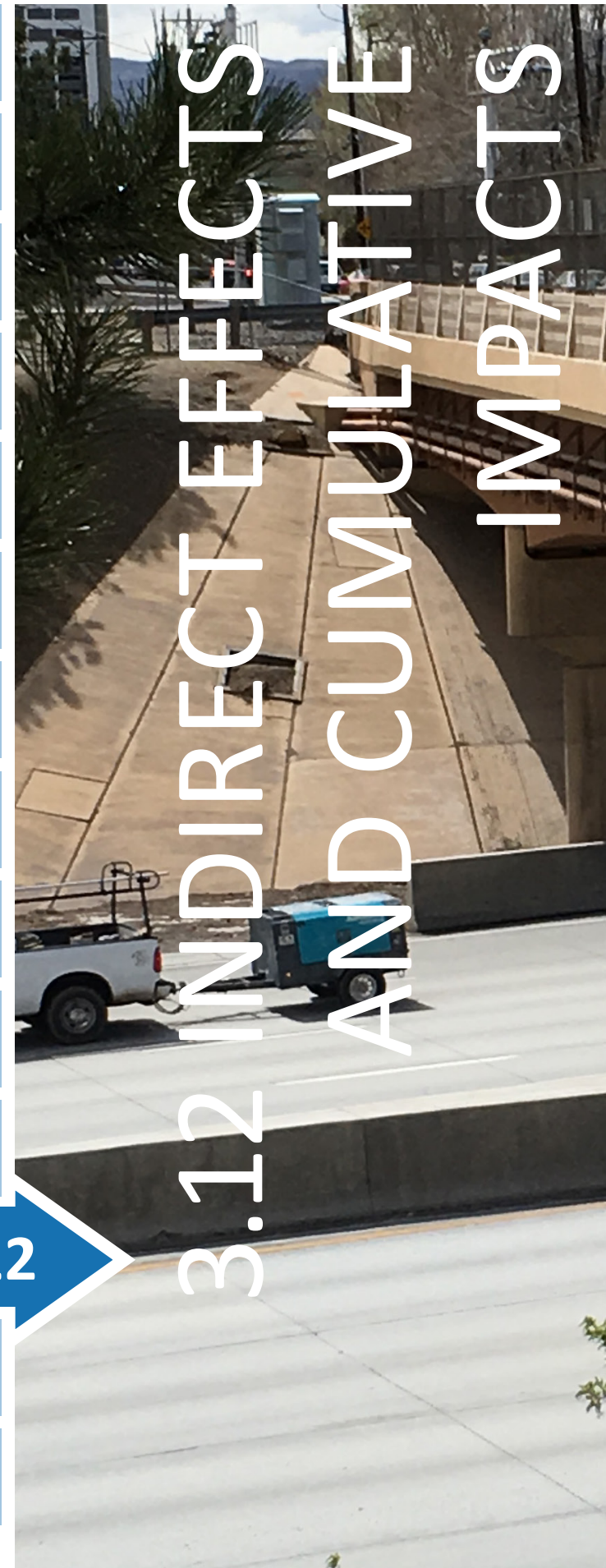


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## 3.12 Indirect Effects and Cumulative Impacts

This section summarizes the indirect effects analysis NDOT conducted for the Spaghetti Bowl Project and describes in detail NDOT’s cumulative impacts analysis. In general, indirect and cumulative impacts include consequences of the project that are not direct and may not be readily observable. Unlike direct effects, indirect effects would occur after construction is completed and would be located outside the project’s construction footprint. Cumulative impacts would result from the incremental consequences of an action like this project when added to other past, present, and reasonably foreseeable future actions. Indirect effects and cumulative impacts are less defined than direct impacts, and by definition, cumulative impacts are incremental in nature and usually are less defined than indirect effects.

### INDIRECT EFFECTS

There are three broad categories of indirect effects (National Cooperative Highway Research Program 2002):

- 1. Induced Growth Impacts:** Project-influenced development related to improved accessibility to an area, which may change land use, promote development, or influence an increase in the rate of development. One example of an induced growth impact identified in American Association of State Highway and Transportation Officials’ (AASHTO’s) *Practitioner’s Handbook 12* (2016) is commercial development occurring around a new interchange.
- 2. Impacts Related to Induced Growth:** Effects related to project-influenced development (impacts of the change in land use) on the human and natural environment. These effects are caused by induced growth or the future land use changes—for example, the environmental impacts associated with commercial development occurring around a new interchange (AASHTO 2016).
- 3. Encroachment-Alteration Impacts:** Alteration of the behavior and functioning of the affected environment caused by project encroachment (physical, biological, socioeconomics) on the environment. These effects are caused by the proposed action but occur later in time or farther removed in distance. One example of an encroachment effect identified in AASHTO’s *Practitioner’s Handbook 12* (2016) is a long-term decline in the viability of a population of a particular species as a result of habitat fragmentation caused by the project.



## 3.12 INDIRECT EFFECTS AND CUMULATIVE IMPACTS

NDOT determined that the project would not substantially change the location or magnitude of future development within the study area and beyond based on input from the Truckee Meadows Regional Planning Agency and Regional Transportation Commission of Washoe County stating that:

- There is little correlation between future development in the project area and the Spaghetti Bowl Project.
- The purpose of the project is not economic development.
- There are strong regional and local land use growth management strategies in the study area.

Therefore, an induced-growth indirect impacts analysis is not required, and there are no impacts related to induced growth. The potential for growth-related indirect effects is discussed in Section 2.5.2.1 of the Indirect and Cumulative Impacts Technical Report in [Appendix D.14](#).

Having eliminated two categories of indirect effects, NDOT evaluated the project’s potential encroachment-alteration impacts on the resources discussed in [Sections 3.2 through 3.11](#). Table 2-10 in Appendix D.14 identifies the resources NDOT considered but did not analyze for potential indirect effects and the rationale for not doing so. The resources that NDOT evaluated for indirect effects: public schools, regional land use patterns, environmental justice, water resources, and the Reno-Sparks Indian Colony are discussed in the preceding sections of Chapter 3, as well as Section 2 of Appendix D.14. Table 3.12-1 summarizes the analysis of potential encroachment-alteration indirect impacts.



**Table 3.12-1. Resources Considered for Encroachment-Alteration Effects**

Resource	Would this resource experience encroachment-alteration impacts?
<b>Community Resources – Public Schools</b>	<ul style="list-style-type: none"> <li>• The project could contribute to an adverse indirect effect on public schools if displaced students east of Kietzke Lane are relocated to an area with an overcrowded school. Although the Washoe County School District Infrastructure Plan is scheduled to be complete prior to most residential displacements, if students cannot be accommodated at new schools, NDOT would work with Washoe County School District to allow these students to continue to attend their current school until accommodation can be made at the new school or the Infrastructure Plan is complete in 2025.</li> <li>• If Coral Academy Middle School was relocated, but within the same general vicinity, it would be unlikely to adversely affect a student’s decision to attend the school given the considerable distance between the elementary, middle, and high school. Therefore, the project is unlikely to have an indirect effect on the Coral Academy of Science.</li> </ul>
<b>Regional Land Use Patterns</b>	The project would not have an adverse indirect effect on regional land use patterns, because it would not induce traffic growth or contribute to population, employment, or household growth or distribution.
<b>Environmental Justice</b>	<ul style="list-style-type: none"> <li>• The project could contribute to an adverse indirect effect on environmental justice populations if residents are relocated farther from services provided in downtown Reno. NDOT would closely monitor the housing market and will take additional steps beyond those required by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act) to ensure displaced residents are adequately taken care of, including an assessment of public transportation availability from residential relocations beyond the “McCarran Ring” to community services and medical facilities to ensure reasonable access.</li> <li>• There would not be an indirect effect on the environmental justice populations that use the Boys &amp; Girls Club and the Community Services Agency if they are relocated. While some residents may be closer to the relocated services and others may be farther, environmental justice populations on the whole would have comparable access to the relocated Boys &amp; Girls Club and Community Services Agency.</li> </ul>
<b>Water Resources</b>	The project would contribute to a beneficial indirect effect on Truckee River water quality by providing detention basins to treat stormwater runoff from the project’s paved area (existing and proposed), along with unpaved and disturbed areas within the construction footprint before it enters the river.
<b>Reno-Sparks Indian Colony</b>	The changes in freeway access resulting in increased travel time from I-580 to businesses on RSIC under Alternative 3 may affect customer preferences for patronizing the Reno-Sparks Indian Colony’s businesses. Under Alternative 3, potential changes in customer preferences would be mitigated by signs to direct drivers from I-580 to Reno-Sparks Indian Colony businesses.



