Draft

Water Resources Technical Memorandum

Regional Transportation Commission (RTC Washoe) and the Nevada Department of Transportation

Lemmon Drive Traffic Improvements and Resiliency Project

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Acronyms and Abbreviations

AtkinsRéalis	AtkinsRéalis, Inc.
BMP	Best Management Practice
City	City of Reno, Nevada
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
NAC	Nevada Administrative Code
NDOT	Nevada Department of Transportation
NEPA	National Environmental Policy Act
RTC	Regional Transportation Commission of Washoe County

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1.0 Introduction

1.1 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 (City) and 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 to the roadway. The project also includes the reconstruction of a multi-use path within the project limits and the construction of a new multi-use path connecting Lemmon Drive to Lemmon Valley Elementary School. Additionally, the project would eliminate residential driveway connections to a high-speed regional road, implement required earthwork balancing, or flood volumetric mitigation to avoid altering the base flood elevation, and stormwater improvements, including the construction of volume mitigation basins. These comprehensive measures collectively enhance safety, connectivity, and transportation resiliency in Lemmon Valley. The Project Area is shown in **Figure 1**.

The purpose of this report is to document the interaction of the Project with the water resources in the vicinity including existing conditions in the corridor, resource effect analysis, and mitigation measures.

1.2 Purpose and Need of the Project

Why is the Project Needed?

Lemmon Drive is a high-volume arterial road in Lemmon Valley that provides connection to US 395, the closest freeway. In 2017, Lemmon Drive was overtopped by floodwaters and faced emergency long-term closures and extensive mitigation actions which disrupted the community's access, highlighting the need for a more resilient roadway. Lemmon Drive's closure caused the residents road trips travel time to roughly increase by an additional half hour. Washoe County has limited financial and human resources to continuously provide flood mitigation for Lemmon Drive and private property, and emergency responders rely upon this roadway to access the community. 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 Washoe'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, reduce direct driveway access and decrease unsafe conditions, and provide safe access for all multi-modal users.

1.3 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 Swan Lake, and on top 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 of this section of Lemmon Drive extending to Ramsey Way, see **Figure 1**.

The Build Alternative would also involve modifications to cross-street direct access to 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 to Lemmon Drive via a new frontage road which provides access to Lemmon Drive at Ramsey Way, see **Figure 1**. Idaho Street and Waterash Street would use 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 also provide access to the realigned Lemmon Drive.

