City of Wenatchee Confluence Parkway SR285 Bypass Project

Noise Discipline Report

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Executive Summary

The Confluence Parkway Project is a proposed 2.5-mile bypass corridor that is intended to reduce congestion on SR 285/North Wenatchee Avenue. Confluence Parkway would be a new two-lane arterial street that would begin at the existing U.S. 2/ Euclid Avenue interchange, cross the Wenatchee River on a new bridge, and extend south to the intersection of North Miller Street and North Wenatchee Avenue. The corridor would have one vehicle travel lane and bicycle lane in each direction. The proposed Project would include a new bypass corridor to SR 285 (North Wenatchee Avenue) and, therefore, to receive support of federal funds, a detailed noise impact and abatement analysis is required. The noise analysis is based on the guidelines presented in the current Federal-Aid Policy Guide, Sub-chapter H, Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (FHWA 2010) and the Traffic Noise Policy and Procedures, Washington State Department of Transportation (WSDOT 2020).

As part of the noise study an on-site visit was performed to review land use and locate corridor properties and topographical conditions that would affect the propagation of noise. In general, the Project corridor is a mixed-use land area of commercial properties, residences, hotels, parks, a railway alignment, natural areas, recreation facilities, and schools. Areas included in this analysis include all areas that could have noise impacts related to the construction and operation of the Confluence Parkway based on the project construction limits.

Specific areas of concern include the Horan Natural Area, an undeveloped, riverfront passive park with hiking trails, including the Apple Capital Recreation Loop Trail, and wildlife and scenic viewing areas. The Wenatchee Confluence State Park is also near the corridor and includes day-use recreational facilities, overnight camping areas, and parking facilities. More detail on land use is provided in Section 5.

In addition to site inspection, noise monitoring was performed at 22 different locations along the corridor. Because much of the corridor currently has no nearby roadways, and therefore no or very little traffic noise, noise monitoring was crucial for defining the existing noise levels in the Horan Natural Area and the Wenatchee Confluence State Park. To aid in this, several noise monitoring terminals were used, capturing data for up to several hours with some sites monitored overnight. Overall, noise levels ranged from 42.6 to 66.1 dBA Leq. Noise levels were highest along N Wenatchee Avenue and N Miller Street. Noise levels in the Horan Natural Area, Wenatchee Confluence State Park, and the nearby Apple Capital Recreation Loop Trail were much lower, ranging from 43.6 to 58.5 dBA Leq, with the lowest noise levels near and in the Horan Natural Area sensitive bird and animal habitat areas. Noise levels were also rather low, ranging from 44 to 50 dBA Leq in most other locations in this study, except for those sites near N Wenatchee Avenue and N Miller Street. Complete information on the measured noise levels are provided in Section 5.5.

Using traffic volumes from project traffic engineers, and the Traffic Noise Model (TNM) from the Federal Highway Administration, noise levels were modeled at 126 independent locations to determine the potential overall noise effects of the project and identify project

impacts. Modeled noise levels for the existing conditions ranged from 42 to 64 dBA Leq during the PM peak hour. Under the No-Build alternative, noise levels remain essentially the same at the existing, with variations of only -1 to +2 dB when compared to the existing conditions.

Modeled noise levels under the Build alternative range from 46 to 70 dBA Leq, with variation of -1 dB to +23 dB over the existing noise levels. There are nine modeling locations representing up to four residences and six locations on the Apple Capital Recreation Loop Trail with noise impacts under the Build alternative. The impacts are as follows:

- Three residences at the Monterey Senior Community,
- Six receivers along the Apple Capital Recreation Loop Trail,
- One receiver along Confluence Parkway near a potential site for the relocated Confluence State Park staff housing.

At other modeling locations in the Horan Natural Area noise levels are predicted to increase up to 6 dB, and noise levels in the Wenatchee Confluence State Park day use and campgrounds increase up to 9 dB, but these increases do not qualify as noise impacts per WSDOT/FHWA criteria. Also, noise levels at the overnight campgrounds at the Confluence State Park are not predicted to exceed 53 dBA Leq. None of the residences north of North Miller Street, hotels, or schools along the Project corridor are anticipated to experience noise increases meeting WSDOT/FHWA impact criteria.

Traffic noise abatement was considered for all noise impacts identified. Noise impacts were identified at two receivers, corresponding to three residences, at the Monterey Senior Community. Several different noise walls were considered and evaluated for this area, and no abatement was effective at meeting the WSDOT reasonability and insertion loss requirements due to community driveways and access to a commercial use in front of the Monterey Senior Community.

Several traffic noise abatement measures were considered for the noise impacts in the Horan Natural Area and along the Apple Capital Recreation Loop Trail. First, the design team provided detailed drawings for three earth berms that could be constructed with the proposed project. The proposed berms would be located along the east side of Confluence Parkway, with heights above the roadway of approximately 4 feet. In addition to the berm, the initial modeling for noise abatement also included a 4-foot-tall noise wall along a short part of Confluence Parkway where the right-of-way was not sufficiently wide enough for an earth berm (pinch point). Modeling of the berm and 4-foot wall reduced the overall noise levels in the Horan Natural Areas and along the Apple Capital Recreation Loop Trail by up to 5 dB.

To increase the noise reduction, noise walls were added along the top of the 4-foot berm. Two options were examined, a 2-foot topper wall, resulting in an effective wall height of 6 feet, and a 4-foot topper wall, for an 8-foot effective height. Note that the standalone noise wall height in the pinch point was also raised to 6 feet and 8 feet, respectively. With the 6-

foot effective height, the noise reductions increased to 5 to 7 dB along the Apple Capital Recreation Loop Trail. An 8-foot effective height berm-wall increased the reductions to as high as 11 dB and eliminated most impacts along the Apple Capital Recreation Loop Trail, except for a short part of the trail near the pinch point where levels are 12 to 13 dB over the existing conditions.

Cost calculations for the topper walls were performed using WSDOT methods. Considering only the topper walls, the noise abatement measures would meet WSDOT criteria. However, if the berm cost is included, they will not meet the standard criteria for reasonable noise abatement. Because, at this time, no reasonable and feasible noise abatement is available, no formal recommendation is being made. However, the noise abatement package selected for this project will likely need to include some combination of berms, walls, and plantings. Additional noise modeling will be performed once comments from Project Stakeholders, the City of Wenatchee, and WSDOT have been received and considered. Completed details on the abatement evaluated is provided in Section 11.3.

Project construction is also discussed, and the local noise control ordinance related to construction is summarized. Noise from construction would be like other highway construction projects. Maximum noise levels for construction activities can be expected to range from 70 to 95 dBA as measured at sites 50 feet from the construction activities. More details, including information on pile driving, is provided in Section 12.

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1. INTRODUCTION AND PROJECT DESCRIPTION

The Confluence Parkway Project is a proposed 2.5-mile bypass corridor that is intended to reduce congestion on SR 285/North Wenatchee Avenue. The Project is a part of a larger effort known as the Apple Capital Loop Project, which is a network of projects that, together, will complete an integrated highway, transit, and non-motorized trail loop that functions as the backbone of the Wenatchee Valley's transportation system. The Confluence Parkway Project will provide relief from the current North Wenatchee Avenue Bridge bottleneck and alleviate congestion in this area.

1.1. Location

The Project is located in the City of Wenatchee (City) in Chelan County (Figure 1). Wenatchee is located in a valley in central Washington at the confluence of the Columbia and Wenatchee rivers. Currently, Wenatchee is the second largest city in central Washington and is an urban hub for north-central Washington. The Project area is shown in Figure 1.

The Project connects the central downtown area with the U.S. 2/Euclid Avenue interchange on the north end of Wenatchee. The Project area is primarily to the east of the Burlington Northern Santa Fe (BNSF) railroad tracks with a large portion adjacent to the Wenatchee Confluence State Park and the Horan Natural Area. The sections that follow provide a description of key Project elements and construction methods.

Almost the entire Project area is composed of developed areas including existing roadways and commercial and industrial development. The only undeveloped features within the Project area include the crossing of the Wenatchee River, the associated riparian shoreline where the river crossing is proposed, and the Horan Natural Area located on the south side of the Wenatchee River. Vegetated areas within Walla Walla Point Park located on the south side of the river and Wenatchee Confluence State Park located on the north side of the river are limited to mowed grass areas and landscape trees and shrubs.

1.2. Project Elements

The following sections provide a summary of the project elements. More details on land uses is provided in Section 5 and informational brochures for the Horan Natural Area and the Wenatchee Confluence State Park are provided in Appendix E.

1.2.1. Roadway Alignment

Confluence Parkway would be a new two-lane arterial street that would begin at the existing U.S. 2/ Euclid Avenue interchange, cross the Wenatchee River on a new bridge, and extend south to the intersection of North Miller Street and North Wenatchee Avenue. The corridor would have one vehicle travel lane and bicycle lane in each direction. Two-way left turn lanes would be included between Wenatchee Confluence State Park and the U.S. 2/Euclid Avenue interchange as well as south of the junction of Hawley Street and North Miller Street. All Project elements would meet current design standards, including compliance with

the Americans with Disabilities Act of 1990, where applicable. New traffic signals, illumination upgrades, and safety measures for at-grade railroad crossings would be part of the Confluence Parkway.

Traffic signals would be installed at and other modifications made to the existing U.S. 2/Euclid Avenue interchange to accommodate the additional traffic associated with the Confluence Parkway. The new roadway would continue southwest along the existing Euclid Road alignment, construct a new at-grade railroad crossing, and follow along the existing Isenhart Avenue alignment. The existing at-grade crossing at Penny Road would remain and the intersection of Confluence Parkway with Euclid Avenue would be upgraded from a three-leg to four-leg intersection to accommodate the through movement on the Confluence Parkway. From there, the new roadway would continue south along the current alignment of Isenhart Avenue to Olds Station Road. Olds Station Road would be terminated on the west side of the railroad by constructing a cul-de-sac and the at-grade railroad crossing would be removed.

South of Isenhart Avenue, the new road would turn slightly west and continue through the west side of the existing McDougall & Sons warehouses. The existing Wenatchee Confluence State Park entrance would remain in its current location. Modifications would be required to the southwestern portion of the park for the roadway. The existing Wenatchee Confluence State Park staff housing will be removed and replaced with a new housing facility within the park.

Confluence Parkway would cross the Wenatchee River on a new bridge approximately midway between the existing BNSF rail bridge and the Apple Capital Recreation Loop Trail pedestrian/bicycle bridge. The bridge would be a combined two-level vehicle and pedestrian bridge. The top portion would consist of a vehicle travel lane and bike lane in each direction, and the bottom would consist of a shared use bicycle and pedestrian path that replaces the existing narrow and aging pedestrian bridge. The new bridge would include three piers in the water, which would likely be in the same alignment as those on the existing railroad bridge. The existing pedestrian bridge would be removed after the new bridge is open.

From the river crossing south to Hawley Street, Confluence Parkway would create a new roadway along the east side of the BNSF railroad tracks, which are east of and parallel to the existing alignment of North Wenatchee Avenue, requiring a portion of the western edge of the Horan Natural Area. It would join the existing alignment of Hawley Street just south of where Hawley Street currently crosses the BNSF mainline at-grade. The at-grade crossing would be closed, with Hawley Street becoming a cul-de-sac west of the railroad tracks.

Confluence Parkway would follow the existing alignment of North Miller Street. The existing North Miller Street at-grade railroad crossing would be replaced with a new railroad underpass. New signals would be installed at the Walla Walla Avenue and Maple Street intersections. The existing North Wenatchee Avenue and Miller Street intersection would be reconfigured to accommodate the new traffic volumes associated with Confluence Parkway and, about 450 feet to the south, a new street would connect Miller Street and North Wenatchee Avenue with traffic signals at each intersection. These improvements in the

vicinity of the existing Miller Street/North Wenatchee Avenue intersection represent the southern end of Confluence Parkway.

1.3. Pedestrian and Bicycle Facilities

Confluence Parkway would include bicycle lanes in each direction along its entirety. Bike lane buffers would be provided in the more developed areas of the Project to the south of the existing Hawley Street railroad crossing.

Between the north end of the Project and the Wenatchee Confluence State Park entrance, there would generally be a planted buffer and sidewalk on both sides of the roadway. The Project does not propose sidewalks between the Wenatchee Confluence State Park entrance on the north and Hawley Street on the south because pedestrians will use the parallel Apple Capital Recreation Loop Trail along this stretch of roadway and there are no business or residential properties to generate a need for pedestrian access at the street. The sidewalk and planted buffer would continue between approximately Hawley Street and the southern extent of the Project at North Miller Street and North Wenatchee Avenue.

Connections would be provided between the roadway pedestrian and bicycle facilities and the Apple Capital Recreation Loop Trail at both Walla Walla Park and Wenatchee Confluence State Park. North of the Wenatchee River, pedestrians would connect from the sidewalk to the existing Apple Capital Recreation Loop Trail and would use the new combined vehicle and pedestrian bridge to cross the river.

On the north side of the Wenatchee River, the Apple Capital Recreation Loop Trail would largely remain in its current configuration. The trail would be rerouted slightly to align with the new combined vehicle and pedestrian bridge. A new connection from the street level to the trail will also be provided at the Wenatchee Confluence State Park entrance.

The trail would cross the Wenatchee River on a new combined vehicle and pedestrian bridge, with a travel lane for vehicles on the top deck and a bicycle and pedestrian lane below. On the south side of the Wenatchee River, the trail would converge with the roadway, running parallel on its east side with a vegetated berm separating the trail from vehicle traffic. Retaining walls would also be installed in this area where necessary to minimize impacts to the Horan Natural Area. At the north end of the Public Utility District (PUD) No. 1 of Chelan County's maintenance yard, located between Hawley Street and Wenatchee Confluence State Park, the trail would diverge from the road alignment, continuing to the south between the PUD property and the Horan Natural Area. It would converge back with the existing trail near the intersection of Hawley Street and Miller Street and Walla Walla Point Park.

The existing pedestrian bridge would remain open to the extent possible. Portions of the trail may need to be temporarily re-routed during construction. The City of Wenatchee will provide notice to the bicycle commuters and recreational trail users in advance of trail closures or re-routing. Demolition of the pedestrian bridge will be scheduled to occur after the new bridge is operational, if feasible.