## CUMULATIVE IMPACTS

This section describes the project's potential cumulative effects on the built and natural environment when considered in conjunction with the impacts of other projects in the study area and Truckee Meadows. It discusses NDOT's analysis of which resource areas might experience cumulative effects because of the project, and it identifies other projects that affect one or more of the same social, economic, or environmental resources that the project would also affect. This section also evaluates the need to mitigate the project's potential cumulative impacts.

More information about cumulative effects and NDOT's analysis of potential cumulative impacts is found in Chapter 3 of the Indirect and Cumulative Impacts Technical Report in Appendix D.14. The project's potential direct and indirect effects are discussed in Sections 3.2 through 3.11.



## Background

Cumulative effects are “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period” (40 CFR 1508.7). The analysis of cumulative effects identifies direct and indirect impacts that may be minimal when examined within the context of the project, but that may accumulate and become significant when considered with other planned actions in the study area.

Reasonably foreseeable future actions are projects that are likely to occur or probable, rather than those that are merely possible.

NDOT used *Considering Cumulative Effects Under the National Environmental Policy Act* (Council on Environmental Quality 1997) to determine which resources affected by the project to analyze for cumulative impacts. The document states that not all potential cumulative-effect issues identified during scoping need to be included in an EIS. It also notes “Cumulative effects analysis should count what counts, not produce superficial analysis of a long laundry list of issues that have little relevance to the effects of the proposed action or eventual decisions.”

Based on the Council on Environmental Quality guidance, NDOT identified community impacts (affordable housing) and impacts to the federally protected Lahontan cutthroat trout and cui-ui as the resource topics to analyze for cumulative effects. The cumulative impacts study areas for the two resources are as follows (and are illustrated in Figures 3-1A and 3-1B in Appendix D.14):

- Community impacts (affordable housing) – neighborhoods adjacent to the Spaghetti Bowl
- Federally protected fish – Truckee River upstream of Reno and continuing downstream to Pyramid Lake

More information on NDOT's process to select the resources for cumulative effects analysis (affordable housing and the protected fish species) is found in Section 3 of the Indirect and Cumulative Impacts Technical Report in Appendix D.14. Table 3-1 of the technical report lists the other resources that NDOT considered but excluded from the analysis.



## 3.12 INDIRECT EFFECTS AND CUMULATIVE IMPACTS

### PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Table 3.12-2 lists past, present, and reasonably foreseeable future actions (projects) that may, in conjunction with the Spaghetti Bowl Project, contribute to cumulative impacts on affordable housing and the Lahontan cutthroat trout and cui-ui within the cumulative impacts study area for each resource. Figures 3-1A and 3-1B in Appendix D.14 show the cumulative impacts study area.

Table 3.12-2 lists federal and non-federal actions, a range of transportation projects, residential and commercial development projects, and projects that could affect the Lahontan cutthroat trout and cui-ui. Not all the projects listed will affect affordable housing or the federally protected fish species; rather, NDOT's intent in developing the comprehensive list was to demonstrate that the cumulative effects analysis encompasses a full range of other projects, not just other transportation projects or other actions that require federal approval.



Apartment construction in Sparks



Table 3.12-2 identifies planned developments and Tentative Maps with 2,500 units or greater in the Truckee Meadows Service Areas. There are an additional 182 planned developments and Tentative Maps within the study area that have been considered in the analysis, as appropriate. The complete list can be found in Attachment 6 to Appendix D.14.

The timeframe for the analysis of future cumulative effects often coincides with a project's design year (2040 for the Spaghetti Bowl reconstruction), but it is also influenced by the availability of reliable data. That timeframe is typically consistent with the planning horizons used for regional land use and transportation planning purposes. The timeframe should be long enough for cumulative impacts to unfold, but not so far into the future that the effects become too difficult to reasonably anticipate. With those objectives in mind, NDOT considered potential future cumulative effects to 2035 for this analysis in order to be consistent with the Regionally Adopted Consensus Forecast with a forecast year of 2035. The Truckee Meadows Housing Study (TMRPA 2017) was integral to the analysis on affordable housing, which relied on demographic information from the regionally adopted Washoe County Consensus Forecast (TMRPA 2016). Transportation projects planned through 2040 were considered during the analysis and are included in Table 3.12-2.

The past projects identified in Table 3.12-2 are from the last 10 years. As noted in *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (EPA 1999), "The identification of the effects of past actions is critical to understanding the environmental condition of the area. Knowing whether the resource is healthy, declining, near collapse, or completely devastated is necessary for determining the significance of any added impacts due to the proposed project." The lack of data on impacts to affordable housing, particularly from private sector projects that are not required to collect and publish impact information as is done in this document, limits the practicality of collecting data on how past projects contributed to cumulative affordable housing impacts. Even with federally funded projects, the issues of affordable housing and environmental justice concerns have come into prominence following Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*; Clinton 1994). State departments of transportation and FHWA have developed a process for analyzing this issue and documenting it in EISs.

The physical and biological impacts to the Truckee River and native fish species such as the Lahontan cutthroat trout and cui-ui date back to the early development of Reno and Sparks. A detailed description of the historical impacts of 150 years of water impoundment, water diversion, and transportation projects is not needed to understand the current condition of the Truckee River and the resident Lahontan cutthroat trout and cui-ui. For this analysis, it is sufficient to know that past development has affected the volume of water in the Truckee River and the amount of and quality of natural habitat adjacent to the river, and that the Lahontan cutthroat trout and cui-ui populations in the river (and elsewhere) have declined so much that both species are federally protected.


Figure 2-13 in Appendix D.14 identifies the locations of planned developments in the study area, Figures 3-2 and 3-3 identify the locations of transportation projects, and Figure 3-1B identifies the location of projects that have the potential to affect Lahontan cutthroat trout and cui-ui.

The two cumulative impacts of the project are affordable housing and the Lahontan cutthroat trout and cui-ui, during construction.





**Table 3.12-2.** Past, Present, and Reasonably Foreseeable Actions

Project	Project Description	Past, Present, and Reasonably Foreseeable Actions	Label on Figure 2-13, 3-2, or 3-3 in Appendix D.14 (if applicable)
<i>Transportation – Roads</i>			
Spaghetti Bowl Paving	This project rehabilitated the aging pavement at the Spaghetti Bowl.	Past (completed August 2017)	
I-80 Robb Drive to Vista Boulevard	This project improved capacity and safety at several locations along I-80 in the study area by widening shoulders between Keystone Avenue and Prater Way, just east of the Spaghetti Bowl, and widening off ramps at Virginia Street, Rock Boulevard, and McCarran Boulevard. This project did not bring shoulders to NDOT standards in all locations; it implemented improvements within the existing right-of-way, improved safety, and provided better connectivity.	Past (completed December 2012)	
I-580 Widening Northbound from Moana Lane to Spaghetti Bowl and Off-Ramp Widening Northbound I-580 to East- and Westbound I-80	This project added new freeway lanes, shoulders, and ramp connections on northbound I-580, as well as widening bridges. This project is a long-term solution and will tie into the planned Spaghetti Bowl redesign.	Past (completed November 2011)	
I-580/Moana Lane Interchange	NDOT reconstructed the I-580/Moana Lane interchange and widened Moana Lane as a long-term solution to ease congestion and provide better access to businesses along Moana Lane.	Past (completed December 2012)	
I-580/Meadowood Mall Way Interchange	New partial interchange and frontage roads as a long-term solution to reduce congestion at the S McCarran Boulevard and S Virginia Street intersection near Meadowood Mall.	Past (completed December 2012)	
I-580 Freeway from Mt. Rose Highway to Washoe Valley	Construction of the I-580 Freeway extension between Reno and Carson City was completed in 2012. The 8.5-mile project alleviated congestion and reduced crashes along US 395 through Pleasant Valley.	Past (completed December 2012)	
SouthEast Connector Project	<p>This new 5.5-mile arterial—from the intersection of Sparks Boulevard and Greg Street one-half mile south of I-80, south to S Meadows Parkway and Veterans Parkway—is a six-lane highway with multi-use paths. It adds capacity to the regional transportation network, especially in the southeast part of the RTC’s planning area.</p> 	Present (opened July 2018)	8 (Figure 3-3)