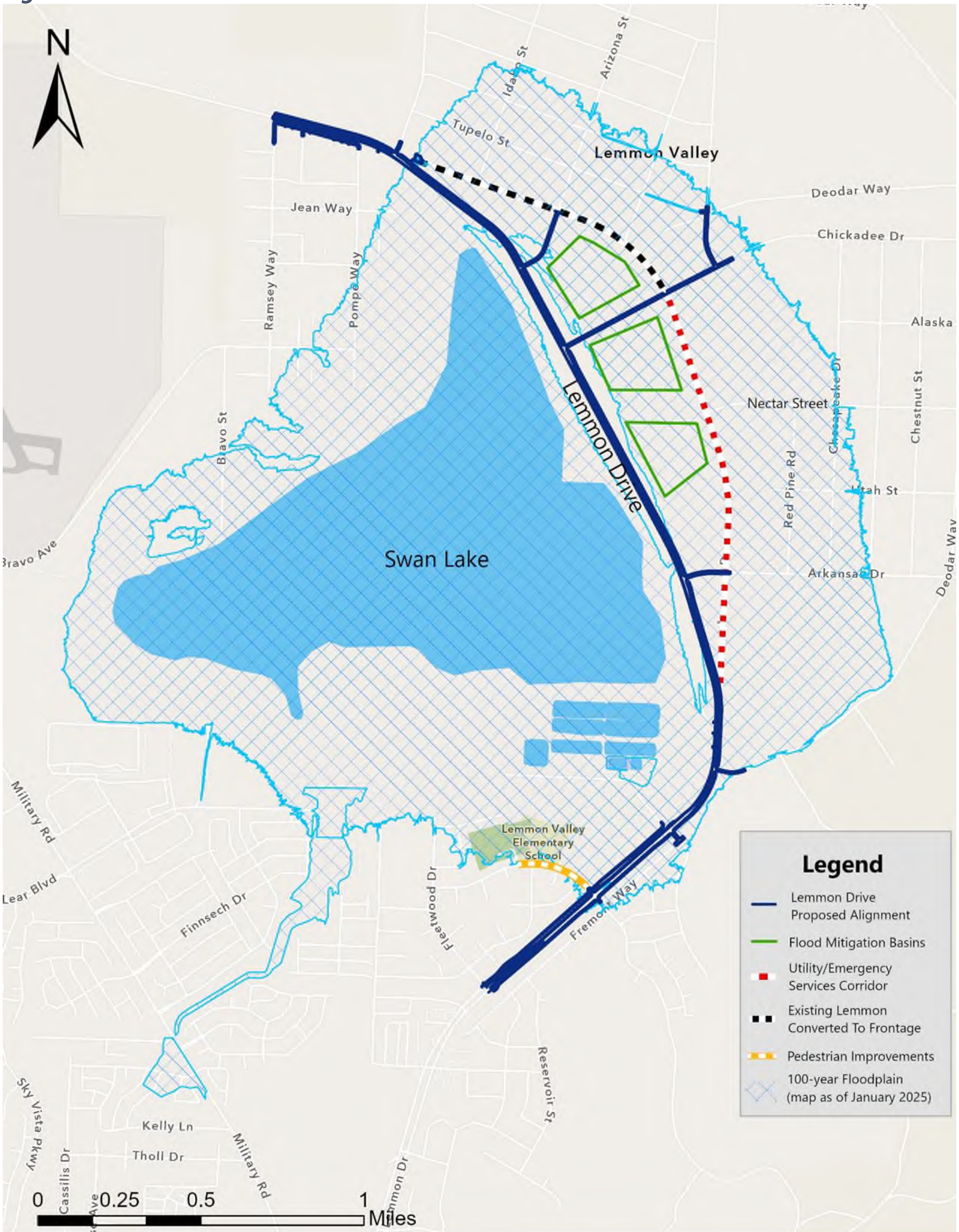
Drainage improvements would also be constructed under the Build Alternative. Key drainage features would include improvements to the existing drainage channel along Lemmon Drive from Fleetwood Drive to Palace Drive. The existing berm has breaks in it near Deodar Way and Idaho St which allow floodwaters to pass through the berm towards existing Lemmon 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 at the location of the breaks in the existing berm. 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 floodplain basin excavation for every 1 cubic yard of embankment placed within the FEMA 100-year floodplain.

Other 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 improvements to the Patrician Drive intersection. Additional pedestrian enhancements would be constructed from Lemmon Drive to the Lemmon Valley Elementary School along Patrician Drive.

No Build Alternative

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

Figure 1: Lemmon Drive Build Alternative



2.0 Applicable Laws, Regulations, and Guidance

2.1 Floodplain Laws, Regulation, and Guidance

Floodplains provide many functions and benefits, including flood retention and storage, habitat, and filtering of pollutants from stormwater runoff, and floodplains are managed by the Federal Emergency Management Agency (FEMA). Executive Order (EO) 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities." Federal, State, and local agencies consult with FEMA concerning implementation of this EO. Also, FHWA-sponsored projects comply with the FHWA floodplain regulations found in 23 CFR 650 Subpart A.

2.2 Water Resources and Quality Laws, Regulations, and Guidance

2.2.1 Clean Water Act – Section 303(d)

The Clean Water Act enforced by the Environmental Protection Agency (EPA) requires states to publish an annual list of water bodies that are not meeting their beneficial uses because of excess pollutants. These pollutants can occur naturally or be a result of human activity. The list of impaired waters, known as the Section 303(d) List, is based on violations of water quality standards; it is organized by watersheds and further divided into stream segments. In Nevada, a waterbody is also included on the Section 303(d) list if a fishing, drinking, or swimming advisory had been in effect for the water body during the listing. Refer to Section 3.2.2 for Swan Lake related information.