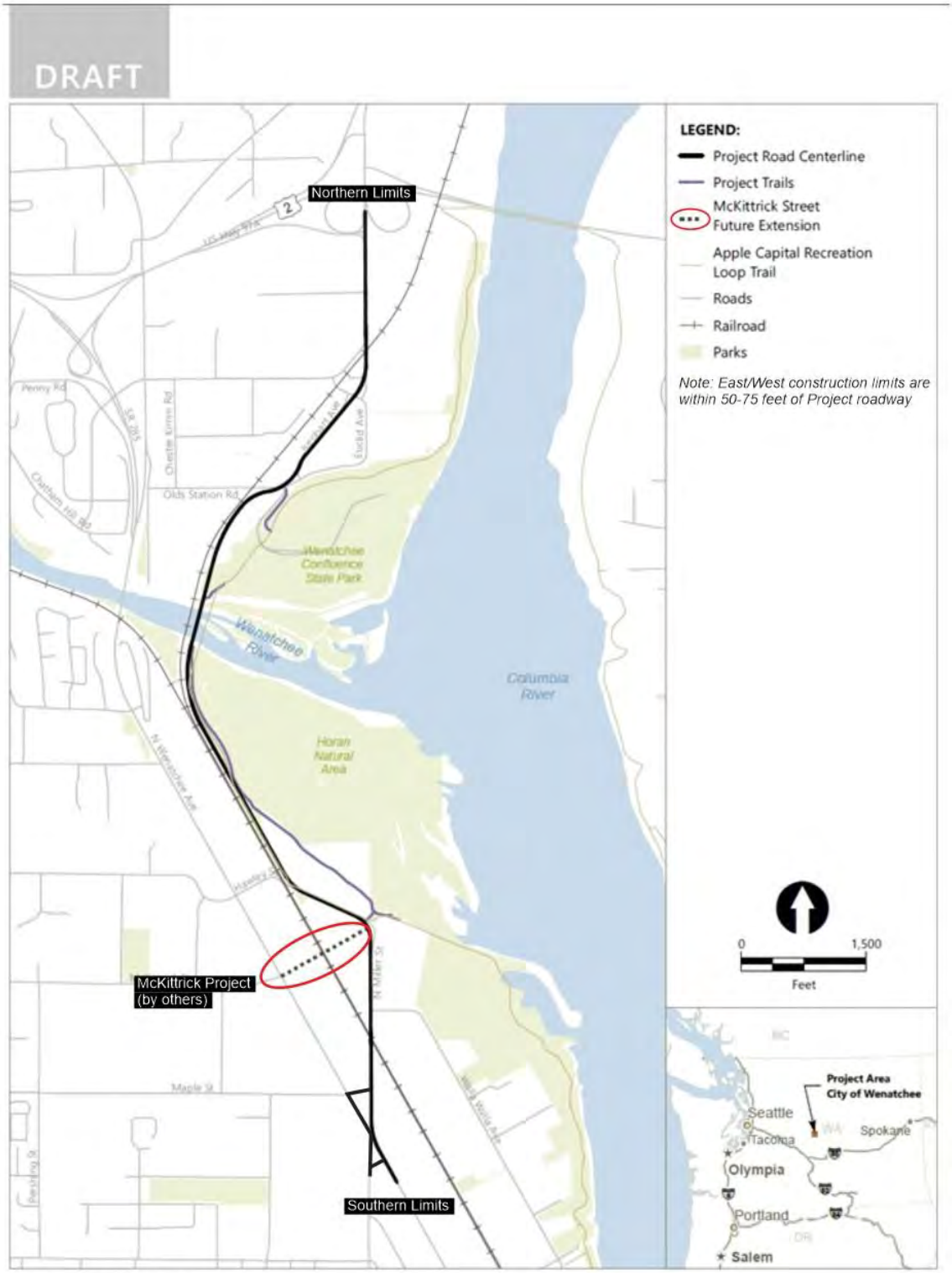

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Figure 1
Project Vicinity
Confluence Parkway, City of Wenatchee

2. ANALYSIS REQUIREMENT

A Traffic Noise Analysis is required whenever a Type I project is federally funded or requires FHWA approval. A Type I project is a project that includes construction of a new highway or roadway, an increase in the number of traffic lanes, a substantial realignment (horizontal or vertical) of an existing highway, or significant changes to the existing topography around roadways. The proposed Project would include a new bypass corridor to SR 285 (North Wenatchee Avenue) and, therefore, meets the requirements for a detailed noise impact and abatement analysis.

3. INTRODUCTION TO ACOUSTICS

Noise is generally defined as unwanted sound. Noise is measured in terms of sound pressure level. It is expressed in decibels (dB), which are defined as 10 log P^2/P^2ref, where P is the root-mean-square (RMS) sound pressure and P_{ref} is the reference RMS sound pressure of 2 x 10^5 Newtons per square meter.

The number of fluctuation cycles or pressure waves per second of a particular sound is the frequency of the sound. The human ear is less sensitive to higher and lower frequencies than to mid-range frequencies. Therefore, sound level meters used to measure environmental noise generally incorporate a weighing system that filters out higher and lower frequencies in a manner similar to the human ear. This system produces noise measurements that approximate the normal human perception of noise. Measurements made with this weighing system are termed "A-weighted" and are specified as "dBA" readings.

Several noise descriptors are used that take into account the variability of noise over time. The minimum noise level during a measurement period is denoted L_{min}. The maximum noise levels (L_{max}) that occur during an event, such as the passing of a heavy truck or the flyover of an airplane, can be useful indicators of interference with speech or sleep.

The equivalent sound level (L_{eq}) is the level of a constant sound for a specified period of time that has the same sound energy as an actual fluctuating noise over the same period of time. It is an energy average sound level.

In summary, the noise level descriptors are defined as follows:

Symbol	Description
L_{eq}	The average noise level (energy basis)
L_{min}	The minimum noise level
L_{max}	The maximum noise level

Noise levels decrease with distance from a noise source. For each doubling of the distance from a point source (such as an engine), noise levels decrease by 6 dBA because of the geometric divergence of the sound waves. Excess noise reduction (attenuation) can be

provided by vegetation, terrain, and atmospheric effects that block or absorb noise. The L_{eq} noise level from a line source (such as a road) will decrease by 3 dBA for each doubling of distance (3 dB / DD) because of geometric divergence alone. However, the L_{max} from individual vehicles on the road will decrease by 6 dBA / DD. Therefore, the maximum noise levels (L_{max}) decrease more rapidly with distance from the road than do the average noise levels (L_{eq}).

It is important to understand how humans perceive noise and changes in noise levels. Subjectively, a 10 dBA change in noise level is judged by most people to be approximately a twofold change in loudness (e.g., an increase from 50 dBA to 60 dBA causes the loudness to double). A 3 dBA increase is a barely perceptible increase. Therefore, if traffic noise levels increase by 1 to 2 dB, the majority of people may not even notice the change in noise levels.

It is also important to understand the compatibility with land use based on area noise levels. For example, noise levels at night in a quiet rural area are typically between 32 and 35 dBA. Quiet urban nighttime noise levels range from 40 to 50 dBA. Daytime noise levels in a noisy urban area are frequently as high as 70 to 80 dBA.

In summary, areas with PM peak hour traffic noise levels below 50 dBA Leq are typically found in quiet bedroom communities (rural and suburban) that are far from interstate or state highways, major arterial roadways, and urban areas. PM peak hour traffic noise levels from 50 dBA to 60 dBA Leq are typically found in quiet bedroom communities with arterial roadways nearby and primarily passenger traffic accessing the area (little or no truck traffic). Communities with traffic noise levels of 60 dBA to 67 dBA Leq are typically closer to urban areas and / or major arterial roadways where some truck traffic is present.

A more detailed section about acoustics is provided in Appendix B.

4. METHODOLOGY

This section provides a summary of the methods used for the Traffic Noise Analysis. In general, the methods follow the WSDOT policy and procedures for a traffic noise study as published in the 2020 WSDOT Policy. Reference policies, manuals and guides used for this report are provided in Appendix A.

4.1. Regulatory Setting and Impact Criteria

The FHWA traffic noise impact criteria, against which the Project traffic noise levels are evaluated, are taken from Title 23 of the Code of Federal Regulations (CFR) Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. The FHWA criterion applicable for residences is an exterior hourly equivalent sound level (Leq) that approaches or exceeds 67 dBA. The exterior criterion for places of worship, schools, recreational uses, and similar areas is also 67 dBA Leq. The criterion applicable for hotels, motels, offices, restaurants / bars, and other developed lands is an exterior Leq that approaches or exceeds 72 dBA. There are no FHWA traffic noise impact criteria for retail facilities, industrial, warehousing, undeveloped lands that are not permitted for development,

or construction noise. No traffic noise analysis is required for those uses for which no criteria exist.

WSDOT considers a predicted sound level of 1 dBA below the NAC as sufficient to satisfy the condition of "approach," or approaching the NAC, required by FHWA for all land use categories. For example, where the NAC is 67 dBA for outdoor use at a residence, a noise level of 66 dBA is considered an impact. Receivers are also considered impacted when the worst hourly traffic noise is predicted to increase 10 dBA ("substantial increase") or more between the Existing and Build conditions. Impacts at places of worship, schools, and recreational areas (Category C properties) also occur at 66 dBA or higher in Washington. Hotel / motel, office building, and restaurant / bar impacts (Category E properties) occur at 71 dBA or higher. Table 1 summarizes the FHWA and the WSDOT traffic noise abatement criteria.

Table 1. Noise Abatement Criteria (NAC) by Land Use Category				
Activity Category	Activity Criteria in hourly Leq (dBA)		Evaluation Location	Activity Description
	FHWA NAC	WSDOT NAC		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B[1]	67	66	Exterior	Residential (single and multi-family units)
C[1]	67	66	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E[1]	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	--	Undeveloped lands that are not permitted

Notes:
1. Includes undeveloped lands permitted for this activity category

The primary FHWA category applicable to this analysis are FHWA Categories B, C, and E, which includes residential land uses (B), schools and parks (C), and hotels (E). Under FHWA policy, the noise impact criteria is applicable to frequently used exterior areas, for example, a back-yard deck or patio at a residence or along a path or viewing area at a park.

4.2. Local Noise Ordinance

The City of Wenatchee has a noise control ordinance published under *Public Disturbance Noise,* Chapter 6A.40 of the Wenatchee Municipal Code. The code does not contain any specific ordinances applicable to the operations of the proposed project. The ordinance is applicable to project construction. Under the code, construction is restricted between the hours of 10:00 p.m. and 6:00 a.m. Monday through Saturday, and between the hours of 6:00 p.m. and 8:30 a.m. on Sunday. Construction work during these hours would require a noise variance from the City of Wenatchee.

4.3. Analysis and Modeling Procedures

The methodology used for a Type I traffic noise analysis is defined in the 2020 WSDOT Policy. A summary of the policy follows.

Projected traffic noise level conditions were calculated using the FHWA Traffic Noise Model (TNM). Noise emission levels used in the model were nationwide averages for automobiles, medium trucks, and heavy trucks provided by the FHWA and built into the TNM. Model input included traffic volumes, and vehicle type and speed information. The area was evaluated for noise-reducing effects of first row[1] residences, existing outbuildings, roadway depressions, and topography. Actual roadway width and average pavement type were used for existing and future conditions. The effects of signalized intersections and round-a-bouts were also included where appropriate.

The new Confluence Parkway Bridge would be equipped with a traffic safety barrier. For this noise analysis it was assumed that a solid barrier at least 32 inches above the roadway surface would be included along the entire bridge structure. This barrier was included in the noise model as they can be effective at reducing tire-roadway noise.

Traffic volumes and vehicle class percentages used for the modeled roadways were provided by KPG traffic engineers. The traffic data used for the analysis is provided in Appendix D. The PM peak traffic hour on weekdays has the highest total traffic volumes and, therefore, was used throughout the analysis to ensure the worst-case noise levels were predicted. Vehicle speeds used are the current or proposed posted speeds. For Confluence Parkway, the modeling speed limit used was 30 mph, increasing to 45 in the northern end near Highway 2. On N Wenatchee Avenue, the speed limit is 30 mph. Speed limits on other local roadways were also modeled at posted speeds of 25 to 30 mph. Roundabouts were modeled using the methodology from the *Supplemental Guidance for Modeling Signalized Interchanges, Intersections and Roundabouts*, taken from the Supplemental Guidance on the Application of FHWA's Traffic Noise Model (TNM), NCHRP Report, 791.

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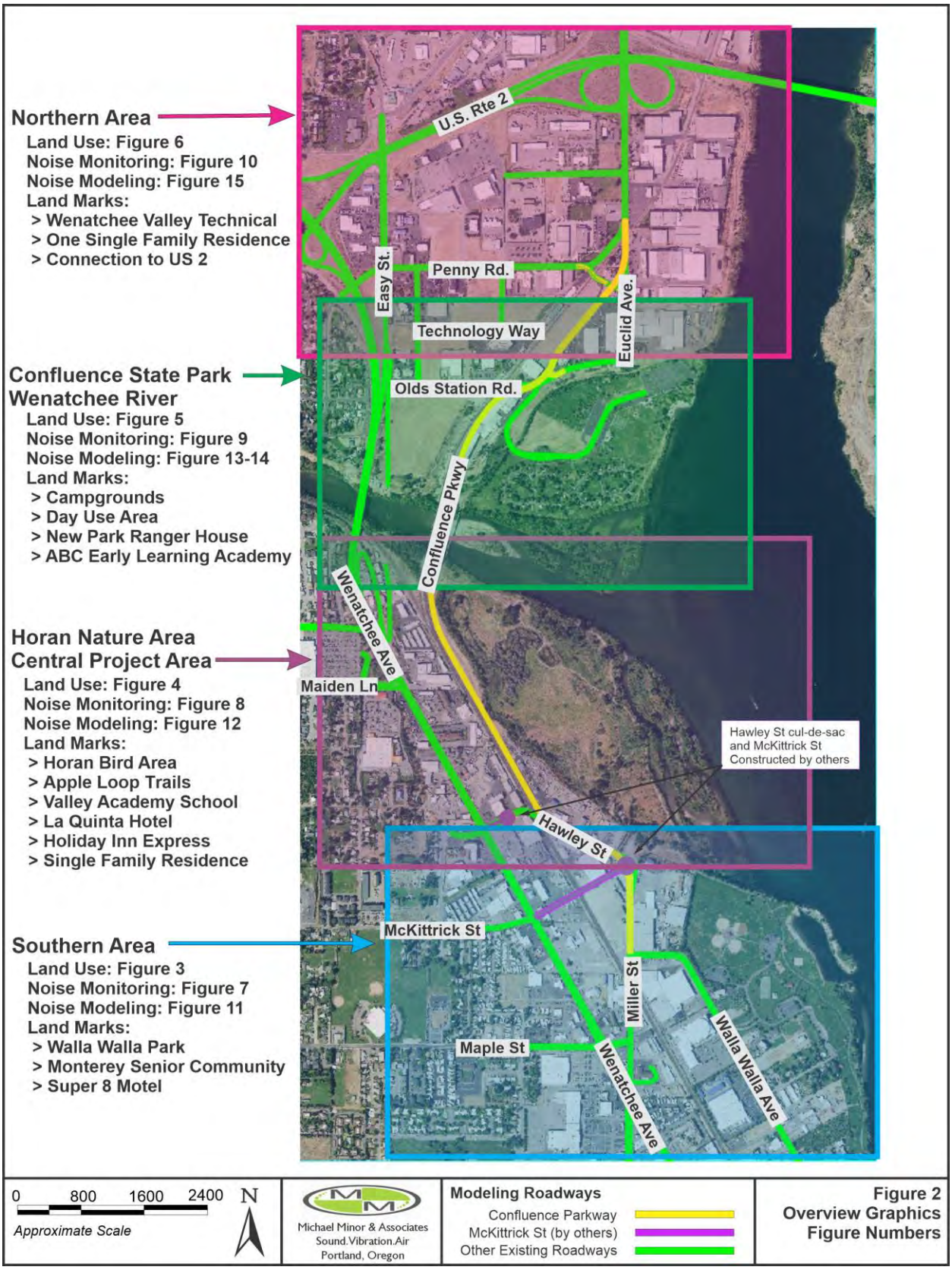
1 For the purpose of this report, "first row" refers to noise sensitive receivers located directly adjacent to the Project roadway.