## 3.12 INDIRECT EFFECTS AND CUMULATIVE IMPACTS



**Table 3.12-2.** Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Project Description	Past, Present, and Reasonably Foreseeable Actions	Label on Figure 2-13, 3-2, or 3-3 in Appendix D.14 (if applicable)
Pyramid Highway	At McCarran Boulevard, this project improves capacity, safety, and multimodal access.	Present (completed in spring 2018)	
Dolores Drive	This project will provide a new two-lane road from existing Dolores Drive west to Lazy 5 Parkway.	Future project (2017-2021)	1 (Figure 3-3)
Kiley Parkway	This project will provide a new two-lane road from Wingfield Hills Road to Henry Orr Parkway.	Future project (2017-2021)	3 (Figure 3-3)
Wingfield Hills Road	This project will provide a new four-lane road from existing Wingfield Hills Road west to David Allen Parkway.	Future project (2017-2021)	13 (Figure 3-3)
US 395	This project will widen US 395 to six lanes from N McCarran Boulevard to Lemmon Drive.	Future project (2017-2021)	50, 51 (Figure 3-2, Figure 3-3)
Lazy 5 Parkway	This project will provide a new two-lane road from W Sun Valley arterial to Pyramid Highway.	Future project (2017-2021)	4, 21 (Figure 3-3)
Lemmon Drive	This project will widen the road from four to six lanes from US 395 to Military Road; widen two to four lanes from Fleetwood Drive to Arkansas Street.	Future project (2017-2026)	5-6, 22-23 (Figure 3-3)
Stonebrook Parkway	This project will provide a new two-lane road from La Posada Drive to N/S Connector Road (2017-2017). Stonebrook Parkway will then be extended (new two-lane road) from N/S Connector Road to Pyramid Highway (2022-2026). N/S Connector Road is new road (2022-2026) from Stonebrook Parkway to Winfield Hills Road.	Future project (2017-2026)	9, 32 (Figure 3-3)
Pyramid Highway/US 395 Connector	This new high-speed/limited-access arterial from US 395 to Pyramid Highway, which will convert approximately 6 miles of existing Pyramid Highway (SR 445) from an arterial to a six-lane, high-speed, limited-access arterial, will alleviate current and future congestion in Sparks and Spanish Springs. It will serve future growth areas and provide additional east-west connectivity.	Future project (2017-2040)	43 (Figure 3-2) 7, 43-47 (Figure 3-3)
Arrowcreek Parkway	This project will widen the road from two to four lanes from Wedge Parkway to Zolezzi Lane.	Future project (2022-2026)	14 (Figure 3-3)
Buck Drive	This project will widen the road from two to four lanes from Lemmon Drive to N Hills Boulevard.	Future project (2022-2026)	15 (Figure 3-3)
Damonte Ranch Parkway	This project will provide a new two-lane road from Veterans Parkway to Rio Wrangler Parkway.	Future project (2022-2026)	16 (Figure 3-3)
Geiger Grade	This project will widen the road from two to four lanes from Toll Road to Rim Rock.	Future project (2022-2026)	17 (Figure 3-3)
Geiger Grade Realignment	This project will provide a new four lane road.	Future project (2022-2026)	18 (Figure 3-3)
N/S Connector Road	This project will provide a new two-lane road from Stonebrook Parkway to Wingfield Hills Road.	Future project (2022-2026)	27 (Figure 3-3)
Loop Road	This project will provide a new two-lane road from Salomon Circle to Eastern Slope Road.	Future project (2022-2026)	24 (Figure 3-3)
Military Road	This project will widen Military Road from two to four lanes from Lemmon Drive to Echo Avenue.	Future project (2022-2026)	25 (Figure 3-3)





## INDIRECT EFFECTS AND CUMULATIVE IMPACTS **3.12**

**Table 3.12-2. Past, Present, and Reasonably Foreseeable Actions (continued)**


Project	Project Description	Past, Present, and Reasonably Foreseeable Actions	Label on Figure 2-13, 3-2, or 3-3 in Appendix D.14 (if applicable)
Moya Boulevard	This project will widen the road from two to four lanes from Red Rock Road to Echo Avenue.	Future project (2022-2026)	26 (Figure 3-3)
Parr Boulevard	This project will provide interchange improvements.	Future project (2022-2026)	28 (Figure 3-2, Figure 3-3)
Red Rock Road	This project will widen Red Rock Road from two to four lanes from Moya Boulevard to Evans Ranch Access.	Future project (2022-2026)	30 (Figure 3-3)
Sky Vista Parkway	This project will widen the parkway from two to four lanes from Lemmon Drive to Silver Lake Road.	Future project (2022-2026)	31 (Figure 3-3)
White Lake Parkway	This project will widen the parkway from two to four lanes between US 395 ramp terminals.	Future project (2022-2026)	33 (Figure 3-3)
I-80	This project will implement capacity and operational improvements from W McCarran Boulevard to Vista Boulevard.	Future project (2027-2040)	36 (Figure 3-2, Figure 3-3)
Kirman Avenue	This project will widen the road from three to four lanes from Mill Street to Second Street.	Future project (2027-2040)	38 (Figure 3-3)
McCarran Boulevard	This project will widen the road from four to six lanes from Seventh Street to N Virginia Street.	Future project (2027-2040)	39 (Figure 3-3)
McCarran Boulevard	This project will widen the road from four to six lanes from El Rancho Drive to Rock Boulevard.	Future project (2027-2040)	40 (Figure 3-3)
McCarran Boulevard	This project will widen the road from four to six lanes from Sky Mountain Drive to I-80.	Future project (2027-2040)	41 (Figure 3-3)
Mira Loma Drive	This project will widen the road from two to four lanes from McCarran Boulevard to SouthEast Connector.	Future project (2027-2040)	42 (Figure 3-3)
Eagle Canyon Extension	This project will provide a new four-lane arterial from Eagle Canyon to Lemmon Drive; Lemmon Drive to Military Road.	Future project (2027-2040)	34, 35 (Figure 3-3)
Sutro Street	This project will widen the road from two to four lanes from McCarran Boulevard to Sunvilla Boulevard.	Future project (2027-2040)	48 (Figure 3-2, Figure 3-3)
Sutro Street Extension	This project will provide a new two-lane road from Sunvilla Boulevard to Clear Acre Lane.	Future project (2027-2040)	49 (Figure 3-2, Figure 3-3)
US 395	This project will widen US 395 to six lanes from Lemmon Drive to Stead Boulevard.	Future project (2027-2040)	52 (Figure 3-3)
Vista Boulevard	This project will widen Vista Boulevard from four to six lanes from I-80 to Prater Way.	Future project (2027-2040)	54 (Figure 3-3)
West Sun Valley Arterial	This project will provide a new four lane road from Dandini Boulevard to Eagle Canyon.	Future project (2027-2040)	55 (Figure 3-2, Figure 3-3)



## 3.12 INDIRECT EFFECTS AND CUMULATIVE IMPACTS



**Table 3.12-2.** Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Project Description	Past, Present, and Reasonably Foreseeable Actions	Label on Figure 2-13, 3-2, or 3-3 in Appendix D.14 (if applicable)
<i>Transportation – Transit</i>			
RTC RAPID Lincoln Line	This 3.1-mile bus rapid transit line in the Fourth Street/Prater Way Corridor links the business districts of Reno and Sparks. The line includes eight passenger stations (four in each direction), off-vehicle fare collection, transit signal priority, and real-time schedule information at stations. The project included a bus charging facility and multimodal improvements including new sidewalks and bicycle lanes.	Present (completed spring 2019)	5 (Figure 3-2)
RTC RAPID Virginia Line Extension	<p>This bus rapid transit line along Virginia Street from downtown Reno to Meadowood Mall opened in 2009. The Virginia Street Bus RAPID Transit Extension Project to extend the RAPID service from midtown to the University of Nevada, Reno is under construction, including utility, multimodal and aesthetic improvements to the Virginia Street corridor from 15th Street to Plumb Lane. The route would not use either freeway but extends along Virginia Street over I-80 in the study area.</p> 	Present (construction began in 2018, to be completed in 2021)	8 (Figure 3-2)
<i>Transportation – Bicycle, Pedestrian, Multimodal</i>			
Glendale Avenue (Kietzke Avenue to McCarran Boulevard)	The project will provide pavement reconstruction and multimodal improvements.	Present (completed December 2017)	11 (Figure 3-2)
Ninth Street/G Street (Wells Avenue to El Rancho Drive)	This project will enhance sidewalks and bike lanes.	Future project (2027-2040)	2 (Figure 3-2)
Oddie Boulevard/Wells Avenue (I-80 to Pyramid Highway)	This project will provide multimodal improvements (corridor study complete).	Future project (2017-2021)	3 (Figure 3-2)
Second Street (Keystone Avenue to I-580)	This project will provide multimodal improvements (corridor study complete).	Future project (2017-2021)	10 (Figure 3-2)
W Second Street (Reno)/Keystone Avenue to Galletti Way (Sparks)	This project will enhance sidewalks, landscaping, bike lanes.	Future project (2022-2026)	10 (Figure 3-2)
Kietzke Lane (Virginia Street to Galletti Way)	This project will provide multimodal improvements (corridor study complete).	Future Project (2017-2021)	7 (Figure 3-2)