2.2.2 Nevada Division of Environmental Protection

The Nevada Division of Environmental Protection (NDEP) has statutory authority for water quality through its Bureau of Water Quality Planning (BWQP). The BWQP performs a variety of functions pertaining to surface waters, including the assignment of antidegradation requirements to the beneficial uses of surface waters throughout Nevada, known as Requirements to Maintain Existing Higher Quality (RMHQs). RMHQs are established when the existing parameters exceed the criteria established to protect the beneficial uses. Application of the antidegradation measures to water quality standards helps to develop management strategies through permitting programs.

Additionally, the NDEP Water Quality Standards Branch is responsible for assigning Total Maximum Daily Loads (TMDL), which is the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards. Refer to Section 3.2.2 for Swan Lake related information.

3.0 Affected Environment

Floodplain and water resources/quality conditions were examined within the Project study area (see **Figure 1**).

3.1 Floodplain Existing Conditions

Floodplains in the study area are associated with Swan Lake and its tributaries. The regulatory Swan Lake floodplain is illustrated in **Figure 2** and described below. Swan Lake, located north of Reno in Lemmon Valley, is a terminal lake within the Lemmon Valley "closed basin," meaning precipitation and snowmelt drain to the lake during winter and storm events and the outflow from the lake is limited to evaporation and infiltration. After the 2017 atmospheric river storm event, which caused high water levels and considerable flooding in Swan Lake, it took months for the water levels to recede, with surrounding residences and businesses damaged by the flooding and some streets closed off completely for long durations. Washoe County spent over $10 million on flood fighting efforts in Lemmon Valley after the 2017 event (Washoe County, 2022).

The following FEMA flood zones of high-risk areas are found within the study area:

Zone AE—The 1 percent annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1 percent chance of being equaled or exceeded in any given year. The special flood hazard area is the area subject to flooding by the 1 percent annual chance flood. The base flood elevation is the water surface elevation of the 1 percent annual chance flood. Zone AE is defined as an area where the base flood elevations have been determined. As shown in **Figure 2**, this zone covers Swan Lake and extends across Lemmon Drive at two points into some of the surrounding residential areas. The published base flood elevation is 4924.0 in the area but is approved to be increased to 4924.7 with recent approval of the Letter of Map Revision; the project is using the new elevation for project designs.

Other flood zones present in the study area which are low risk include:

Zone X (Area of Minimal Flood Hazard)—These are areas outside the 0.2 percent annual chance (500-year flood) floodplain and are areas of minimal flood risk where no base flood elevations have been determined. **Figure 2** shows that most of Lemmon Drive is in this zone.

Figure 2: Lemmon Drive Project Floodplain Map

3.2 Water Quality Existing Conditions

3.2.1 Surface Water

The study area lies within the Swan Lake watershed, which is 39.99 square miles in size with the intermittent playa lake being centrally located within the basin. The Lake is about 1000 acres in size depending upon the annual precipitation. The Swan Lake watershed is a closed basin and the only losses from these basins are through evaporation and infiltration. The watershed is located in the southern part of Washoe County, Nevada with southern portions within incorporated boundaries of the City of Reno. Elevations within the watershed range from a maximum of 8,266 feet to a minimum of 4,906 feet. The watershed consists of gently sloping alluvia material with a poorly defined drainage system with most the runoff occurring as shallow sheet flow and braided flow (Quad Knopf, 2007).

Swan Lake is not a drinking water source. A wastewater treatment plant, the Reno Stead Water Reclamation Facility discharges treated effluent to Swan Lake. It has a capacity of 2 million gallons per day and a large portion of the recycled water flows to Swan Lake, and some of the recycled water is also used for irrigation (City of Reno, 2024). Washoe County also discharges treated effluent to Swan Lake at a rate of about 300,000 gallons per day.