4.4. Noise Study Area

The study area for traffic noise studies must be large enough to account for and include all potential noise sensitive properties within the project construction limits that could experience traffic noise impacts with the proposed project. For this Project, the study area includes all noise sensitive properties between the southern terminus near the intersection of N Miller Street and N Wenatchee Avenue at the south end of the corridor to Gunn Road and Euclid Avenue at the north end of the Project corridor. In addition to the south-north limits, the noise sensitive uses near the Horan Natural Area, relocated non-motorized Apple Capital Recreation Loop Trail, Confluence State Park and the Walla Walla Park are also included in the study area.

5. AFFECTED ENVIRONMENT

Due to the length of the corridor, and varying land use, several graphics were prepared to aid in the understanding of the project and the noise analysis. Figure 2 is an overview of the project corridor, showing the project elements, landmarks and notable sensitive land uses, and references to other graphics with land use, noise monitoring site and modeling locations.


Northern Area
Land Use: Figure 6
Noise Monitoring: Figure 10
Noise Modeling: Figure 15
Land Marks:
> Wenatchee Valley Technical
> One Single Family Residence
> Connection to US 2
Confluence State Park
Wenatchee River
Land Use: Figure 5
Noise Monitoring: Figure 9
Noise Modeling: Figure 13-14
Land Marks:
> Campgrounds
> Day Use Area
> New Park Ranger House
> ABC Early Learning Academy
Horan Nature Area
Central Project Area
Land Use: Figure 4
Noise Monitoring: Figure 8
Noise Modeling: Figure 12
Land Marks:
> Horan Bird Area
> Apple Loop Trails
> Valley Academy School
> La Quinta Hotel
> Holiday Inn Express
> Single Family Residence
Southern Area
Land Use: Figure 3
Noise Monitoring: Figure 7
Noise Modeling: Figure 11
Land Marks:
> Walla Walla Park
> Monterey Senior Community
> Super 8 Motel
U.S. Rte 2
Easy St.
Penny Rd.
Technology Way
Euclid Ave.
Olds Station Rd.
Confluence Pkwy
Wenatchee Ave
Maiden Ln
Hawley St cul-de-sac
and McKittrick St
Constructed by others
Hawley St
McKittrick St
Miller St
Maple St
Wenatchee Ave
Walla Walla Ave
0 800 1600 2400
Approximate Scale
N
Michael Minor & Associates
Sound.Vibration.Air
Portland, Oregon
Modeling Roadways
Confluence Parkway
McKittrick St (by others)
Other Existing Roadways
Figure 2
Overview Graphics
Figure Numbers

5.1. Existing Land Uses

In general, the Project corridor is a mixed-use land area of industrial and commercial properties, residences, hotels, parks, a railway alignment, natural areas, recreation facilities, and schools. Areas included in this analysis include all areas that could have noise impacts related to the construction and operation of the Confluence Parkway based on the project construction limits. Most commercial and all industrial land uses in the corridor are FHWA Category F and G, and therefore do not have an impact criterion and were not included in the study (see Table 1). Land uses in the study area are summarized below by land use type corridor segment and shown on Figures 3 through 6.

5.1.1. Residences, Hotels, and Schools

Residential, hotel, and school-uses (FHWA Category B, C and E) are located in mixed-use areas of the city of Wenatchee along with high density commercial properties, parks, a power sub-station, and the BNSF railway alignment.

South of the Wenatchee River, the Monterey Senior Community, Red Lion Hotel, and Super 8 Motel, on the corner of N Miller Street and N Wenatchee Avenue, are the only residential and hotel uses located at the south end of the Project corridor. There is one residential use located east of Hawley Street and north of Walla Walla Park along the southern border of the Horan Natural Area. A La Quinta Inn, Holiday Inn Express, and the Valley Academy of Learning are all located near the intersection of Maiden Lane and N Wenatchee Avenue. The Holiday Inn Express and Valley Academy of Learning would receive no shielding from the proposed Project area which will run east of the BNSF railway alignment.

North of the Wenatchee River, there is the Wenatchee Confluence Park staff housing for day and overnight use located within the Wenatchee Confluence State Park. However, the current compound would be demolished under the proposed project and the proposed relocated park staff housing would be built at a nearby location (Figure 5). There are only two schools north of the river along the Project corridor, ABC Learning Center on Old Station Road and Wenatchee Valley Technical Skills Center on E Penny Road. At the north end of the Project corridor there is a single residence located on Euclid Avenue.

5.1.2. Parks, Recreations, and Natural Areas.

Parks, recreation facilities, and natural area-uses (FHWA Category C) are also located within mixed used areas of the city near some high-density commercial properties, residences, a power sub-station, the Wenatchee Confluence State Park staff housing, and the BNSF railway alignment.

Walla Walla Point Park, along with portions of the Apple Capital Recreation Loop Trail, is closest to the southern end of the Project corridor. The park is for day-use and includes baseball facilities. Only the northern part of the park is within 500 feet of the proposed Project alignment, however the entire park was included in the study due to community concern. North of Walla Walla Point Park is the Horan Natural Area. The Horan Natural Area is an undeveloped, riverfront passive park with hiking trails, including the Apple

Capital Recreation Loop Trail, and wildlife and scenic viewing areas. It also provides habitat for a variety of nesting birds and portions of the area are closed seasonally to protect sensitive species.

The Apple Capital Recreation Loop Trail includes a pedestrian bridge that crosses over the Wenatchee River to the main portion of the Wenatchee Confluence State Park. The park includes day-use recreational facilities, overnight camping areas, and parking facilities.

5.2. Zoning and Comprehensive Land Use Plan Design

A study of the Project area indicated that each segment of the corridor is a mix of high intensity to low intensity commercial, residences, and developed and undeveloped lands. There are currently no planned or approved land use changes that would affect this noise study.

5.3. Planned and Permitted Projects

The McKittrick Street/BNSF Grade Separation is a planned project with independent utility and logical termini, located in the southern portion of the Confluence Parkway Project vicinity, at the intersection of Hawley and North Miller streets. McKittrick Street currently ends in a "T" intersection with North Wenatchee Avenue. It will be extended to the east as a grade-separated underpass of the railroad tracks. The extension will continue to a planned round-about at the intersection of Hawley and North Miller streets. The portion of the McKittrick Street Extension west of the railroad tracks is funded and scheduled for construction in 2021. The railroad undercrossing and the connection to North Miller and Hawley streets is currently unfunded. The City of Wenatchee is working to secure additional funds.

Because the McKittrick project is a separate project with independent utility and logical termini, it is not included with the proposed Project. Construction for the McKittrick project had not yet begun when noise monitoring data was collected and was therefore not included with the existing noise analysis but is included in the Project No Build and Project Build Analysis.

There are no other planned and permitted projects along the Project corridor that are not already considered in this analysis.

5.4. Displacements Due to Project Construction

The Project would require property acquisition in several areas along the alignment. All acquisitions and relocations would be compliant with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970. A total of approximately 10 acres will be acquired. Two full acquisitions are anticipated; the remainder are anticipated to require only partial acquisition.

Several residential structures north of Euclid Court would be acquired and demolished to construct the upgrades to the Penny Road/Isenhart Avenue intersection. Three of these

buildings now house commercial businesses. The McDougall & Sons warehouses would be acquired, and most structures would be demolished. The existing office space on the north side of the property would be preserved.

Approximately 1 acre of the Wenatchee Confluence State Park would be acquired between the park entrance and the new Wenatchee River bridge. The existing park staff housing would be relocated (noise modeling receivers R-49 and R-50). Although the final location has not been decided, a tentative site was included in this analysis. Approximately 4.4 acres of the Horan Natural Area would be acquired for the Confluence Parkway alignment and the relocated Apple Capital Recreation Loop Trail.

No other displacements are planned that would affect the transmission of noise, noise impacts, or noise abatement measures.

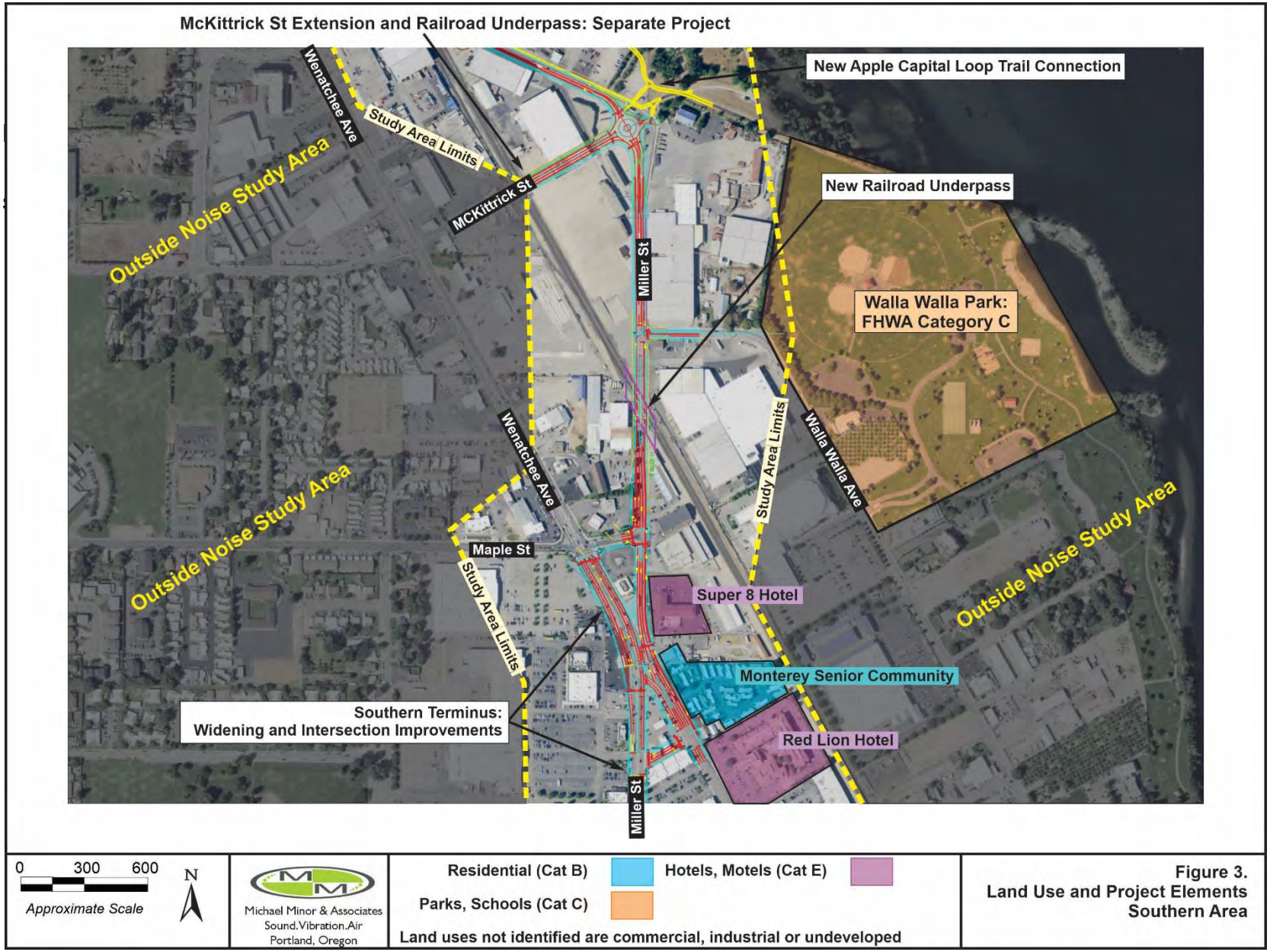
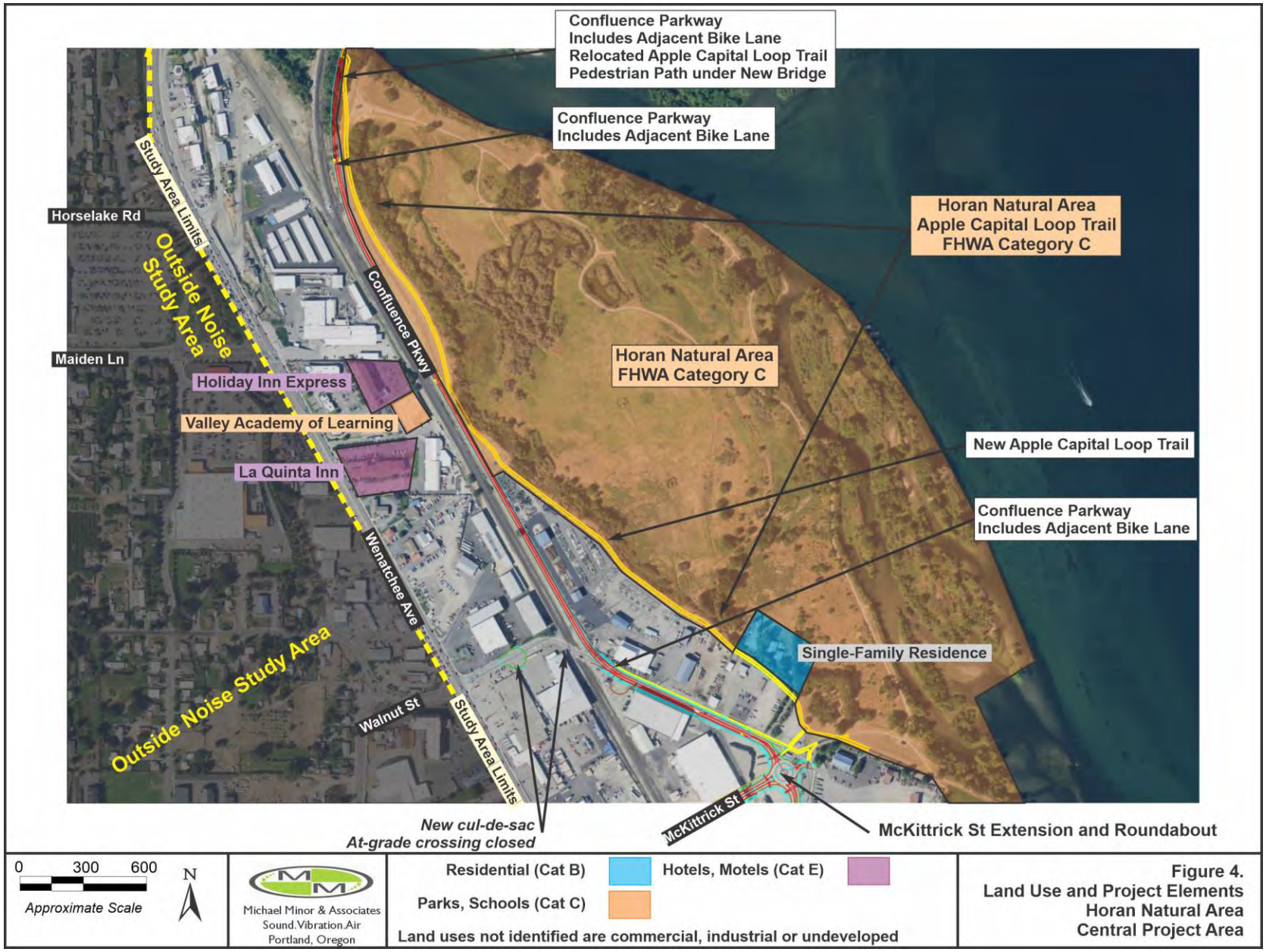