## INDIRECT EFFECTS AND CUMULATIVE IMPACTS **3.12**

**Table 3.12-2. Past, Present, and Reasonably Foreseeable Actions (continued)**

Project	Project Description	Past, Present, and Reasonably Foreseeable Actions	Label on Figure 2-13, 3-2, or 3-3 in Appendix D.14 (if applicable)
Mill Street/Terminal Way: Reno Tahoe International Airport to Lake Street (downtown Reno)	This project will provide multimodal improvements; (corridor study complete).	Future project (2017-2021)	6 (Figure 3-2)
Victorian Avenue (16th Street to Pyramid Way)	This project will provide bicycle lanes.	Future project (2017-2021)	12 (Figure 3-2)
Vine Street (Riverside Drive to University Terrace)	This project will provide bicycle lanes.	Future project (2017-2021)	1 (Figure 3-2)
Center Street (S Virginia to I-80)	This project will widen sidewalks and provide bicycle lanes.	Future project (2017-2021)	4 (Figure 3-2)
Sierra Street (California Avenue to Ninth Street)	This project will widen sidewalks and provide bicycle lanes.	Future project (2017-2021)	9 (Figure 3-2)
<i>Transportation – Aviation</i>			
Reno-Tahoe International Airport	This project will expand the terminal from two concourses to four concourses to accommodate new gates.	Future project (2021-2036)	
Reno-Tahoe International Airport	This project will provide new or expanded parking, added incrementally to bring the total number of parking spaces to approximately 4,300 spaces.	Future project (2021-2036)	
Reno-Tahoe International Airport	This project will relocate air cargo facilities to the southwest quadrant, near Runway 16R-34L, to accommodate forecasted growth in air cargo activity.	Future project (2021-2036)	
<i>Land Use and Development</i>			
Tahoe-Reno Industrial Center	The Tahoe-Reno Industrial Center is a 107,000-acre park that encompasses a developable 30,000-acre complex. The park is intended to be a mixed-use, non-residential development consisting of a wide range of industrial, office, and commercial businesses. There is approximately 11 million square feet of industrial space currently in use by almost 130 companies. Notable tenants include Tesla, Google, Jet.com, Walmart, and Switch.	Current and future project (development ongoing)	
University of Nevada, Reno Campus Gateway Precinct/University District	The Campus Gateway Precinct is expanding University of Nevada, Reno between Ninth and Eighth streets, and Virginia and Evans streets. The remainder of the University District is identified for redevelopment from I-80 to downtown Reno. The University would like to see University-related housing and commercial and retail development and to improve physical and economic connections to downtown Reno.	Current and future project (2017-2024)	



## 3.12 INDIRECT EFFECTS AND CUMULATIVE IMPACTS



**Table 3.12-2.** Past, Present, and Reasonably Foreseeable Actions (continued)

Project	Project Description	Past, Present, and Reasonably Foreseeable Actions	Label on Figure 2-13, 3-2, or 3-3 in Appendix D.14 (if applicable)
Meridian 120	This project is a 783-acre mixed-use development along I-80, 8 minutes west of downtown Reno. Tourist, commercial, industrial, retail, and residential zoning is currently in place, and the development will create a vibrant community for nearby campus employees to live, work, and play. The development will serve as a gateway to Reno from California.	Current and future project (development ongoing)	39 (Figure 2-13)
Rancharrah	Located south of the Spaghetti Bowl along I-580, Rancharrah is a 141-acre master-planned community with abundant amenities.	Current and future project (development ongoing)	36 (Figure 2-13)
Park Lane	Park Lane is a 45.6-acre master-planned, mixed-use community, south of the Spaghetti Bowl along I-580 at Plumb Lane and S Virginia Street.	Current and future project (development ongoing)	
Summit Club	The project includes a 584-unit apartment complex adjacent to The Summit outdoor shopping center near Mt. Rose Highway and I-580. It will have a blended mix of 80 percent market-rate housing and 20 percent workforce housing, the first of its kind in northern Nevada. The apartments will be constructed in configurations of 12, 18, and 26 one- and two-bedroom units.	Current and future project (development ongoing)	
Woodland Village	This is a 2,458-unit development in Cold Springs; 430 units remain to be constructed. A Tentative Map request for the development plan has been approved.	Current and future project (development process ongoing)	74 (Figure 2-13)
Sonoma Highlands	This is a 2,510-unit planned development in the City of Sparks.	Current and future project (development process ongoing)	19 (Figure 2-13)
Wingfield Springs	This is a 2,546-unit planned development in the City of Sparks; 492 units remain to be constructed.	Current and future project (development process ongoing)	8 (Figure 2-13)
Pioneer Meadows	This is a 2,756-unit planned development in the City of Sparks; 1,630 units remain to be constructed.	Current and future project (development process ongoing)	7 (Figure 2-13)
Mortensen-Garson	This is a 3,000-unit planned development in the City of Reno near Verdi; 2,996 units remain to be constructed.	Current and future project (development process ongoing)	32 (Figure 2-13)
Double Diamond	This is a 3,300-unit planned development in the City of Reno. It is south of the Spaghetti Bowl along I-580.	Current and future project (development process ongoing)	64 (Figure 2-13)
Kiley Ranch North	This is a 4,463-unit planned development in the City of Sparks.	Current and future project (development process ongoing)	11 (Figure 2-13)
Damonte Ranch	This is a 4,905-unit planned development in the City of Reno. It is south of the Spaghetti Bowl along I-580.	Current and future project (development process ongoing)	88 (Figure 2-13)



## INDIRECT EFFECTS AND CUMULATIVE IMPACTS **3.12**

**Table 3.12-2. Past, Present, and Reasonably Foreseeable Actions (continued)**

Project	Project Description	Past, Present, and Reasonably Foreseeable Actions	Label on Figure 2-13, 3-2, or 3-3 in Appendix D.14 (if applicable)
Evans Ranch	This is a 5,679-unit planned development in the City of Reno. It is along US 395 N, near Cold Springs.	Current and future project (development process ongoing)	24 (Figure 2-13)
Downtown Sparks Redevelopment	Ongoing and future redevelopment is occurring in Victorian Square, situated north of I-80, bounded by Victorian Avenue to the south, 15th Street to the west, and Victorian Plaza Circle to the north and east. The plans are to create a vibrant, mixed-use downtown.	Current and future project (development process ongoing)	
StoneGate	This project is a 1,387-acre master-planned community 13 miles from the Spaghetti Bowl along US 395 N, off N Virginia Street on the historic Heinz Ranch property. It will provide for 4,135 dwelling units.	Future project	97 (Figure 2-13)
Renown Operations Building	Renown Health purchased the old Lowe’s building on Oddie Boulevard, in which it plans to house back-office operations, including the contact center, warehouse, population health management organization, information technology, and revenue cycle.	Future project	
<i>Bridge, Flood Management, and Fish Passage Projects</i>			
Truckee River Flood Management Project	This project will reduce flood damage by replacing bridges to increase Truckee River channel capacity, excavating floodplain terraces to improve floodwater storage, and restoring ecosystem functions and creating habitat for native species.	Current and future project	Various locations from downtown Reno through the Lower Truckee River
U.S. Fish and Wildlife Service (USFWS) Fish Passage Projects	USFWS is planning several fish passage projects at four dams that currently block within-stream movement and upstream movement from Pyramid Lake. The dams will be rehabilitated from 2018 through 2022. The Derby Dam will also be rehabilitated in the next several years.	Current and future project	Figure 3-1B



## 3.12 INDIRECT EFFECTS AND CUMULATIVE IMPACTS

# EXISTING CONDITIONS, IMPACTS, AND POTENTIAL MITIGATION MEASURES

The following subsections describe the potential cumulative impacts that affordable housing and federally protected fish (Lahontan cutthroat and cui-ui) could experience because of Alternatives 1, 2, and 3, and other past, present, and reasonably foreseeable future actions listed in Table 3-2 of Appendix D.14. The subsections also summarize the current conditions or trends in affordable housing and the health of protected fish species in the study area.