The existing Lemmon Drive is within FEMA's 100-year inundation boundary of Swan Lake. Runoff from storm events either sheet flows towards Swan Lake and ponds behind the existing berm or gets collected in roadside channels which ultimately discharge to Swan Lake.

3.2.2 Water Quality Standards

As noted in Nevada Administrative Code 445A.120, "the quality of any waters receiving waste discharges must be such that no impairment of the beneficial usage of water occurs as the result of the discharge. Natural water conditions may, on occasion, be outside the limits established by standards." The Nevada 2020-2022 Water Quality Integrated Report does contain Swan Lake as an assessed water body with the assessment unit code as NV01-NW-13_00. However, Swan Lake falls under Assessment Category 3: Insufficient Information, which means that insufficient or no data and information is available to determine if any beneficial use is attained. No TMDL requirements are associated with Swan Lake (NDEP, 2022).

3.2.3 Groundwater Resources

In the study area, ground-water resources exist in both fractured consolidated rocks in the uplands adjacent to and at depth beneath valley fill, and in valley-fill alluvium that partly fills the structural depression underlying Lemmon Valley. The valley-fill alluvium represents the more productive and most important aquifers in both hydrographic basins, due to its overall transmissivity, permeability and extent.

Groundwater from within Lemmon Valley is extracted by TMWA to serve customers in Lemmon Valley. TMWA is also operating aquifer storage and recovery programs in Lemmon Valley (NDWR, 2015).

3.2.4 Stormwater

The 2017 flooding event in Lemmon Valley, caused flooding of residential and non-residential structures, closure of some streets, rendered some septic systems inoperable, and forced Washoe County to take emergency measures to maintain transportation connectivity through the Valley. In the aftermath of this flooding event, Washoe County has been working on creating solutions for the flooding including diverting recycled water from the Reno Stead Water Reclamation Facility out of the Valley or pumping it underground for Aquifer Storage and Recovery Programs. Other solutions are also being investigated (RGJ, 2023). This Project can be considered as one part of the solution as it would raise Lemmon Drive above the 100-year floodplain and prevent it from being overtopped in up to 100-year storm events.

4.0 Impact Analysis

4.1 Floodplain Impacts

Impacts to floodplains would result from widening the berm for the relocated Lemmon Drive which would introduce fill into the floodplain.

The Study team overlaid FEMA's FIRM maps which designate special flood hazard areas, (see **Figure 2**), with the proposed design to assess the Project's effects on the expanse of floodplains. The FIRM maps are currently under revision by Washoe County but are still draft. The regulated water surface elevation is expected to rise resulting in a larger inundation area. This assessment did not include hydrologic and hydraulic modeling of the floodplains, as it is currently being completed by others. The goal of the Project is not to have an impact on the expanse of the Special Flood Hazard Area. This will be accomplished by conservatively estimating the volume of fill being placed within the special flood hazard areas. The fill volumes estimated below will be based on the new/proposed limits which results in a larger and more conservative volume that will be mitigated.

4.2 Water Resources and Quality Impacts

Impacts to water resources and quality could arise from the additional pavement from roadway widening and its relocation to the top of the berm. The Study team identified existing conditions and potential impacts to water resources and water quality using a watershed-based approach consistent with guidance developed by the USEPA. Data source and applicable statutes for the analysis of water resources and water quality include the following:

- EPA
- Truckee Meadows Water Authority
- Nevada Department of Environmental Protection
- Clean Water Act

The Project results in an overall increase in impervious area. The actual location and size have yet to be determined, but there will be approximately 16 acres of new pavement with the current design layout. Approximately 10 acres of pavement is being removed resulting in an increase in impervious area of six acres. The overall net increase in pavement/impervious area will generate additional runoff, which will have to be collected by the drainage system, and ultimately routed to mitigation basins and Swan Lake. Preliminary estimates show that an additional 2.5 ac-ft of volume would be generated from the proposed net increase in impervious area. Local regulation requires stormwater volume increases resulting from increases in impervious areas are to be fully mitigated on a 1.3 to 1 basis. Relative to Swan Lake, these increases are imperceptible and will not raise the water surface elevation, with no mitigation measures recommended for the additional runoff. Also, the added roadway fill material will not cause an increase in the Swan Lake water levels as volume mitigation features will be added in the design process.