Figure 3.
Land Use and Project Elements
Southern Area


Confluence Parkway
Includes Adjacent Bike Lane
Relocated Apple Capital Loop Trail
Pedestrian Path under New Bridge
Confluence Parkway
Includes Adjacent Bike Lane
Horan Natural Area
Apple Capital Loop Trail
FHWA Category C
Horan Natural Area
FHWA Category C
New Apple Capital Loop Trail
Confluence Parkway
Includes Adjacent Bike Lane
Single-Family Residence
Horselake Rd
Maiden Ln
Study Area Limits
Outside Noise Study Area
Confluence Pkwy
Holiday Inn Express
Valley Academy of Learning
La Quinta Inn
Wenatchee Ave
Outside Noise Study Area
Walnut St
Study Area Limits
McKittrick St
New cul-de-sac
At-grade crossing closed
McKittrick St Extension and Roundabout
0 300 600
Approximate Scale
N
Michael Minor & Associates
Sound.Vibration.Air
Portland, Oregon
Residential (Cat B)
Hotels, Motels (Cat E)
Parks, Schools (Cat C)
Land uses not identified are commercial, industrial or undeveloped
Figure 4.
Land Use and Project Elements
Horan Natural Area
Central Project Area

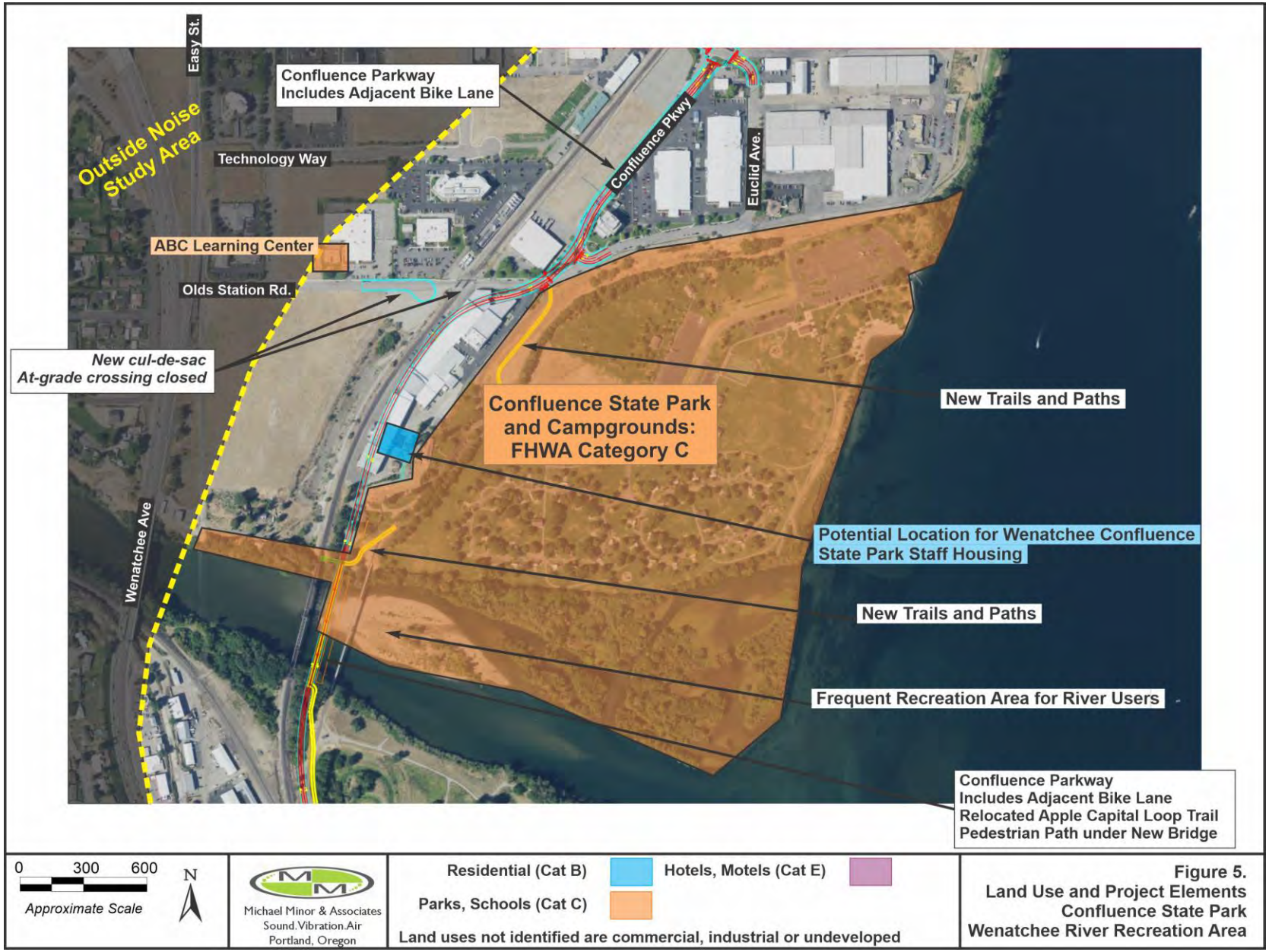


Figure 5.
Land Use and Project Elements
Confluence State Park
Wenatchee River Recreation Area

0 300 600

Approximate Scale

N

Michael Minor & Associates
Sound.Vibration.Air
Portland, Oregon

Residential (Cat B)
Hotels, Motels (Cat E)
Parks, Schools (Cat C)

Land uses not identified are commercial, industrial or undeveloped

Figure 6.
Land Use and Project Elements
Northern Area

5.5. Noise Monitoring

On-site noise monitoring was performed at 22 locations throughout the Project study area. Figures 7 through 10 provide an overview of the monitoring locations denoted M-1 through M-22 within the Project area. Figures for each noise monitoring site are included in Appendix C and provide detailed information on each monitoring site, including aerial views and photos showing the exact location of the monitoring site.

The monitoring was performed on October 23, 2019 and October 24, 2019. Noise measurements were taken in accordance with methods provided in the 2020 WSDOT Policy and in accordance with the American National Standards Institute (ANSI) procedures for community noise measurements. The equipment used for noise monitoring were Bruel & Kjaer Type 2238 Sound Level Meters. All meters were calibrated prior to and after the measurement period using a Bruel & Kjaer Type 4231 Sound Level Calibrator. Calibration varied by less than 0.1 dB during the measurement period. Complete system calibration is performed on an annual basis by Bruel & Kjaer Instruments. System calibration is traceable to the National Institute of Standards and Testing (NIST). The system meets or exceeds the requirements for an ANSI Type 1 noise measurement system.

All measurements taken included one-second Leq, Lmax and Lmin. Bruel & Kjaer Type 7820 Evaluation Software was used for data post-processing and calculations of the hour Leq noise levels presented in this report. All data transfer and analysis was performed using a computer interface, preventing any data editing or corruption.

5.5.1. Measurement Results

Noise monitoring sites were located within the public right-of-way and on private properties. Noise levels ranged from 42.6 to 66.3 dBA Leq. Traffic on local roads, and industrial activities were the primary noise source at most of the monitoring locations. Although there was one train during the measurements, there were no trains during most of the measurement sessions. Water, wind, and birds were the primary noise source for most of the monitoring locations with the Horan Natural Area. Secondary noise sources included typical neighborhood and recreation activities such as people on the Apple Capital Recreation Loop Trail, boating and river activities, and park maintenance activities.

The highest traffic noise measurement of 65.4 dBA Leq occurred at M-1 located adjacent to the Monterey Senior Community. The lowest noise measurement of 42.6 dBA Leq was recorded at M-7 which is located within the Horan Natural Area closest to the Columbia River. Overall, traffic noise levels are consistently low throughout the Horan Natural Area and Wenatchee Confluence State Park.

Table 2 provides a summary of the measured noise levels. A discussion of the measurements for specific areas follows the table.

Table 2. Confluence Parkway Noise Monitoring Results			
Site[1]	**Description or Address[1]**	**Noise Level[2]**	**Type[3]**
M-1	Residences, 1305 N Wenatchee Ave – Northwest corner of lot	65.4	Short
M-2	Hotel, 1401 N Miller St – Southwest corner	66.1	Short
M-3	Walla Walla Point Park, 1500 Walla Walla Ave – Southwest corner	55.3	Short
M-4	Walla Walla Point Park, 1500 Walla Walla Ave – Northwest corner	53.1	Short
		57.0	Short
M-5	Power Substation, 16 E Hawley St – Hawley Street connection	63.2	Short
M-6	Hotel, 1921 N Wenatchee Ave – Southwest corner	51.5	Short
M-7	Horan Natural Area – Park trail intersection	42.6	Long
M-8	Horan Natural Area – South of the Observation Point	47	Short
M-9	Apple Capital Recreation Loop Trail – Observation Point	45.2	Short
		45.4	Short
M-10	Horan Natural Area – North of park trail intersection near river	46.3	Overnight
		44.5	Long
M-11	Horan Natural Area – Park viewing area	48.4	Overnight
		47.8	Long
M-12	Apple Capital Recreation Loop Trail – South end of bridge	57	Short
		49.1	Short
M-13	Apple Capital Recreation Loop Trail – Center of bridge	58.5	Short
		54.6	Short
M-14	Apple Capital Recreation Loop Trail in Wenatchee Confluence State Park – Near park staff housing	52	Long
M-15	Wenatchee Confluence State Park – Southwest corner of western camping area	50.3	Overnight
		50.8	Long
M-16	Wenatchee Confluence State Park – Southcentral edge of western camping area	47.6	Overnight
		49.3	Long
M-17	Apple Capital Recreation Loop Trail in Wenatchee Confluence State Park – West of campground near trail parking	48.4	Overnight
		49.1	Long
M-18	Wenatchee Confluence State Park – Northeast corner of western camping area	48.9	Overnight
		49.9	Long
M-19	Wenatchee Confluence State Park – Group camping area covered picnic tables	49.3	Overnight
		50.8	Long
M-20	Wenatchee Confluence State Park – Along trail near group camping	43.6	Short
M-21	Wenatchee Confluence State Park – Along trail near group camping	44.1	Overnight
		46.9	Long
M-22	Residence, 2710 Euclid Ct – Northeast corner	58.8	Short

Notes:

1. Monitoring sites are shown on Figures 7 through 10.
2. All data is presented as an hourly Leq.
3. Short = short-term measurement of 15 to 20 minutes, depending on location; Long = Long-term measurements of one to several hours; Overnight = measurements taken overnight, ranging between 18 and 23 hours continuously.

Horan Natural Area

Due to the lack of any existing roadways in or near the Horan Natural Area or the Wenatchee Confluence State Park, measurements in those areas are used to help establish the existing noise environment and used to verify the noise model. Several of the measurements in the Horan Natural Area and at the Wenatchee Confluence State Park were performed using unattended terminals that were left in place for several hours, with some sites monitored overnight, in order to better establish the existing noise levels in these areas. The data from these long-term measurements were analyzed to produce typical hourly Leq noise levels during peak traffic hours used for this analysis. The result showed that most areas in the Horan Natural Area were consistently below 50 dBA with typical average hourly Leq's during daytime hours of 43 to 47 dBA Leq. See data for monitoring sites M-7, M-8, M-10, and M-11.

Apple Capital Recreation Loop Trail

Noise measurements were also taken along the Apple Capital Recreation Loop Trail to establish the existing noise levels. Noise from traffic along Wenatchee Avenue was at times audible at the southernmost part of trail, near Hawley Street, where measurements and traffic counts were performed (see M-5). For the northern part of the trail, traffic noise was not a major source and therefore measurement sites M-9 and M-12 were used to assist in establishing the existing noise environment. Additional monitoring was performed on, and at the north and south ends, of the existing pedestrian bridge over the Wenatchee River (see M-12 through M-14).

Wenatchee Confluence State Park

The Wenatchee Confluence State Park is also located in an area with little to no background traffic noise. The park is in a deep cut below Olds Station Road and Euclid Avenue. As a result, there is no notable traffic noise in the park besides the local area traffic accessing the park for recreation and traffic related to park maintenance. In a similar way to the Horan Natural Area, measurements in the Confluence State Park were also taken using a combination of long-term unattended and short-term attended noise measurements. Monitoring sites M-15 through M-21 were all located in the Wenatchee Confluence State Park and used along with modeling to establish the existing noise levels.