## Affordable Housing

### Affordable Housing Condition and Trends

The Truckee Meadows Service Area is established by the Truckee Meadows Regional Planning Agency and is the area where urban services such as municipal water and wastewater are intended to be provided.

The number of housing units in the Truckee Meadows Service Area increased by nearly 50,000 between 2000 and 2015, as shown in Table 3.12-3. This is an increase of nearly 40 percent over the 15-year period. Between 2000 and 2016, the City of Reno’s population increased by 31.4 percent (56,641 new residents) and the City of Sparks’ population increased by 42.8 percent (28,372 new residents). Over the next 20 years, the Truckee Meadows Regional Planning Agency (TMRPA) forecasts population to increase in the City of Reno by 74,691, in the City of Sparks by 27,498, and in unincorporated Washoe County by 16,417 (TMRPA 2017). This growth will drive future demand for housing.

**Table 3.12-3. Total Residences in Truckee Meadows Services Area (2000 and 2015)**

Area	Number of Units		Change (2000 – 2015)	
	2000	2015	Number	Percent
Unincorporated Washoe County	22,502	30,838	8,336	37%
Reno	77,156	104,999	27,843	36%
Sparks	26,738	39,087	12,349	46%
<b>Total</b>	<b>126,396</b>	<b>174,924</b>	<b>48,528</b>	<b>38%</b>

Source: TMRPA 2017.



The TMRPA Housing Study (TMRPA 2017), referred to hereafter as “Housing Study,” estimated that by 2035, about 51,000 new units will be needed in the Truckee Meadows Service Area to accommodate future growth in the region, approximately the same number of housing units that were built between 2000 and 2015. Table 3.12-4 illustrates the allocation of future residences to each jurisdiction within the Truckee Meadows Service Area. The Housing Study also estimated the capacity of vacant residential land, as well as land with infill and redevelopment potential, and found capacity for more than 90,000 new residences in the Truckee Meadows Service Area under current zoning designations.

**Table 3.12-4. Projected Units Needed in Truckee Meadows Service Area (2035)**

Jurisdiction	Future Population Increase	Future Units Needed Based on Population	Vacant Units <sup>a</sup>	Total Future Units Needed
Unincorporated Washoe County	16,417	6,314	695	7,009
Reno	74,691	28,727	3,160	31,888
Sparks	27,498	10,576	1,163	11,739
<b>Totals</b>	<b>118,606</b>	<b>45,618</b>	<b>5,018</b>	<b>50,636</b>

<sup>a</sup> Washoe County assumes a vacancy rate of 11 percent.

Source: TMRPA 2017.

Although the Housing Study found that there is more than enough capacity to accommodate future growth, it identified a potential shortfall in some housing types to meet future demands, referred to as the “missing middle,” or affordable housing. The types of housing that could fill this gap are single-family housing on small lots, cottage housing, duplexes, townhouses, and apartments. The Housing Study’s initial look at financial feasibility found that building affordable housing is difficult under current market conditions. It also found that few of the forecasted housing units will be affordable to residents with incomes below \$40,000, and this is especially true for residents with incomes below \$20,000. Households earning between \$20,000 and \$40,000 per year can afford monthly housing costs between \$500 and \$1,000. In this income range, households typically can afford to rent an apartment or small house (TMRPA 2017).

The City of Reno completed a housing market needs analysis in 2016 (City of Reno 2016) and found that there appears to be an adequate supply of homes for households earning between 80 and 120 percent of the area median income, while the percentage of houses sold to households earning less than 80 percent of the area median income was less than 10 percent. Table 3.12-5 identifies the number of home sales in Reno at each income level.





# INDIRECT EFFECTS AND CUMULATIVE IMPACTS 3.12

**Table 3.12-5. Number of Home Sales in Reno in 2014 – 2015, by Income Level**

Income Level	Maximum Household Income	Affordable Sales Price	Number of Homes Sold (2014-2015)	% of Sales
50% of area median income and below	\$22,832	\$60,600	140	3%
50% to 80% of area median income	\$36,530	\$119,900	304	6%
80% to 100% of area median income	\$45,663	\$158,800	328	6%
100% to 120% of area median income	\$54,796	\$197,700	571	11%
Above 120% of area median income	No Maximum	\$197,000+	3,813	74%

Source: City of Reno 2016

### Other Future Actions

Redevelopment in downtown Reno, where most affordable housing is available, will likely increase rents and home prices. The Fountain District is a proposed \$500 million mixed-use redevelopment project in downtown Reno along Fourth Street between West Street and Keystone Avenue. The Fountain District redevelopment project will demolish several motels that serve as affordable housing. These motels have served as single-room occupancy<sup>1</sup> and housing of last resort for low- to very-low-income populations. The Fountain District developer has donated \$1.5 million in affordable housing inventory and cash to the Reno Housing Authority (ThisisReno 2017).

A similar redevelopment project is proposed along Second Street between Washington Street and Arlington Avenue in downtown Reno. About 237 apartments and weekly motel rooms will be removed and residents relocated as part of this redevelopment project. These residents likely have incomes below 80 percent of the area median. Three types of affordable housing are proposed as part of the redevelopment plan: subsidized affordable housing, housing for the city’s workforce that is made affordable through pricing, and active senior housing. The developer’s presentation to the City of Reno identified 20 percent of proposed apartments for those earning 80 percent of the region’s median income, and 70 percent of the condominiums are expected to qualify for the Nevada Home is Possible program, which offers a down payment grant (*Reno Gazette-Journal* 2016).

<sup>1</sup> Single-room occupancy housing (SRO) is commonly understood as smaller-than-average studio apartments sharing a common kitchen or bathroom. Unlike apartments shared by roommates, each SRO unit is individually leased (U.S. Department of Housing and Urban Development 2018).

Downtown Sparks (Victorian Square) is also undergoing redevelopment to create a mixed-use downtown. To date, the redevelopment has constructed multifamily units on former parking lots and vacant lots without displacing existing housing.

The TMRPA, Washoe County, and the Cities of Reno and Sparks recognize the need for a more diverse, affordable housing supply and have identified actionable policies and programs in their plans to promote development of affordable housing.





## 3.12 INDIRECT EFFECTS AND CUMULATIVE IMPACTS

### Affordable Housing Impacts

Table 3.12-6 describes impacts on affordable housing.

**Table 3.12-6. Cumulative Effects on Affordable Housing**

No Build Alternative	Alternatives 1, 2, and 3
<b>No impact</b>	<p>The Spaghetti Bowl Project would not affect the region’s housing supply by contributing to economic and regional growth (population, households, or employment). It would, however, acquire between 233 (with Alternative 3) and 938 residences (with Alternative 1) (Table 3.12-7.) Of these, between 2 and 86 are publicly owned by the Reno Housing Authority, between 15 and 72 are mobile homes, and between 86 and 608 are low- or mid-density multifamily homes (see the Spaghetti Bowl Project Community Impacts Assessment Technical Report in <a href="#">Appendix D.2</a> for more information on direct effects). These three types of housing units are part of the missing middle category of housing. The loss of units in this middle category could affect the supply of affordable housing, because the market feasibility of developing these types of housing is much lower than for low-density, single-family residences. Market incentives (i.e., profitability) encourage development of single-family housing (TMRPA 2017).</p> <p>If either the Fountain District Development or West 2nd District Development were to occur concurrently with the Spaghetti Bowl Project, it could intensify the potential impacts on the supply of affordable housing for homeowners and renters earning less than 80 percent of the area median income. The actionable affordable housing policies and programs identified in the Cities of Reno and Sparks plans promote development of affordable housing as an integral element of redevelopment projects.</p> <p>The Spaghetti Bowl Project would likely contribute to an adverse cumulative impact on the availability of affordable housing if the Fountain District Development, West 2nd District Development, and Spaghetti Bowl Project occur concurrently.</p>



**Table 3.12-7. Number of Residential Displacements**

	Residential Displacements			
	Single-Family Residential	Mobile Home	Reno Housing Authority (Mineral Manor)	Multifamily Residential
<b>Alternative 1</b>	172	72	86	608
<b>Alternative 2 (Preferred Alternative)</b>	87	15	42	182
<b>Alternative 3</b>	75	70	2	86

Source: Spaghetti Bowl Project Community Impacts Assessment Technical Report (Appendix D.2)



Mineral Manor



### Measures to Minimize and Mitigate Adverse Affordable Housing Impacts

Mitigation measures for cumulative impacts on the supply of affordable housing will be implemented in the future when residential displacements will be needed for construction. Section 3.2 and Table 3.12-8 list mitigation measures NDOT will implement.