The relocation and widening of Lemmon Drive will result in fill material being placed in the playa basin which if not mitigated could cause an increase in the Lake's water surface elevation.

Local regulation requires any importation of fill to be fully mitigated on a 1.3 to 1 basis. Preliminary estimates show that roughly 48.5 ac-ft of fill/embankment will be placed for the Project. Combining the 48.5 ac-ft with the 2.5 ac-ft for increased impervious area results in approximately 52 ac-ft of volume to be mitigated. At the 1.3 to 1 ration, a combined mitigation volume of 68 ac-ft will be provided. Future hydraulic modeling will confirm that mitigation provided with the project provides this conservative mitigation. These volume mitigation basins will likely have shallow depths with the bottom of the basins placed above the groundwater level. Once the mitigation strategy is finalized, the overall impact to the floodplain is expected to be negligible.

The Project will cause a negligible impact to water quality. This is due to a variety of factors. In the existing condition, runoff from the Lemmon Drive section between Fleetwood Drive and Palace Drive drains to roadside ditches which drain to the infield open space between Lemmon Drive and the existing berm, and infiltrates into the ground. Runoff from the section of Lemmon Drive between Palace Drive and Ramsey Way either directly drains to the infield open space between Lemmon Drive and the existing berm or is captured in roadside ditches between Lemmon Drive and the surrounding residences where in low flow conditions it likely infiltrates into the ground. In the proposed condition, the drainage patterns are perpetuated between Fleetwood Drive and Palace Drive but with the addition of curb and gutter and drop inlets along the roadway along with widened channels. New culverts are added just south of Palace Drive on Lemmon Drive and draining to the infield open area. Lemmon Drive realignment starts from the Deodar Way intersection and ends at the Oregon Blvd intersection, with the road now following the existing berm alignment with its profile also raised. This realigned section of Lemmon Drive is crowned with one half of the road draining to infield area between the berm and existing Lemmon Drive and then drains to Swan Lake through new culverts added under the realigned Lemmon Drive, and the other half of the road drains directly to Swan Lake. The storm drains and culvert outlets will have riprap aprons for erosion protection. The embankment slopes of Lemmon Drive will be vegetated which will help with erosion and sediment control. The drop inlets installed as part of the Project will be the newer style drop inlets with a sump and sur-trap to maintain and improve water quality. This will mitigate against pollutants generated from the pavement degradation, vehicular traffic, and winter road maintenance. Also, the traffic volume projections will be the same, so the vehicle related contaminant loading should not increase due to this Project. Overall, turbidity is not expected to increase due to the water quality and erosion control measures added in the Project.

The construction phase of the Project can potentially generate pollutants, e.g., Total Suspended Solids or Total Dissolved Solids, and create short term impacts. These impacts will be mitigated during construction with the Storm Water Pollution Prevention Plan (SWPPP) and using Best Management Practices (BMPs).

5.0 Mitigation

Mitigation measures are recommended to address permanent and temporary adverse impacts of the Project. Impacts shown in Section 4 are summarized in tabular format in this section to align with recommended mitigation. **Table 1** summarizes the direct and indirect impacts of the Proposed Action.