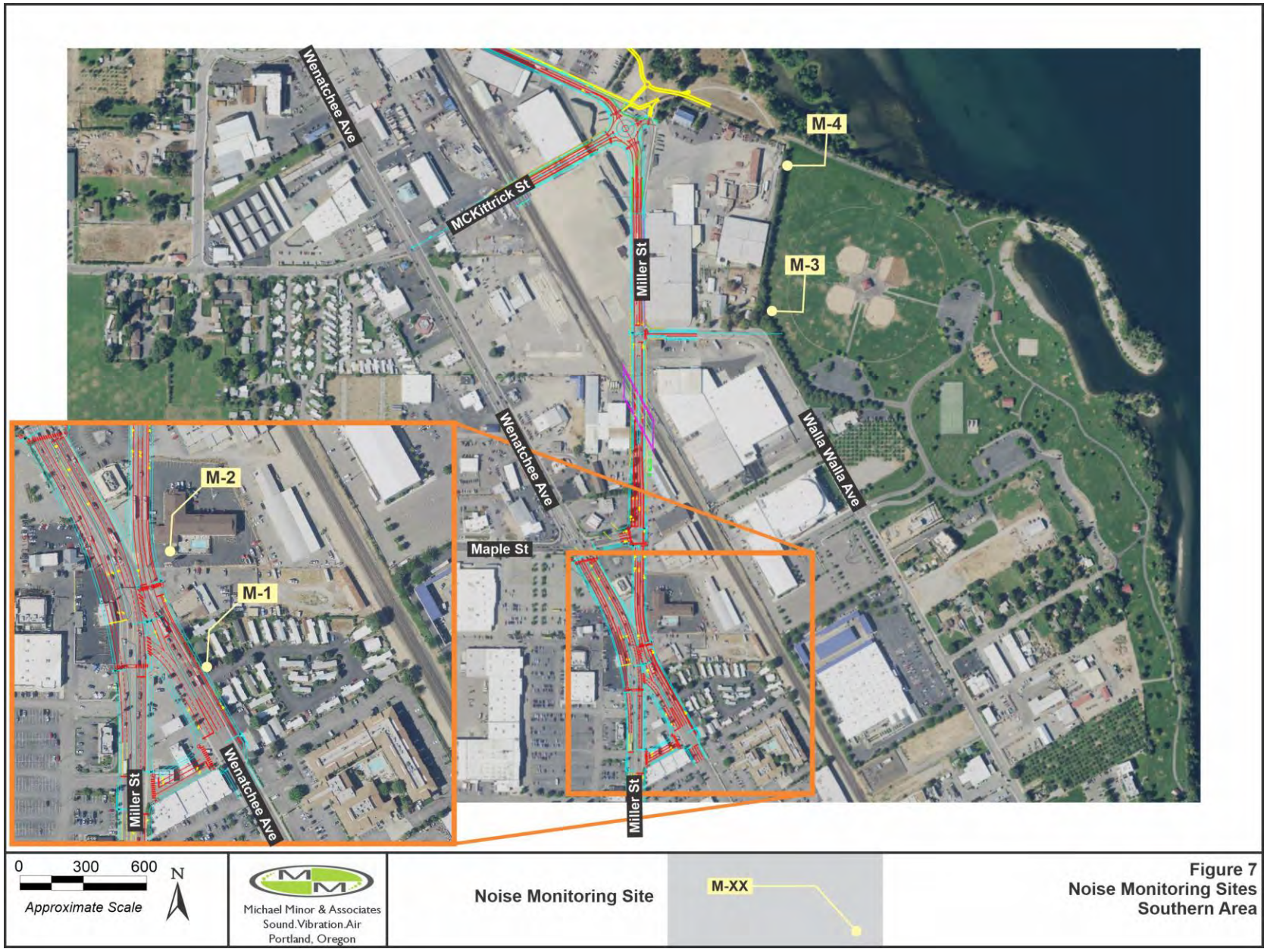


Figure 7
Noise Monitoring Sites
Southern Area

Figure 8
Noise Monitoring Sites
Horan Natrual Area
Central Project Area

Figure 9
Noise Monitoring Sites
Confluence State Park
Wenatchee River Recration Area

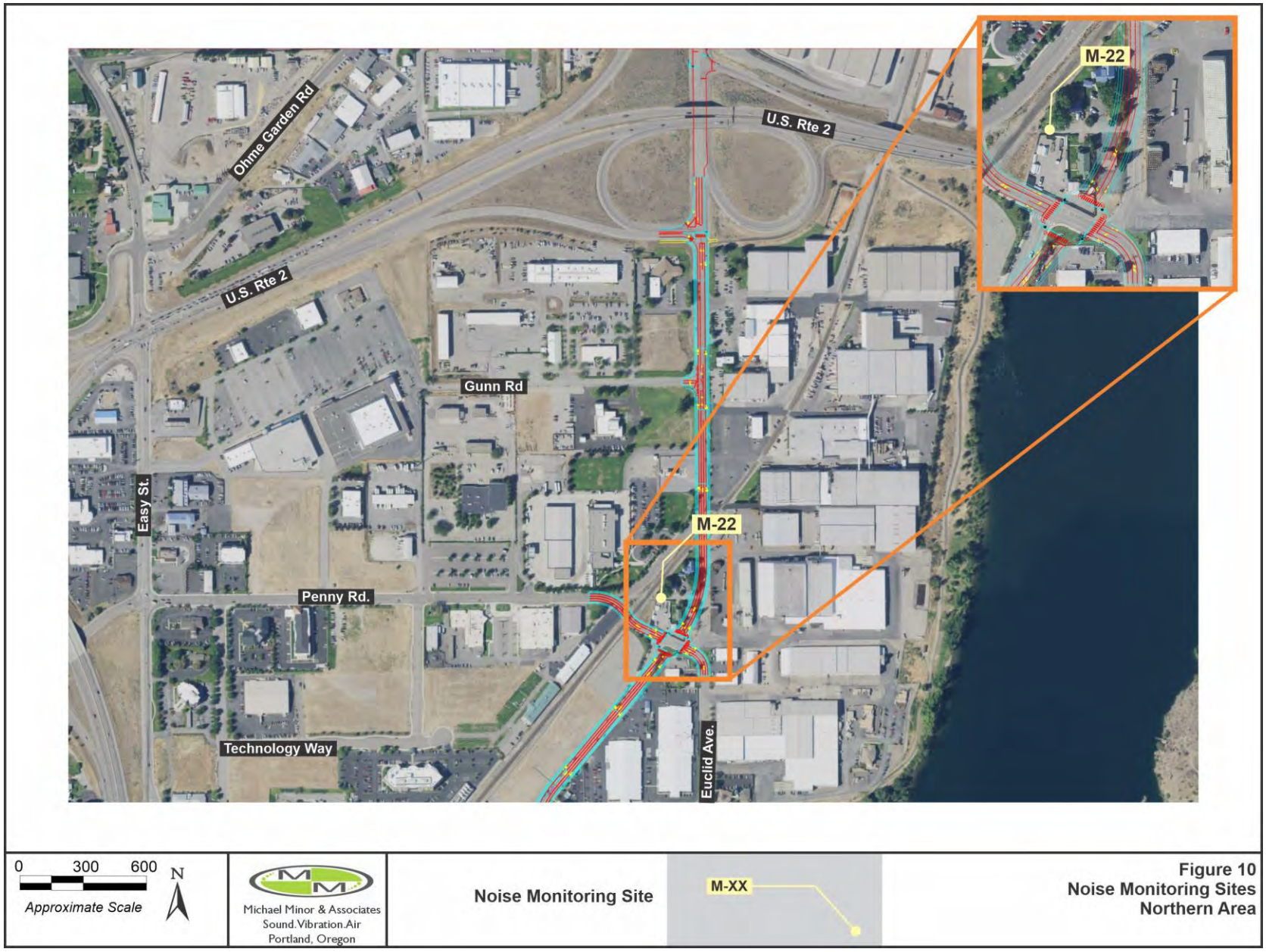


Figure 10
Noise Monitoring Sites
Northern Area

6. NOISE MODELING VALIDATION AND RECEIVERS

As previously described, the noise levels used for describing the existing and future conditions are taken from the FHWA TNM. This section describes the noise model validation results and selection of receivers used for modeling noise levels related to the Confluence Parkway Project.

6.1. Noise Model Validation

Traffic noise levels were modeled to test the agreement of calculated and measured noise levels. For model verification, the actual traffic counts and speeds as observed during the noise monitoring were used as input to the model. Five of the 22 noise monitoring sites were selected for model verification. The five selected monitoring sites are in areas where traffic noise was the dominating noise source and, thereby, could be used to validate the traffic noise model. The noise model was used to predict the traffic noise levels of each of the modeling sites. A comparison of the five monitoring locations used for model validation is provided in Table 3.

Table 3. Measured vs. Modeled Noise Levels

Receiver	Measured	Modeled	Difference
M-1	65.4	65.5	-0.1
M-2	66.1	64.6	1.5
M-3	55.3	53.5	1.8
M-5	63.2	61.7	1.5
M-22	58.8	57.0	1.8

The modeled and measured noise results agree within +/- 2 dBA. Because a 2 dBA change in noise levels is barely perceptible to a person with average hearing, an agreement of +/- 2 dBA or less is considered acceptable deviation for modeled and measured noise levels.

The remaining monitoring 17 sites were all located in areas where there is little or no traffic, and therefore virtually no traffic noise. Those monitoring sites, which are used to help establish the existing noise environment in those areas, include monitoring sites inside the Horan Natural Area, the Wenatchee Confluence State Park, Walla Walla Point Park and along portions of the Apple Capital Recreation Loop Trail.

6.2. Selection of Receivers

Noise modeling sites were selected to represent noise-sensitive areas located along both sides of the Confluence Parkway Project corridor, where traffic noise impacts are most likely to occur. More specifically, the receiver locations were located in areas of frequent outdoor human use such as front yards, back yards, paths, trails, camping sites and other recreation areas. In addition to receiver locations immediately adjacent to the Project roadways,

modeled receiver locations were also extended beyond typical noise study project limits in some areas to verify that all potential noise impacted are identified. Figures 11 through 15 provide an aerial view of all Project noise modeling locations.

Traffic noise modeling was performed using the FHWA TNM. Existing and future traffic noise levels were predicted throughout the Project corridor at 126 locations representing 149 sensitive uses including residences, hotels, schools, parks, and recreational areas. In several instances, one receiver location is used to represent a group of two or more neighboring residences expected to experience similar sound levels for both existing and future conditions and have comparable noise reductions if a noise barrier was constructed.

The Project corridor was divided into two analysis categories based on land-use types, and then further divided into seven sub-areas, for the purpose of providing a detailed view of the modeling sites and to aid in the discussion of existing and future noise levels. Residences, hotels, and school uses include 19 noise modeling sites, representing 39 noise sensitive uses, denoted as R-1 through R-10 and R-120 through R-128. The parks and recreation uses include 107 noise modeling sites, representing 110 sensitive uses, and are denoted as R-11A through R-119. Modeling locations for each area are described below and identified on Figures 11 through 15. Notes include in bold italics text are for receivers that are specific to either the existing and No-Build or Build alternative, but not both.

North Wenatchee Avenue and North Miller Street Receivers:

- R-1 through R-9: Nine (9) receivers at the Monterey Senior Community with three (3) first row receivers along N. Wenatchee Avenue. Receiver R-1 at the Monterey Senior Community was also used for the exterior entrance of the Red Lion Hotel, which has an additional exterior use with a pool located in the center of the building that is entirely shielded from Wenatchee Avenue and would not be affected by traffic noise (Figure 11).
- R-10: One (1) receiver at the front entrance of the Super 8 Motel facing N. Miller Street (Figure 11).

Horan Natural Area Receivers:

- R-11A through R-13B: Six (6) receivers on the portion of the Apple Capital Recreation Loop Trail that is proposed for relocation by the Project along the southwestern perimeter of the Horan Natural Area (Figure 12). *Note: because the relocated Apple Capital Recreation Loop Trail does not currently exist, receivers R11A through R13B were not modeled under the existing or No-Build conditions as there is no trail there now and would not be there under the No-Build alternative.*
- R-14 through R-19 and R-58: Six (6) receivers on the Apple Capital Recreation Loop Trail along the northwestern perimeter of the Horan Natural Area, with one (1) receiver (R-16) adjacent to the trail within the Horan Natural Area (Figure 12).
- R-20 through R-33: Fourteen (14) receivers inside the Horan Natural Area (Figure 12).

- R-34: One (1) receiver at the trail intersection linking the Horan Natural Area and Walla Walla Point Park (Figure 12).

Walla Walla Point Park Receivers:

- R-35 through R-36: Two (2) receivers along the north and northwest park boundaries (Figure 11).
- R-37: One (1) receiver at the baseball field (Figure 11).
- R-38: One (1) receiver at the park playground (Figure 11).
- R-39: One (1) receiver at the park tennis court (Figure 11).

Wenatchee Confluence State Park Day-Use and Group Camping Area Receivers:

- R-40 through R-46: Seven (7) receivers near the Apple Capital Recreation Loop Trail pedestrian bridge. Three (3) receivers are along the bridge with four (4) receivers in the Wenatchee River waterway and on the island directly adjacent to the bridge. This area was called out by the parks service as a location of frequent human activity (Figure 13). *R-43 is not applicable to the Build Alternative as the bridge would be removed.*
- R-47: One (1) receiver at the southcentral edge of western camping area (Figure 13).
- R-48: One (1) receiver on the Apple Capital Recreation Loop Trail near the Wenatchee Confluence State Park staff housing and trail parking (Figure 13).
- R-49 through R-50: Two (2) receivers near the existing location of the McDougall & Sons, Inc. buildings, which is a potential site of proposed relocated park staff housing (Figure 13). *Note, these two receivers are only modeled under the Build alternative.*
- R-51: One (1) receiver at the intersection of Olds Station Road and trail parking lot (Figure 13).
- R-52 through R-55: Four (4) receivers within the group over-night camping areas (Figure 13).
- R-56: One (1) receiver at the park tennis court (Figure 13).
- R-57: One (1) receiver at the park playground (Figure 13).
- R-59 through R-60: Two (2) receivers near and along the pedestrian level of the proposed Confluence Parkway Bridge (Figure 13). *Note, these two receivers are only modeled under the Build alternative.*

Wenatchee Confluence Park Main Over-Night Camping Area Receivers:

- R-66 through R-119: Fifty-four (54) receivers at each campsite in the main over-night camping area (Figure 14). (Note: receiver numbers R-61 to R-65 were not used).

Residential, Hotel, and School Use Receivers:

- R-120: One (1) first row residential receiver at 40 E. Hawley Street (Figure 12).
- R-121: One (1) receiver at back entrance of the La Quinta Inn at 1905 N. Wenatchee Avenue (Figure 12).
- R-122: One (1) receiver at the Valley Academy of Learning entrance at 1911 N. Wenatchee Avenue (Figure 12).
- R-123: One (1) receiver at the southwest corner of the Holiday Inn Express at 1921 N. Wenatchee Avenue (Figure 12).
- R-124: One (1) receiver at the playground of the ABC Learning Center at 200 Olds Station Road (Figure 13).
- R-125: One (1) receiver at the east building of the West Valley Technical Skills Center at 327 E. Penny Road (Figure 15).
- R-126: One (1) receiver at the west building of the West Valley Technical Skills Center at 327 E. Penny Road (Figure 15).
- R-127: One (1) first row residential receiver on the northwest corner of 2710 Euclid Ct (Figure 15).
- R-128: One (1) undeveloped land at 5 Horan Road where future trails and river outlook is possible. However, because the site is not planned and permitted this receiver was modeled for informational purposes only (Figure 13).

6.3. Residential Equivalents

Under WSDOT policy, residential equivalents are calculated for out-door use areas that are not associated with residential units. These residential equivalents are required and used during the noise abatement analysis for areas such as parks, schools, and trails. Equivalencies are calculated by usage factor, such as how often an area is used, and the number of people using the space. The residential equivalents are used for noise abatement calculations.

