoic acid) - MCL = 10 ng/L
- HFPO-DA (Hexafluoropropylene oxide dimer acid) – MCL = 10 ng/L

Measured concentrations of these PFAS in Swan Lake are as follows:

- PFOA – 108.63 ng/L
- PFOS – 8.83 ng/L
- PFHxS – 256.83 ng/L
- PFNA – 50.05 ng/L
- HFPO-DA – not detected

Although 4 of these 5 measured Swan Lake PFAS concentrations exceed their respective MCLs, Swan Lake is not a drinking water source, and therefore there is no known chronic human exposure for oral ingestion of Swan Lake water. In the absence of such exposure, there is little if any risk to human health. While PFAS have also been measured in Lemmon Valley soils, there are currently no regulatory guidelines for PFAS in soils. While Lemmon Valley residents may be

exposed to soils through various outdoor activities, such exposures are not anticipated to be any different under current conditions as compared to future conditions following completion of the Lemmon Drive Project.

According to the Nevada Division of Natural Resources (NDNR) there is estimated to be 1,237 domestic (private household) wells located in the eastern part of Lemmon Valley (NDNR 2015). Groundwater reservoirs in the western part of Lemmon Valley and eastern part of Lemmon Valley are distinct and are not hydraulically connected. Swan Lake and the residential community to the east of the Lemmon Drive Project overlie only the eastern groundwater reservoir. As such, there is a potential for residents to be exposed to PFAS through consumption of groundwater drawn from private wells. However, this potential exposure pathway currently exists and will not increase or decrease in magnitude as a result of the Lemmon Drive Project. We note that PFAS has not been measured in soil or groundwater in this part of Lemmon Valley.

In conclusion, PFAS are present in surface water, groundwater, and soils throughout the U.S. and the State of Nevada, including Lemmon Valley. However, their presence in these media does not necessarily infer human exposure or health risk to Lemmon Valley residents. Moreover, there is no indication the Lemmon Drive Project will have any impact (increase or decrease) on PFAS concentrations in Swan Lake surface water or Lemmon Valley groundwater and soils.

As a precaution, the project would not directly use water from Swan Lake to avoid the potential direct contact between the untreated Swan Lake water and construction workers or the general public passing through the project construction. In addition, standard dust control procedures as required by permitting agencies will be incorporated and monitored.

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