**Table 3.12-8. Potential Affordable Housing Cumulative Impacts Mitigation Measures**

	Mitigation All Alternatives
<b>Affordable Housing</b>	<p>The Uniform Act is the cornerstone of NDOT’s plan to mitigate the impacts of residential displacements. The Uniform Act stipulates that property owners must receive fair market value for their property and covers renters, too. Per the Uniform Act, NDOT is required to:</p> <ul style="list-style-type: none"> <li>• Pay fair market value for homes purchased.</li> <li>• Provide replacement housing for homeowners. This means no one is required to move from a residence without NDOT offering a comparable replacement.</li> <li>• For renters, find a comparable replacement rental.</li> <li>• People who live in publicly owned housing like Reno Housing Authority’s Mineral Manor are treated similar to market rate renters but with additional protections to not change their monthly rental costs.</li> </ul> <p>Beyond the Uniform Act requirements, NDOT commits to:</p> <ul style="list-style-type: none"> <li>• Convening a meeting of Reno Housing Authority, City of Reno, City of Sparks, and Truckee Meadows Regional Planning Agency to discuss the project’s impact on affordable housing. The meeting was held December 17, 2018. The goal of the meeting was to put the impact in context and discuss additional mitigation measures beyond the required Uniform Act provisions that could help mitigate the affordable housing impact. At the meeting, the Reno Housing Authority said that it did not have a preference for onsite versus offsite replacement of housing, but that it would depend on the location. They also noted that it is critical to end up with the same or greater number of units after displacement occurs.</li> <li>• Extending rental assistance up to 24 months beyond the Uniform Act required 42 months (rental assistance for a total of 66 months).</li> <li>• Providing funds or land already owned by NDOT to others (Cities of Reno or Sparks, Washoe County) to build affordable replacement housing for non-Reno Housing Authority displacements. Those displaced by this project who wish to remain in the area will be given priority access to the replacement housing. After those needs have been addressed this affordable housing will then be made available to those who qualify for affordable housing and have not been displaced by the project. Residents will be considered eligible for this replacement affordable housing if they meet Section 8<sup>a</sup> eligibility requirements or Reno Housing Authority’s Admission and Continued Occupancy Policy<sup>b</sup> (2018). The contribution of funds or lands will be tied to commitments from recipients to have affordable replacement housing available prior to the initiation of the NDOT right-of-way acquisition process.</li> </ul>

**Table 3.12-8. Potential Affordable Housing Cumulative Impacts Mitigation Measures (continued)**

	Mitigation All Alternatives
<b>Affordable Housing (continued)</b>	<ul style="list-style-type: none"> <li>• Ensuring, to the extent possible, the Reno Housing Authority’s federal funding from the Department of Housing and Urban Development will not be reduced because of the Spaghetti Bowl Project. This may be accomplished by providing the Reno Housing Authority with funding to replace the Mineral Manor buildings that will be acquired with an equal number of total units or up to 10 percent more units than the number of units being acquired. NDOT will provide the difference in funds between what the Uniform Act pays and what is required to replace the same number of units or up to 10 percent more units than will be displaced. This measure will be implemented early enough to ensure displaced residents move directly from their current Reno Housing Authority residence into the new Reno Housing Authority replacement housing.</li> <li>• Providing undeveloped land already owned by NDOT to the Reno Housing Authority for them to build replacement units.</li> <li>• Providing Reno Housing Authority with funding so the Reno Housing Authority can provide vouchers for up to 24 months for displaced Mineral Manor residents, allowing them to live offsite in existing housing in the event replacement Reno Housing Authority housing is not immediately available.</li> <li>• Working with the Reno Housing Authority to complete a feasibility study focused on Mineral Manor. The study will be completed within one year of the issuance of the ROD for the Spaghetti Bowl Project and will address the following:             <ul style="list-style-type: none"> <li>— Estimate the remaining life in the Mineral Manor buildings under different investment scenarios ranging from routine maintenance only to major maintenance as needed to maximize building life, and associated cost of each scenario.</li> <li>— Assess parking needs and limitations at the existing and future Reno Housing Authority as a result of new traffic patterns and existing parking facility displacement resulting from the project as a whole or by construction phase.</li> <li>— Explore the feasibility of onsite Reno Housing Authority replacement housing versus potential offsite replacement housing. Assess the number of replacement units needed, related parking requirements, possible zoning changes, pros and cons of ground-level or multistory facilities, and timelines for when housing replacement construction will need to start to prevent impacts to Reno Housing Authority operations and possible loss of HUD subsidies.</li> </ul> </li> </ul>

<sup>a</sup> Created by the Housing and Community Development Act of 1978, the Housing Choice Voucher program, also known as Section 8, provides assistance to eligible low- and moderate-income families to rent housing in the private market. Eligibility for this program is based on a family’s gross annual income and family size.

<sup>b</sup> The Admissions and Continued Occupancy Policy describes the eligibility, continued occupancy and termination policies for RHA’s Public Housing program as approved by the Board of Commissioners. It explains the day-to-day operations of the Public Housing Program and includes local policies and procedures.



## 3.12 INDIRECT EFFECTS AND CUMULATIVE IMPACTS



**Table 3.12-8.** Potential Affordable Housing Cumulative Impacts Mitigation Measures (continued)

	Mitigation All Alternatives
Affordable Housing (continued)	<ul style="list-style-type: none"> <li>All mitigation commitments are based on 2019 Reno/Sparks area housing conditions and project area demographics. Because the project will be delivered over 20 years, in the future when residential relocations will be needed for construction, the identified mitigation measures could be revised to reflect the most current housing and community needs</li> </ul> <p>The Reno-Sparks housing market has become quite expensive, and affordable housing is hard to find. If all the residential displacements were scheduled to occur in the next year or two, it would be very difficult to find affordable houses and apartments for those displaced by the project. But NDOT’s initial plan is to construct the project in five phases over about 20 years, which will minimize the difficulty in finding adequate and affordable housing for two reasons:</p> <ul style="list-style-type: none"> <li>The displacements will be spread between 2022 and 2039, making it easier to absorb the displaced homeowners and renters into the housing market. Phased relocation will help ensure the availability of comparable replacement properties by not simultaneously displacing too many residents or businesses that would potentially vie with each other for replacement properties. By controlling the number of relocated residents entering the market for replacement properties, sufficient replacements are more likely to be available.</li> <li>Phase 1 would have no residential displacements, and Phase 2 would have few residential displacements (12 under Alternative 2, for example). Not until real estate acquisition begins for Phase 3 in approximately 2025-2027 (in advance of construction in 2027) would a significant number of residential displacements occur (about 200 displacements under Alternative 2, for example). The Truckee Meadows Housing Study forecasts that population and housing demand will grow more slowly after 2020 than it will in the 2015-2020 period (Truckee Meadows Regional Planning Agency 2016b). This should make it easier for the displaced residents to find affordable replacement housing.</li> </ul> <p>NDOT will develop a more detailed relocation plan closer to when the displacements will occur. Regardless of the timing of the displacements and the circumstances of those who are displaced, the Uniform Act will guide NDOT’s mitigation. At each stage of construction, NDOT will closely monitor the housing market and may take additional steps beyond those required by the Uniform Act to help ensure displaced residents are adequately taken care of.</p>



The USFWS limited stocking Lahontan cutthroat trout from 2011 through 2015 (Hawks 2017). According to the Nevada Department of Wildlife, the USFWS considers the Truckee River below Mogul (7 miles west of Reno) “occupied” by Lahontan cutthroat trout because USFWS resumed stocking of this species in 2016 and continued it in 2017 (Hawks 2017 and 2018). Although hatchery Lahontan cutthroat trout occur in the Truckee River in the study area, the native species are not known to be present. Native Lahontan cutthroat trout do not spawn in the study area because Derby Dam (25 miles east of Reno) prevents upstream movement. Natural spawning occurs below Derby Dam and in some California tributaries of the Upper Truckee River (Simpson 2017). Lahontan cutthroat trout also occur in Pyramid Lake, both from hatchery stocking by tribal hatcheries and from reproduction in the lower Truckee River below Derby Dam (Hottle 2017a). See Figure 3-1B in Appendix D.14.