Parks and schools within the Project corridor all qualify for residential equivalencies. Residential equivalents were calculated for the Horan Natural Area, Apple Capital Recreation Loop Trail, and the Wenatchee Confluence State Park Day-Use Area.

Residential equivalents were not predicted for the Valley Academy of Learning or the Wenatchee Valley Technical Skills Center, as neither has a noise impacts and no noise abatement was proposed for those uses. There are no residential equivalents for Walla Walla Point Park due to the low noise levels in that area. Because the Wenatchee Confluence State Park Over-Night Camping Area includes year-round camping with frequent use, each site is counted as one residence and therefore no residential equivalencies were calculated for that area. See Appendix E for calculating residential equivalents.

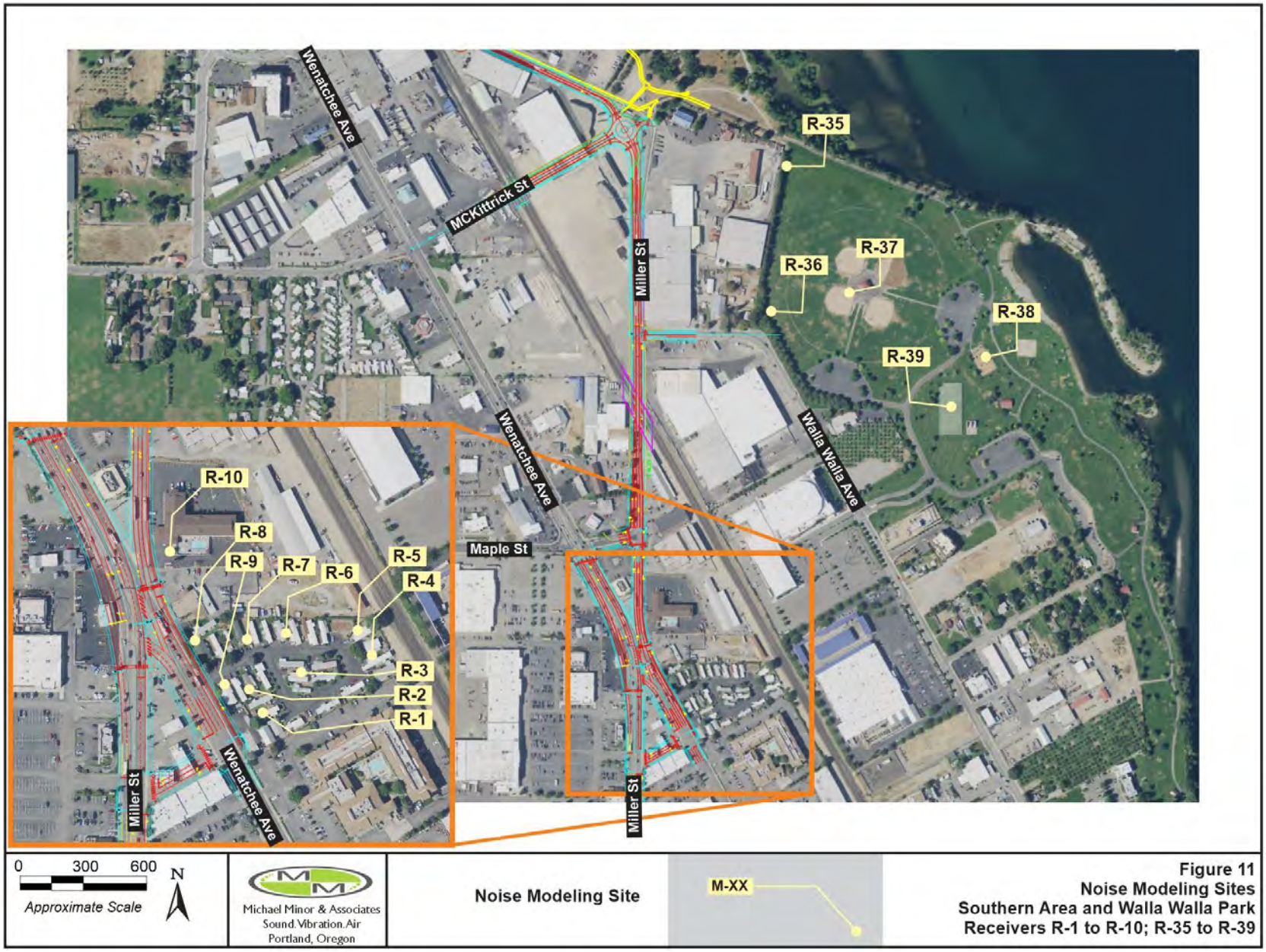


Figure 11
Noise Modeling Sites
Southern Area and Walla Walla Park
Receivers R-1 to R-10; R-35 to R-39

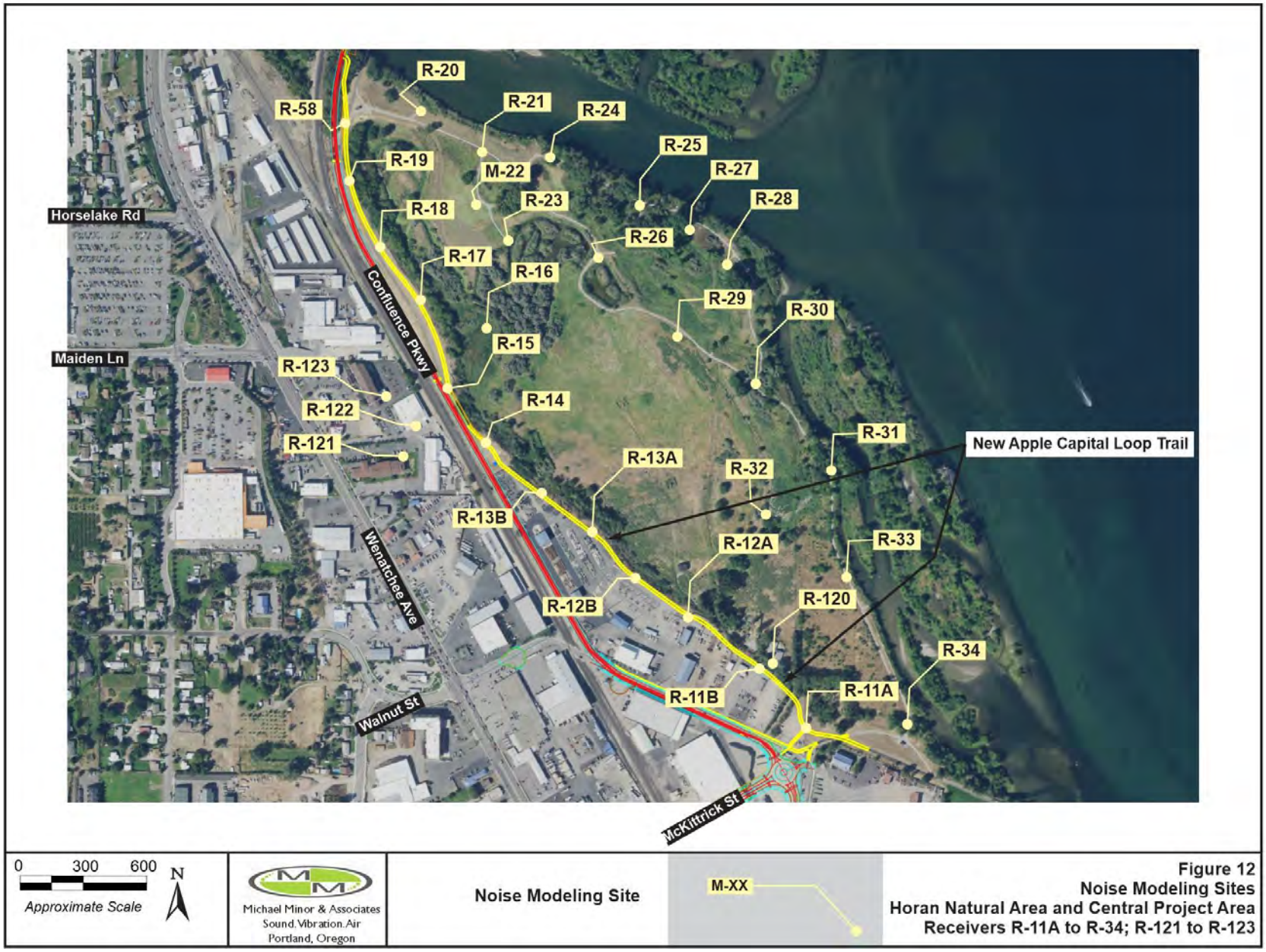


Figure 12
Noise Modeling Sites
Horan Natural Area and Central Project Area
Receivers R-11A to R-34; R-121 to R-123

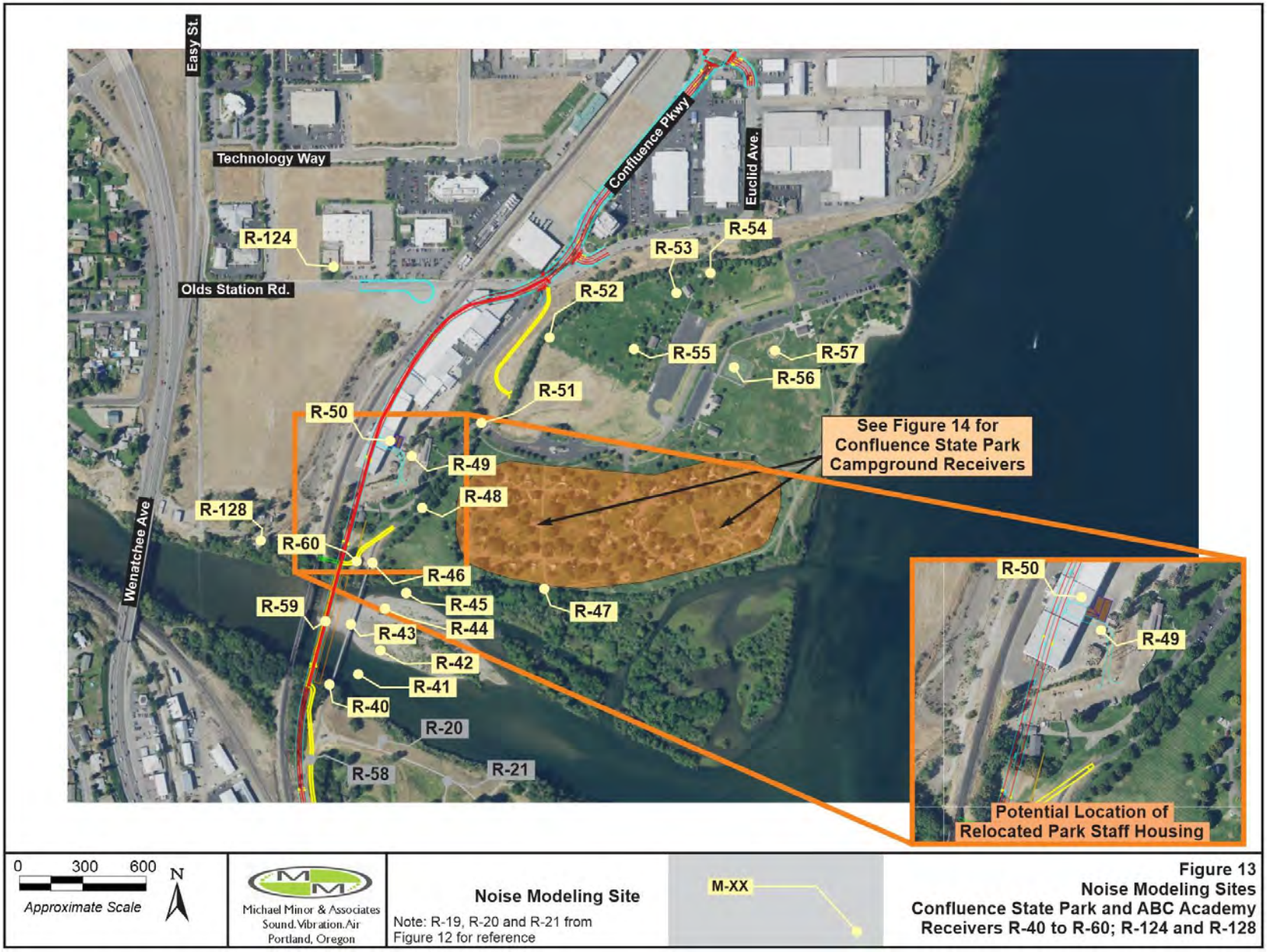


Figure 13
Noise Modeling Sites
Confluence State Park and ABC Academy
Receivers R-40 to R-60; R-124 and R-128

Figure 14
Noise Modeling Sites
Confluence State Park Campgrounds
Receivers R-66 to R-119

0 300 600 N

Approximate Scale

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Noise Modeling Site M-XX

Figure 15
Noise Modeling Sites
Northern Area
Receivers R-125 to R-127

7. EXISTING ENVIRONMENT

This section provides the noise modeling results for the existing conditions (year 2019) PM peak traffic hour. Modeling was performed for 116 of the 126 representative receiver locations shown on Figures 11 through 15. The remaining 10 receivers (R-11A, R-11B, R-12A, R-12B, R-13A, R-13B, R-49, R-50, R-59, and R-60) are modeled only for the future build conditions. Overall, noise levels ranged from 42 to 64 dBA, no sensitive uses had noise levels meeting the WSDOT NAC.

Because the FHWA TNM only predicts noise from the traffic on roadways in the Project area, other common noise sources that also affect the overall background noise are not included in the predictions. For projects with a new roadway, where no road previously existed, measurements are used to assist in establishing existing conditions when the TNM model cannot be validated based on traffic noise from nearby roadways. This typically happens in areas where there are no existing roadways or areas with very low traffic volumes.

For this Project, the TNM model generated low noise levels in areas where no roads currently exist but where low noise levels are expected, such as the Horan Natural Area. For this Project, a combination of measured and modeled noise levels were used to establish existing conditions. For areas with little or no existing traffic noise, the modeled noise levels from TNM were compared to the measured noise levels to determine if any adjustment was needed for the modeled levels based on measurements. Any area where a correction was made for the existing conditions traffic noise levels are identified and discussed.

The results of the existing conditions traffic noise analysis predictions for each of the 116 out of the 126 representative receivers are provided in the following sections.

7.1. Existing Traffic Noise Levels, North Wenatchee Avenue and North Miller Street

Existing noise levels for North Wenatchee Avenue and North Miller Street were modeled at 10 receivers, representing 28 residences, the Super 8 Hotel, and the Red Lion Hotel located on the south side of the Project corridor. The existing levels ranged from 50 to 64 dBA Leq; none of the modeling locations currently meet, or exceed, the WSDOT NAC. Table 4 provides a summary of the existing modeled traffic noise levels for North Segment receivers R-1 through R-10.