Table 1: Recommended Mitigation Measures for Permanent Impacts of the Proposed Action

Location	Activity	Impact	Mitigation
Along Lemmon Drive (Fleetwood Drive to Palace Drive)	Roadway widening	The increase in pavement area will generate additional runoff from widened Lemmon Drive	During final design, the drainage design will ensure that runoff from the widened and relocated Lemmon Drive is adequately collected by the drainage system that includes drop inlets, storm drain, channels and culverts, and conveyed to mitigation basins and in a manner that maintains historic drainage patterns to the maximum extent practical. Preliminary estimates show that an additional 2.5 ac-ft of volume would be generated from increase in impervious area. Local ordinances require volumetric mitigation at a ratio of 1.3 to 1 for stormwater volume increases resulting from the addition of impervious area. This volume will be captured in volume mitigation basins included in the project.
Along Lemmon Drive (Deodar Way to Ramsey Way)	Roadway widening and fill placement in floodplain	Potential increase in water surface elevation, leading to flooding impacts	Local ordinances require volumetric mitigation at a rate of 1.3 cubic yard of excavation for every 1 cubic yard, to satisfy mitigation for fill placement in closed basin. Preliminary estimates show that 48.5 ac-ft of fill will be placed in the floodplain and combined with the 2.5 ac-ft from increased impervious area, 68 ac-ft of mitigation volume would be needed. Hydraulic modeling will be performed and grading/volume mitigation basins will be incorporated into the project to confirm no net increase and no adverse impacts.

Location	Activity	Impact	Mitigation
Along Lemmon Drive (Fleetwood Drive to Palace Drive)	Roadway widening	Potential water quality impacts	This Project is adding curb and gutter along Lemmon Drive. In the proposed condition, all street flow will concentrate along curb and gutter and will be collected by drop inlets and drain to the Swan Lake through storm drain or culverts. The drop inlets installed as part of the Project will be the newer style drop inlets with a sump and sur-trap to maintain and improve water quality. The storm drains and culvert outlets will have riprap aprons for erosion protection. The side slopes of Swan Lake will be vegetated which will help with erosion and sediment control. This will mitigate against pollutants generated from the pavement degradation, vehicular traffic, and winter road maintenance.
Along Lemmon Drive (Deodar Way to Ramsey Way)	Roadway widening and realignment	Potential water quality impacts	The realignment of Lemmon Drive will cause runoff to directly sheet flow into Swan Lake. There are no barrier rail or curb and gutter in this section. Lemmon Drive is crowned and the side adjacent to Swan Lake will drain to Swan Lake and the side opposite to Swan Lake will drain to roadside channels and mitigation basins. During final design, the drainage design will ensure that there is no water quality impact from the Lemmon Drive side draining to Swan Lake.
Project wide	Construction activities, e.g., placing fill, compacting, and grading, restriping, and repaving	The construction phase has the potential to generate sediments that can end up in a water body	Implement BMPs during construction. As part of the development of BMPs for the project, RTC Washoe's construction contractor must file a Notice of Intent with NDEP's Bureau of Water Pollution Control to obtain coverage under the General Permit for Stormwater Discharges Associated with Construction Activity (NVR100000). A Stormwater Pollution Prevention Plan (SWPPP) will be developed before the Notice of Intent is submitted. The SWPPP will outline temporary and permanent erosion and sediment controls, locate stormwater discharge points, and describe BMPs to be implemented to prevent or reduce stormwater pollutant discharge associated with construction activities to the maximum extent practical

6.0 References

Nevada Division of Environmental Protection, 2022. Nevada 2020-2022 Water Quality Integrated Report.

Nevada Division of Water Resources, 2015. Lemmon Valley Hydrographic Basins 7-092A and 7-092B, Groundwater Pumpage Inventory.

Quad Knopf, 2007. North Valleys Flood Control Hydrologic Analysis and Mitigation Options City of Reno and Washoe County, Nevada, Volumes I and II.

City of Reno, 2024. *Wastewater Infrastructure*

https://www.reno.gov/government/departments/utility-services/wastewater-infrastructure.

Reno Gazette Journal, 2023. https://www.rgj.com/story/news/2023/01/20/reno-nevada-swan-lake-lemmon-valley-flood-atmospheric-river-rainstorms/69823287007/

Washoe County, Nevada. 2022. *North Valley Flood Update – February 2022*. https://www.washoecounty.gov/bcc/board_committees/2022/files/Item_5-Presentation---North-Valley-Flood-Update-Feb-8-2022.pdf