One of the leading causes of cutthroat trout population declines in the western United States is habitat fragmentation, which reduces the total habitat available, reduces habitat complexity, and decreases genetic diversity. Fragmentation has occurred in the Truckee River basin, and as a result, Lahontan cutthroat trout in Pyramid Lake can no longer migrate into the upper Truckee River or Lake Tahoe for spawning due to irrigation diversions and other man-made river obstructions (USFWS 2009).

### Lahontan Cutthroat Trout and Cui-ui

#### Lahontan Cutthroat Trout Condition and Trends

In the Truckee River basin, Lahontan cutthroat trout occurred historically from the California headwaters to Pyramid Lake (USFWS 2009). They currently occupy approximately 111,000 acres of lake habitat and 97 miles of stream habitat (NDOT 2017). Lahontan cutthroat trout were eliminated in Pyramid Lake around 1944, but a stocking program returned them to the lake (USFWS 1995). Artificial breeding programs maintain Lahontan cutthroat trout in the Truckee River and Pyramid Lake (USFWS 2009).





Nonnative fish, especially other trout, which compete and hybridize with Lahontan cutthroat trout, are the greatest threat to Lahontan cutthroat trout throughout their range. Introduction of nonnative trout has caused most of the decline, and in places elimination, of the Lahontan cutthroat trout since the mid-1990s. Brook trout are the predominant competitor with Lahontan cutthroat trout (USFWS 2009). Aquatic invasive species such as Mysis shrimp, New Zealand mud snails, and quagga mussels also threaten Lahontan cutthroat trout recovery because they compete for food. Mysis shrimp have been particularly harmful in lakes in the Lake Tahoe basin. None of these are a problem yet in the study area, but the New Zealand mud snails in the Truckee River could become more of a threat (USFWS 2009; Crookshanks 2014).

### *Cui-ui Resource Condition and Trends*

Cui-ui only occur in the Truckee River from Pyramid Lake to Derby Dam and in Pyramid Lake. There are no fish passage facilities at Derby Dam to allow spawning migrations of cui-ui to pass west from that point.

Upstream storage of water and diverting water from the Truckee River reduce inflow to Pyramid Lake and has contributed to the decline of the cui-ui population. Timber harvesting and irrigated agriculture in the basin during the 1800s altered water runoff quantity and quality into the Truckee River. However, the largest diversion of Truckee River water occurred in 1905 with the completion of Derby Dam. Increasing water demands from industry, agriculture, and municipalities further altered the volume and timing of river flows. All these factors combined disrupt cui-ui reproduction (USFWS 1992).

### *Other Future Actions*

Projects that have the potential to affect the Lahontan cutthroat trout and cui-ui are summarized in the following paragraphs. The projects listed are similar to the Spaghetti Bowl Project in that they could have short-term construction impacts on the Lahontan cutthroat trout, but they would also have long-term advantages for the Lahontan cutthroat trout and cui-ui.

**Truckee River Flood Management Project.** The Truckee River Flood Management Authority is implementing the Truckee River Flood Management Project between Jones Street in downtown Reno and the Town of Wadsworth near Pyramid Lake to reduce future flood damage. Recreational and ecosystem restoration features will be incorporated in the footprint of the flood protection infrastructure. Environmental enhancements include the following:

- Replacing bridges to increase Truckee River channel capacity
- Excavating floodplain terraces to improve floodwater storage
- Restoring ecosystem functions and creating habitat for native species

About 7.1 miles of the lower Truckee River channel from Vista to Pyramid Lake have already been restored (Truckee River Flood Management Authority 2017).

**U.S. Fish and Wildlife Service Fish Passage Projects.** The USFWS is planning fish passage projects at several dams that currently block fish movement (Hottle 2017b). The projects would improve Lahontan cutthroat trout and cui ui movement into the study area and beyond. The following four dams upstream of the study area that block fish passage will be rehabilitated from 2018 through 2022 through the Truckee River Fish Passage Project, which is a joint effort between the USFWS and the Truckee Meadows Water Authority:

- Steamboat Ditch Diversion near Verdi, Nevada (scheduled for 2018, now postponed)
- Verdi Power Dam (2019)
- Washoe Highlands Dam (2021)
- Fleisch Diversion Dam (2022)

The Derby Dam, downstream of Reno and Sparks, will also be rehabilitated in the next several years (Hottle 2017a). (See Figure 3-1B in Appendix D.14).

### *Resource Management*

To address threats to Truckee River and Pyramid Lake Lahontan cutthroat trout, the USFWS developed a *Lahontan Cutthroat Trout Recovery Plan* in 1995. The plan identified habitat fragmentation as one of four major threats to the species and recommended developing a Truckee River basin ecosystem plan to determine the long-range options for water and other uses in the Truckee River basin.

Another important recovery effort underway is to improve Lahontan cutthroat trout movement in the Truckee River through construction of fish passage at the dams mentioned above. The Derby Dam will also be rehabilitated in the next several years (Hottle 2017a).

There have been two recovery plans for the cui-ui, with the most recent completed in 1992 (USFWS 1992). The ultimate objective is to allow the cui-ui to be removed from the endangered species list.





## 3.12 INDIRECT EFFECTS AND CUMULATIVE IMPACTS



### Lahontan Cutthroat Trout Impacts

Table 3.12-9 describes impacts on Lahontan cutthroat trout.

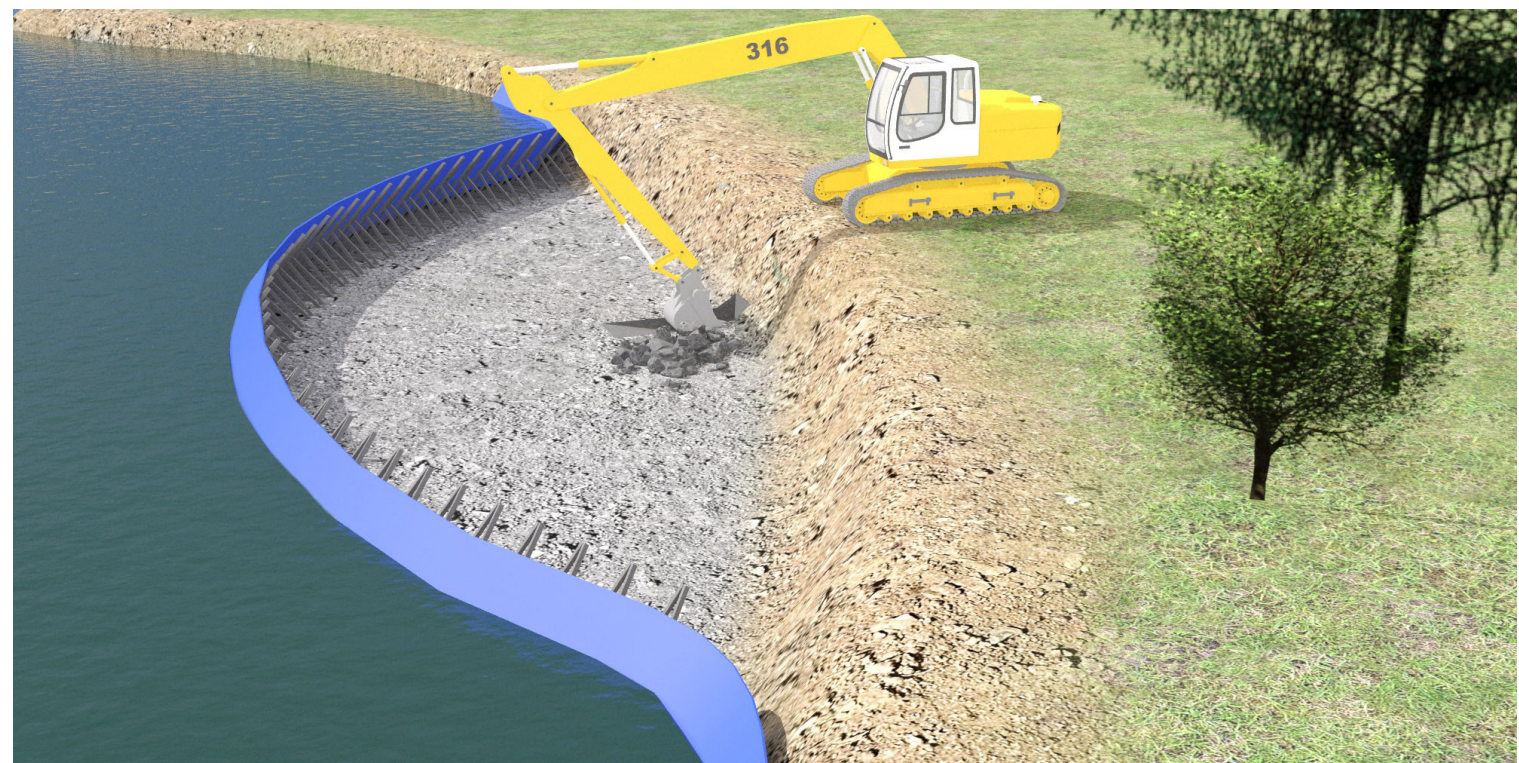
**Table 3.12-9. Cumulative Effects on Lahontan Cutthroat Trout**