Table 4. N Wenatchee Ave and N Miller St Existing Traffic Noise Levels					
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-1	B (E)[7]	2 (1)[8]	66 (71)	58	0 (0)
R-2	B	4	66	58	0
R-3	B	7	66	52	0
R-4	B	2	66	50	0
R-5	B	2	66	50	0
R-6	B	5	66	53	0
R-7	B	3	66	55	0
R-8	B	2	66	64	0
R-9	B	1	66	63	0
R-10	E	1	71	62	0

Notes:

1. Receivers are shown in Figure 11.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in Bold-Red typeface.
6. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.
7. Receiver R-1 represents residential (B) and commercial (E) land uses.
8. Receiver R-1 includes two residences at the Monterey Senior Community (FHWA Cat B: 66 dBA Leq) and one unit for the exterior of the Red Lion Hotel (FHWA Cat E: 71 dBA Leq).

7.2. Existing Traffic Noise Levels, Horan Natural Area

Noise levels in the Horan Natural Area were modeled at 22 sites representing sensitive frequently used areas. Noise levels ranged from 43 to 51 dBA Leq, and no noise sensitive uses currently meet the WSDOT NAC. Existing modeled noise levels for receivers R-14 through R-34 and R-58 in the South Segment are provided in Table 5.

Table 5. Horan Natural Area Existing Traffic Noise Levels					
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-11A	N/A	N/A	N/A	--[7]	N/A
R-11B	N/A	N/A	N/A	--[7]	N/A
R-12A	N/A	N/A	N/A	--[7]	N/A
R-12B	N/A	N/A	N/A	--[7]	N/A
R-13A	N/A	N/A	N/A	--[7]	N/A
R-13B	N/A	N/A	N/A	--[7]	N/A
R-14	C	1.02	66	46	0

Table 5. Horan Natural Area Existing Traffic Noise Levels					
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-15	C	1.02	66	47	0
R-16	C	0.23	66	45	0
R-17	C	1.02	66	49	0
R-18	C	1.02	66	51	0
R-19	C	1.02	66	51	0
R-20	C	0.23	66	49	0
R-21	C	0.23	66	48	0
R-22	C	0.23	66	47	0
R-23	C	0.23	66	46	0
R-24	C	0.23	66	47	0
R-25	C	0.23	66	45	0
R-26	C	0.23	66	45	0
R-27	C	0.23	66	44	0
R-28	C	0.23	66	44	0
R-29	C	0.23	66	44	0
R-30	C	0.23	66	43	0
R-31	C	0.23	66	43	0
R-32	C	0.23	66	44	0
R-33	C	0.23	66	43	0
R-34	C	0.23	66	43	0
R-58	C	1.02	66	49	0

Notes:

1. Receivers are shown in Figure 12.
2. FHWA land use: See Table 1.
3. Number of dwellings or residential equivalents represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in Bold-Red typeface.
6. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.
7. Receivers R11A through R13B which are all on the relocated Apple Capital Recreation Loop Trail, were not modeled under the existing because the trail does not exist.

The modeled traffic noise levels in the Horan Natural Area were compared to the measured noise levels in the same approximate areas. The measured and modeled noise levels were very similar and would be dominated by the high volumes of traffic along Wenatchee Avenue. Final consideration of the measured and modeled noise levels was performed and is discussed under the Future Build analysis in Section 9.

7.3. Existing Traffic Noise Levels, Walla Walla Point Park

Noise levels in the Walla Walla Point Park were modeled at 5 sites to provide an understanding of how the proposed project would affect noise levels in the park and identify noise impacts. Noise levels ranged from 42 to 50 dBA Leq, and no noise sensitive uses currently meet the WSDOT NAC. Existing modeled noise levels for receivers R-35 through R-39 in the South Segment are provided in Table 6.

Table 6. Walla Walla Park Existing Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-35	C	1	66	42	0
R-36	C	1	66	50	0
R-37	C	1	66	43	0
R-38	C	1	66	42	0
R-39	C	1	66	43	0

Notes:

1. All receivers are shown in Figure 11.
2. FHWA land use: See Table 1.
3. Number of dwellings or residential equivalents represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in Bold-Red typeface.
6. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.

7.4. Existing Traffic Noise Levels, Wenatchee Confluence State Park Day-Use and Group Camping Area

Noise levels in the Wenatchee Confluence Park Day-Use and Group Camping Area were modeled at 16 sites. Noise levels ranged from 45 to 54 dBA Leq, and no residences or other noise sensitive uses currently meet the WSDOT NAC. Existing modeled noise levels for receivers R-40 through R-57 in the South Segment are provided in Table 7.

Table 7. Wenatchee Confluence State Park Day-Use and Group Camping Area Existing Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-40	C	1	66	51	0
R-41	C	1	66	49	0
R-42	C	1	66	53	0
R-43	C	1	66	54	0
R-44	C	1	66	51	0
R-45	C	1	66	50	0

Table 7. Wenatchee Confluence State Park Day-Use and Group Camping Area Existing Traffic Noise Levels					
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-46	C	1.02	66	50	0
R-47	C	1	66	45	0
R-48	C	1.02	66	47	0
R-49	N/A	N/A	N/A	--[7]	N/A
R-50	N/A	N/A	N/A	--[7]	N/A
R-51	C	1.51	66	50	0
R-52	C	1.51	66	46	0
R-53	C	1.51	66	48	0
R-54	C	1.51	66	48	0
R-55	C	1.51	66	46	0
R-56	C	1.51	66	46	0
R-57	C	1.51	66	45	0
R-59	N/A	N/A	N/A	--[7]	N/A
R-60	N/A	N/A	N/A	--[7]	N/A

Notes:

1. All receivers are shown in Figure 13.
2. FHWA land use: See Table 1.
3. Number of dwellings or residential equivalents represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in Bold-Red typeface.
6. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.
7. Receivers R-49, R-50, R-59, and R-60 represent receivers that are only valid under the Future-Build and therefore no existing noise modelling noise levels are available.

7.5. Existing Traffic Noise Levels, Wenatchee Confluence Park Main Over-Night Camping Area

Noise levels in the Wenatchee Confluence Park Main Over-Night Camping Area were modeled at 54 locations representing 58 camping sites. Noise levels range from 44 to 47 dBA Leq, and no camp sites currently meet the WSDOT NAC. Existing modeled noise levels for receivers R-66 through R-119 in the South Segment are provided in Table 8.

Table 8. Wenatchee Confluence Park Main Over-Night Camping Area Existing Traffic Noise Levels					
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-66	C	1	66	47	0
R-67	C	1	66	47	0

Table 8. Wenatchee Confluence Park Main Over-Night Camping Area Existing Traffic Noise Levels					
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-68	C	1	66	47	0
R-69	C	1	66	46	0
R-70	C	1	66	46	0
R-71	C	1	66	46	0
R-72	C	1	66	47	0
R-73	C	1	66	47	0
R-74	C	1	66	47	0
R-75	C	1	66	46	0
R-76	C	1	66	46	0
R-77	C	1	66	46	0
R-78	C	1	66	45	0
R-79	C	1	66	45	0
R-80	C	1	66	45	0
R-81	C	1	66	45	0
R-82	C	1	66	45	0
R-83	C	1	66	45	0
R-84	C	1	66	45	0
R-85	C	2	66	46	0
R-86	C	1	66	46	0
R-87	C	1	66	46	0
R-88	C	1	66	46	0
R-89	C	2	66	46	0
R-90	C	1	66	45	0
R-91	C	1	66	45	0
R-92	C	2	66	45	0
R-93	C	1	66	45	0
R-94	C	1	66	45	0
R-95	C	1	66	45	0
R-96	C	1	66	45	0
R-97	C	1	66	44	0
R-98	C	1	66	44	0
R-99	C	1	66	44	0
R-100	C	1	66	44	0
R-101	C	1	66	44	0
R-102	C	1	66	44	0

Table 8. Wenatchee Confluence Park Main Over-Night Camping Area Existing Traffic Noise Levels					
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-103	C	1	66	44	0
R-104	C	1	66	44	0
R-105	C	1	66	44	0
R-106	C	1	66	44	0
R-107	C	1	66	44	0
R-108	C	1	66	44	0
R-109	C	1	66	44	0
R-110	C	1	66	44	0
R-111	C	1	66	44	0
R-112	C	1	66	44	0
R-113	C	1	66	44	0
R-114	C	1	66	44	0
R-115	C	2	66	44	0
R-116	C	1	66	44	0
R-117	C	1	66	44	0
R-118	C	1	66	44	0
R-119	C	1	66	44	0

Notes:

1. All receivers are shown in Figure 14.
2. FHWA land use: See Table 1.
3. Number of dwellings or residential equivalents represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in Bold-Red typeface.
6. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.

7.6. Existing Traffic Noise Levels, Residential, Hotel, and School Uses

Noise levels in for Residential, Hotel, and School Uses north of McKittrick were modeled at 9 sites representing 3 residences, 2 residential equivalents, and 4 school uses. Noise levels ranged from 45 to 63 dBA Leq, and no residences or other noise sensitive uses currently meet the WSDOT NAC. Existing modeled noise levels for receivers R-120 through R-128 in the South Segment are provided in Table 9.

Table 9. Residential, Hotel, and School Uses Existing Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)		Properties Meeting NAC[6]
			Criteria[4]	Existing[5]	
R-120	B	1	66	47	0
R-121	E	1	71	53	0
R-122	C	18.59	66	50	0
R-123	E	1	71	45	0
R-124	C	7.74	66	56	0
R-125	C	8.3	66	54	0
R-126	C	8.3	66	63	0
R-127	B	1	66	59	0
R-128	C	1	66	54	0

Notes:

1. All receivers are shown in Figures 12, 13 and 15.
2. FHWA land use: See Table 1.
3. Number of dwellings or residential equivalents represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in Bold-Red typeface.
6. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.

8. FUTURE NO-BUILD ENVIRONMENT

This section provides the noise modeling results for the No-Build conditions using traffic volumes projected for the year 2040 with no changes to many of the roadways in the Project corridor. However, the separately funded McKittrick Street Project is included with the no-build model since the project could affect noise levels in the Project corridor. The same 121 noise modeling locations used to model the existing conditions (shown in Figures 11 through 15) were modeled for the No-Build Alternative PM peak hour traffic conditions. The TNM inputs include year 2040 traffic volumes and speeds prepared for this Project.

The traffic data for the No-Build Alternative includes the McKittrick Street Project. Therefore, the traffic volumes and flow patterns for the No-Build scenario are different than under the existing conditions due to the new McKittrick Street grade-separated railroad connection and the closure of Hawley Street just east of Wenatchee Avenue. Future No-Build Alternative traffic noise levels would be expected to be higher than those present here if other roadways or new developments are constructed by the year 2040. For further information about future No-Build assumptions see the *Confluence Parkway Transportation Discipline Report,* KPG, 2020.

This section also identifies the number of uses with noise levels that meet or exceed the WSDOT NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario. Locations with levels above the NAC are provided for informational purposes only. Detailed modeled noise levels at each receiver are provided in the following sections.

8.1. 2040 No-Build Traffic Noise Levels, North Wenatchee Avenue and North Miller Street

Future 2040 No-Build traffic noise levels for the 10 receivers at North Wenatchee Avenue and North Miller Street are summarized in Table 10. Under the future No-Build Alternative, traffic noise levels increase by 0 to 1 dB over existing conditions at three of the receiver locations, the remaining receivers have no change. Overall, the range of future No-Build peak hour noise levels is the same as the existing conditions, ranging from 50 to 64 dBA Leq. There are no residences predicted to meet the criteria for WSDOT NAC. The results are provided in Table 10.

Table 10. N Wenatchee Ave and N Miller St Future No-Build Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Properties Meeting NAC[7]
			Criteria[4]	No-Build[5]	Increase vs. Existing (in dB)[6]	
R-1	B (E)[8]	2 (1)[9]	66 (71)	58	0	0 (0)
R-2	B	4	66	58	0	0

Table 10. N Wenatchee Ave and N Miller St Future No-Build Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Properties Meeting NAC[7]
			Criteria[4]	No-Build[5]	Increase vs. Existing (in dB)[6]	
R-3	B	7	66	53	1	0
R-4	B	2	66	50	0	0
R-5	B	2	66	50	0	0
R-6	B	5	66	54	1	0
R-7	B	3	66	55	0	0
R-8	B	2	66	64	0	0
R-9	B	1	66	63	0	0
R-10	E	1	71	63	1	0

Notes:

1. Receivers are shown in Figure 11.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 4.
7. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.
8. Receiver R-1 represents residential (B) and commercial (E) land uses.
9. Receiver R-1 includes two residences at the Monterey Senior Community (FHWA Cat B: 66 dBA Leq) and one unit for the exterior of the Red Lion Hotel (FHWA Cat E: 71 dBA Leq).

8.2. 2040 No-Build Traffic Noise Levels, Horan Natural Area

Noise levels in the Horan Natural Area were modeled at the same 22 sites as the existing model. The future No-Build noise levels were 43 to 52 dBA Leq; there are no sites with noise levels above the WSDOT NAC. Future No-Build traffic noise levels remain unchanged or increase by 1 dB over existing conditions. The results of the future No-Build conditions modeling for the South Segment are provided in Table 11.

Table 11. Horan Natural Area No-Build Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq(dBA)			Properties Meeting NAC[7]
			Criteria[4]	No-Build[5]	Increase vs. Existing (in dB)[6]	
R-11A	N/A	N/A	N/A	--[8]	N/A	N/A
R-11B	N/A	N/A	N/A	--[8]	N/A	N/A
R-12A	N/A	N/A	N/A	--[8]	N/A	N/A
R-12B	N/A	N/A	N/A	--[8]	N/A	N/A

Table 11. Horan Natural Area No-Build Traffic Noise Levels						
R-13A	N/A	N/A	N/A	--[8]	N/A	N/A
R-13B	N/A	N/A	N/A	--[8]	N/A	N/A
R-14	C	1.02	66	47	1	0
R-15	C	1.02	66	47	0	0
R-16	C	0.23	66	46	1	0
R-17	C	1.02	66	50	1	0
R-18	C	1.02	66	51	0	0
R-19	C	1.02	66	52	1	0
R-20	C	0.23	66	50	1	0
R-21	C	0.23	66	48	0	0
R-22	C	0.23	66	48	1	0
R-23	C	0.23	66	47	1	0
R-24	C	0.23	66	47	0	0
R-25	C	0.23	66	46	1	0
R-26	C	0.23	66	46	1	0
R-27	C	0.23	66	45	1	0
R-28	C	0.23	66	45	1	0
R-29	C	0.23	66	45	1	0
R-30	C	0.23	66	44	1	0
R-31	C	0.23	66	44	1	0
R-32	C	0.23	66	44	0	0
R-33	C	0.23	66	43	0	0
R-34	C	0.23	66	44	1	0
R-58	C	1.02	66	50	1	0

Notes:

1. All receivers are shown in Figure 12.
2. FHWA land use: See Table 1.
3. Number of dwellings or residential equivalents represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 5.
7. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.
8. Receivers R11A through R13B which are all on the relocated Apple Capital Recreation Loop Trail, were not modeled under the no-build because the trail does not exist.