No Build Alternative	Alternatives 1, 2, and 3
<p><b>No impact</b></p>	<p>The Reno Spaghetti Bowl Project would have adverse short-term construction impacts on the Lahontan cutthroat trout, most notably in the dewatered area upstream and downstream of the I-580 bridge pier that NDOT is proposing to remove from the Truckee River. NDOT would dewater about half the river in the area around the I-580 bridge pier for about 3 months (Figure 3.12-1). As this area is dewatered, trout that are unable to swim through the dewatered area would be removed by a biologist. FHWA, in consultation with USFWS, determined that handling Lahontan cutthroat trout may result in harm, harassment, and potentially mortality, although this is not anticipated (see Appendix D.10, Biological <i>Opinion</i>). The project would not have short-term construction impacts on the cui-ui because the species is not currently located in the study area.</p> <p>The project’s potential beneficial impact to the Lahontan cutthroat trout is improving Truckee River water quality by building stormwater detention basins, which would treat stormwater runoff from the freeway before it enters the river.</p> <p>As noted, the similarity between the Spaghetti Bowl Project and the others is that they would have short-term construction impacts that could affect the Lahontan cutthroat trout, followed by long-term beneficial impacts.</p> <p>The in-water work proposed with the Spaghetti Bowl Project and the other projects would reduce Truckee River habitat accessible to the Lahontan cutthroat trout during construction. Given the small size of the dewatered areas relative to the amount of habitat available in the Truckee River, the cumulative impacts from a temporary loss of river habitat would be minimal.</p> <p>Sediment that may be stirred up or added to the river during in-water work for the Spaghetti Bowl Project and all other in-river projects would temporarily reduce visibility and possibly increase water temperature, both of which could adversely affect the Lahontan cutthroat trout. NDOT’s contractor’s erosion control measures would minimize the amount of sediment entering the river and its impact on the Lahontan cutthroat trout.</p> <p>If a fish passage project(s) is completed that would allow the cui-ui to enter the study area before the in-water work associated with the Spaghetti Bowl reconstruction, it could expose the cui-ui to some of the same short-term impacts as the Lahontan cutthroat trout. Because NDOT would not conduct any in-water work in April and May when the cui-ui could enter the study area to spawn before returning to Pyramid Lake, the cui-ui would not be exposed to potential impacts associated with dewatered areas.</p> <p>The Spaghetti Bowl Project would install detention basins to treat stormwater runoff from the freeway before it enters the river, which would improve water quality in the river. This would be positive impact to the Lahontan cutthroat trout, which would contribute to the cumulative long-term benefits of the other projects discussed above.</p> <p>The fish passage improvement projects would allow native Lahontan cutthroat trout to enter the study area through migration from upstream or downstream native populations. There would be similar benefits for the cui-ui, which currently only occur in the Truckee River between Pyramid Lake and the Derby Dam. There are no fish passage facilities at Derby Dam that would allow spawning migrations of cui-ui to pass west from that point into the study area. The ability of the Lahontan cutthroat trout and cui-ui to expand their range has the potential to reverse the habitat fragmentation both species have experienced.</p> <p>Improvements to the habitat adjacent to the Truckee River from the Truckee River Flood Management Project may have water quality benefits for the river that could positively affect the Lahontan cutthroat trout.</p> <p>In summary, this project would contribute to cumulative short-term impacts, the most serious of which could be mortality of Lahontan cutthroat trout during dewatering and fish salvage activities. To minimize this impact, NDOT would implement mitigation measures to protect the Lahontan cutthroat trout that do have to be handled. In September 2018, the USFWS issued a Biological Opinion identifying the impact on the Lahontan cutthroat trout (see Appendix D.10).</p> <p>Overall, the positive cumulative impacts of the projects discussed in this subsection outweigh the short-term adverse impacts.</p>





Figure 3.12-1. Truckee River Diversion



The top photo shows a temporary work area and stream diversion of the Truckee River from a previous project, coincidentally next to the I-580 bridge over the Truckee River. The bottom image is a simulation showing how construction could occur in a temporarily dewatered zone.

*Measures to Minimize and Mitigate Adverse Lahontan Cutthroat Trout Impacts*

Table 3.12-10 lists the mitigation measures to address this project’s potential short-term impacts to the Lahontan cutthroat trout during the removal of the I-580 bridge pier in the Truckee River. NDOT is not proposing other mitigation measures for potential cumulative impacts because the long-term impacts of this project and others described in Other Future Actions above are expected to have a positive impact on the Lahontan cutthroat trout and the cui-ui.

Table 3.12-10. Lahontan Cutthroat Trout Cumulative Effects Mitigation Measures

	Mitigation All Alternatives
Construction Impacts Lahontan Cutthroat Trout	<p>NDOT will implement the measures the U.S. Fish and Wildlife Service identified in its September 2018 Biological Opinion for the Lahontan cutthroat trout:</p> <p>The in-river work area is estimated to be 0.65 acre.</p> <ul style="list-style-type: none"> <li>To minimize impacts on the Lahontan cutthroat trout, NDOT’s contractor will develop a fish salvage plan that follows the National Marine Fisheries Service fish salvage protocols. Lahontan cutthroat trout and other fish that do not migrate out of the temporary river diversion will be moved manually through coordinated efforts with NDOT’s contractor and NDOT biologists. Qualified fisheries biologists will move the Lahontan cutthroat trout to a safe place in the river. This process will comply with any additional protocols requested by U.S. Fish and Wildlife Service staff. NDOT will report the completion of the move to the Fish and Wildlife Service within 30 days after it is completed. In accordance with NDOT requirements, water isolated from the diverted Truckee River channel will slowly drain out of the work zone at 1 to 3 inches per hour to allow fish to move downstream. Work within the Truckee River is restricted to July 1 through September 30 to avoid the Lahontan cutthroat trout and cui-ui spawning seasons, as well as the spawning seasons for other fish species. To eliminate the possibility of invasive species introduced to the Truckee River, NDOT will require construction equipment to be inspected for invasive species and prohibit the equipment from entering another water body for a minimum of 5 days. All equipment used in or near the water will be pressure washed prior to use. The contractor will be made aware of New Zealand mudsnail and NDOT will provide them a protocol to reduce risk of spreading.</li> <li>Fueling areas will be at least 100 feet from the river. Implementing best management practices, such as silt fences or erosion-control products, will minimize impacts due to sedimentation, hazardous material spills, or short-term habitat loss during construction.</li> <li>Best management practices will be implemented to prevent debris or contamination from the bridge deck work.</li> <li>Water quality samples will be collected daily during the construction period upstream and downstream of the work area. Work will be suspended if the downriver sample exceeds 10 nephelometric turbidity units above the upriver sample.</li> <li>All other measures discussed in the Biological Opinion will be implemented (see Appendix D.10).</li> </ul>



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