8.3. No-Build Traffic Noise Levels, Walla Walla Point Park

Future 2040 No-Build traffic noise levels for the 5 receivers in Walla Walla Point Park are summarized in Table 12. Under the future No-Build Alternative, traffic noise increases by 1 to 2 dB over existing conditions at all receiver locations. The increased noise is due in part to

the new roundabout and grade separated railroad crossing at McKittrick Street. Overall, the range of future No-Build peak hour noise levels is 43 to 52 dBA Leq, there are no sites with noise levels above the WSDOT NAC. The results are provided in Table 12.

Table 12. Walla Walla Point Park Future No-Build Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Properties Meeting NAC[7]
			Criteria[4]	No-Build[5]	Increase vs. Existing (in dB)[6]	
R-35	C	1	66	44	2	0
R-36	C	1	66	52	2	0
R-37	C	1	66	44	1	0
R-38	C	1	66	43	1	0
R-39	C	1	66	44	1	0

Notes:

1. All receivers are shown in Figure 11.
2. FHWA land use: See Table 1.
3. Number of dwellings or residential equivalents represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 6.
7. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.

8.4. No-Build Traffic Noise Levels, Wenatchee Confluence State Park Day-Use and Group Camping Area

Future 2040 No-Build traffic noise levels for the 16 modeled receivers in the Wenatchee Confluence State Park Day-Use and Group Camping Area are summarized in Table 13. Under the future No-Build Alternative, traffic noise levels remain unchanged at one of the receivers, decrease by 1 dB at one receiver, or increase by 1 to 2 dB over existing conditions at 14 of the 16 receiver locations. The slight increases would be expected due to normal increases in area traffic volumes by the year 2040. Overall, the range of future No-Build peak hour noise levels is 47 to 55 dBA Leq, there are no sites with noise levels above the WSDOT NAC. The results are provided in Table 13.

Table 13. Wenatchee Confluence State Park Day-Use and Group Camping Area Future No-Build Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Properties Meeting NAC[7]
			Criteria[4]	No-Build[5]	Increase vs. Existing (in dB)[6]	
R-40	C	1	66	52	1	0
R-41	C	1	66	50	1	0
R-42	C	1	66	54	1	0

Table 13. Wenatchee Confluence State Park Day-Use and Group Camping Area Future No-Build Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Properties Meeting NAC[7]
			Criteria[4]	No-Build[5]	Increase vs. Existing (in dB)[6]	
R-43	C	1	66	55	1	0
R-44	C	1	66	52	1	0
R-45	C	1	66	49	-1	0
R-46	C	1.02	66	51	1	0
R-47	C	1	66	47	2	0
R-48	C	1.02	66	48	1	0
R-49	N/A	N/A	N/A	--[8]	N/A	N/A
R-50	N/A	N/A	N/A	--[8]	N/A	N/A
R-51	C	1.51	66	50	0	0
R-52	C	1.51	66	47	1	0
R-53	C	1.51	66	49	1	0
R-54	C	1.51	66	50	2	0
R-55	C	1.51	66	48	2	0
R-56	C	1.51	66	47	1	0
R-57	C	1.51	66	47	2	0
R-59	N/A	N/A	N/A	--[8]	N/A	N/A
R-60	N/A	N/A	N/A	--[8]	N/A	N/A

Notes:

1. All receivers are shown in Figure 13.
2. FHWA land use: See Table 1.
3. Number of dwellings or residential equivalents represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 7.
7. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.
8. Receivers R-49, R-50, R-58, and R-60 represent receivers that are only valid under the Future-Build and therefore no No-Build noise modelling noise levels are available

8.5. No-Build Traffic Noise Levels, Wenatchee Confluence State Park Main Over-Night Camping Area

Future 2040 No-Build traffic noise levels for the 58 camp sites in Wenatchee Confluence Park Main Over-Night Camping Area are summarized in Table 14. Under the future No-Build Alternative, traffic noise levels remain unchanged at two receiver locations or increase by 1 to 2 dB over existing conditions at 52 of the 54 receiver locations. Overall, the range of

future No-Build peak hour noise levels is 45 to 48 dBA Leq, there are no sites with noise levels above the WSDOT NAC. The results are provided in Table 14.

Table 14. Wenatchee Confluence State Park Main Over-Night Camping Area Future No-Build Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Properties Meeting NAC[7]
			Criteria[4]	No-Build[5]	Increase vs. Existing (in dB)[6]	
R-66	C	1	66	47	0	0
R-67	C	1	66	48	1	0
R-68	C	1	66	47	0	0
R-69	C	1	66	47	1	0
R-70	C	1	66	47	1	0
R-71	C	1	66	47	1	0
R-72	C	1	66	48	1	0
R-73	C	1	66	48	1	0
R-74	C	1	66	48	1	0
R-75	C	1	66	47	1	0
R-76	C	1	66	47	1	0
R-77	C	1	66	46	0	0
R-78	C	1	66	46	1	0
R-79	C	1	66	46	1	0
R-80	C	1	66	46	1	0
R-81	C	1	66	46	1	0
R-82	C	1	66	46	1	0
R-83	C	1	66	46	1	0
R-84	C	1	66	46	1	0
R-85	C	2	66	47	1	0
R-86	C	1	66	47	1	0
R-87	C	1	66	47	1	0
R-88	C	1	66	47	1	0
R-89	C	2	66	47	1	0
R-90	C	1	66	46	1	0
R-91	C	1	66	46	1	0
R-92	C	2	66	46	1	0
R-93	C	1	66	46	1	0
R-94	C	1	66	46	1	0
R-95	C	1	66	46	1	0

Table 14. Wenatchee Confluence State Park Main Over-Night Camping Area Future No-Build Traffic Noise Levels						
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Properties Meeting NAC[7]
			Criteria[4]	No-Build[5]	Increase vs. Existing (in dB)[6]	
R-96	C	1	66	46	1	0
R-97	C	1	66	46	2	0
R-98	C	1	66	45	1	0
R-99	C	1	66	45	1	0
R-100	C	1	66	45	1	0
R-101	C	1	66	45	1	0
R-102	C	1	66	45	1	0
R-103	C	1	66	45	1	0
R-104	C	1	66	45	1	0
R-105	C	1	66	45	1	0
R-106	C	1	66	45	1	0
R-107	C	1	66	45	1	0
R-108	C	1	66	45	1	0
R-109	C	1	66	45	1	0
R-110	C	1	66	45	1	0
R-111	C	1	66	45	1	0
R-112	C	1	66	45	1	0
R-113	C	1	66	45	1	0
R-114	C	1	66	45	1	0
R-115	C	2	66	45	1	0
R-116	C	1	66	45	1	0
R-117	C	1	66	45	1	0
R-118	C	1	66	45	1	0
R-119	C	1	66	45	1	0

Notes:

1. All receivers are shown in Figure 14.
2. FHWA land use: See Table 1.
3. Number of dwellings or residential equivalents represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 8.
7. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.

8.6. No-Build Traffic Noise Levels, Residential, Hotel, and School Uses

Noise levels for Residential, Hotel, and Schools Uses north of McKittrick were modeled at 9 sites representing 9 sensitive uses. The future No-Build noise levels were 45 to 64 dBA Leq, there are no sites with noise levels above the WSDOT NAC. Future No-Build traffic noise levels remain unchanged, increase by 1 to 2 dB, or decrease 1 dB over existing conditions. The noise level decrease at receiver R-120 is a result of the separate McKittrick Project which will lead to reduced traffic along E Hawley St. The results of the future No-Build conditions modeling are provided in Table 15.

Table 15. Residential, Hotel, and School Uses Future No-Build Traffic Noise Levels

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Properties Meeting NAC[7]
			Criteria[4]	No-Build[5]	Increase vs. Existing (in dB)[6]	
R-120	B	1	66	46	-1	0
R-121	E	1	71	54	1	0
R-122	C	18.59	66	51	1	0
R-123	E	1	71	46	1	0
R-124	C	7.74	66	58	2	0
R-125	C	8.3	66	55	1	0
R-126	C	8.3	66	64	1	0
R-127	B	1	66	60	1	0
R-128	C	1	66	56	2	0

Notes:

1. All receivers are shown in Figures 12, 13 and 15.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 9.
7. The number of uses with noise levels that meet or exceed the NAC. By definition, these are not considered "impacts" as impacts only occur under the Build scenario.

9. FUTURE BUILD ANALYSIS

This section provides the noise modeling results for the Build Alternative. All 126 noise modeling locations (shown in Figures 11 through 15), including those used to model the existing conditions and No-Build Alternative, were modeled for the Build Alternative year 2040 PM peak hour traffic conditions. The TNM inputs included the proposed build of Confluence Parkway and all other project study area roadways that could impact the modeling results. Care was taken to accurately model the proposed roadway alignment and

profile including the bridges across the Wenatchee River, retaining walls, roundabouts, and alterations to the topography necessary to construct the relocated Apple Capital Recreation Loop Trail.

The traffic data for the Build scenario comes from a regional traffic model that includes several additional assumptions, and includes future developments, extension of other planned roadways, and an increase in traffic when compared to the No-Build scenario. Therefore, the traffic noise levels for the Build Alternative are the worst-case noise levels for the year 2040.

Future Build Alternative traffic noise levels are predicted to range from 47 to 70 dBA Leq during the PM peak hour. There are 17 sensitive uses with noise levels that meet the WSDOT NAC. Eleven residential units would have noise levels meeting or exceeding the NAC criteria, six sensitive uses would have noise levels under the NAC criteria but nevertheless qualify for the substantial increase impact under the 2020 WSDOT policy with 13 to 23 dB increases over existing conditions, and two sensitive uses that meet or exceed the NAC Criteria and have a substantial increase. Compared to the existing conditions and No-Build Alternative, the number of traffic noise impacts increases from 0 to 17 under the Build Alternative.

The high traffic noise increases at these receivers is primarily due to the introduction of the new Confluence Parkway. Details on the future Build noise levels for the six analysis areas are summarized below. A discussion and summary of noise impacts is provided under the Noise level Summary in Section 10.

9.1. Build Traffic Noise Levels, North Wenatchee Avenue and North Miller Street

Under the Build Alternative, noise levels at North Wenatchee Avenue and North Miller Street are predicted to range from 56 to 68 dBA Leq. There are three residences that would meet the NAC under the Build Alternative, with noise levels increasing by 4 to 7 dB over the existing conditions. Most increase are due in part to the new connection between North Wenatchee Avenue and North Miller Street, just west of receiver R-1 The modeling results for North Wenatchee Avenue and North Miller Street are provided in Table 16.

Table 16. Future Build Traffic Noise Levels North Wenatchee Avenue and North Miller Street

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-1	B (E)[8]	2 (1)[9]	66 (71)	65	7	0 (0)
R-2	B	4	66	64	6	0
R-3	B	7	66	59	7	0

Table 16. Future Build Traffic Noise Levels North Wenatchee Avenue and North Miller Street

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-4	B	2	66	56	6	0
R-5	B	2	66	56	6	0
R-6	B	5	66	59	6	0
R-7	B	3	66	61	6	0
R-8	B	2	66	**68**	4	2
R-9	B	1	66	**67**	4	1
R-10	E	1	71	67	5	0

Notes:

1. All receivers are shown in Figure 11.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 4; substantial increase impacts identified with **Bold-Red** type face.
7. The number of impacted residences with noise levels that meet or exceed the NAC.
8. Receiver R-1 represents residential (B) and commercial (E) land uses.
9. Receiver R-1 includes two residences at the Monterey Senior Community (FHWA Cat B: 66 dBA Leq) and one unit for the exterior of the Red Lion Hotel (FHWA Cat E: 71 dBA Leq).

9.2. Build Traffic Noise Levels, Horan Natural Area

Future Build Alternative traffic noise levels in the Horan Natural Area are predicted to range from 47 to 70 dBA Leq. Noise impacts were identified at six of the modeling sites in this area, all with substantial increase impacts. Under the Build Alternative, overall traffic noise levels would increase from 5 to 23 dB over existing conditions at all of the receiver locations in the Horan Natural Area. The increase is due entirely to the insertion of a new two-lane roadway adjacent to the Horan Natural Area, where there are currently no roads or other noise sources, except the occasional rail traffic. The added traffic, even at 30 mph, was enough to result in the increase due to the existing low noise levels. Table 17 provides the results of the future Build traffic noise levels for the Horan Natural Area.

Table 17. Future Build Traffic Noise Levels Horan Natural Area						
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-11A	C	1.02	66	59	--[8]	0
R-11B	C	1.02	66	55	--[8]	0
R-12A	C	1.02	66	53	--[8]	0
R-12B	C	1.02	66	54	--[8]	0
R-13A	C	1.02	66	55	--[8]	0
R-13B	C	1.02	66	60	--[8]	0
R-14	C	1.02	66	**67**	**21**	1.02
R-15	C	1.02	66	**70**	**23**	1.02
R-16	C	0.23	66	52	7	0
R-17	C	1.02	66	62	**13**	1.02
R-18	C	1.02	66	65	**14**	1.02
R-19	C	1.02	66	64	**13**	1.02
R-20	C	0.23	66	55	6	0
R-21	C	0.23	66	53	5	0
R-22	C	0.23	66	53	6	0
R-23	C	0.23	66	52	6	0
R-24	C	0.23	66	51	4	0
R-25	C	0.23	66	50	5	0
R-26	C	0.23	66	50	5	0
R-27	C	0.23	66	49	5	0
R-28	C	0.23	66	48	4	0
R-29	C	0.23	66	48	4	0
R-30	C	0.23	66	48	5	0
R-31	C	0.23	66	47	4	0
R-32	C	0.23	66	47	3	0
R-33	C	0.23	66	47	4	0
R-34	C	0.23	66	47	4	0
R-58	C	1.02	66	63	**14**	1.02

Notes:

1. All receivers are shown in Figure 12.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 5; substantial increase impacts identified with **Bold-Red** type face.

Table 17. Future Build Traffic Noise Levels Horan Natural Area						
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	

7. The number of impacted residences with noise levels that meet or exceed the NAC.
8. Receivers R11A through R13B which are all on the relocated Apple Capital Recreation Loop Trail were not modeled under the existing or no-build models because the trail does not exist, therefore the build model cannot be compared to existing noise levels to analyze increase in dB.

9.3. Build Traffic Noise Levels, Walla Walla Point Park

Under the Build Alternative noise levels in Walla Walla Point Park are predicted to range from 46 to 53 dBA Leq. There are no impacts under the Build Alternative. The modeling results for Walla Walla Point Park are provided in Table 18.

Table 18. Future Build Traffic Noise Levels Walla Walla Park

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-35	C	1	66	49	7	0
R-36	C	1	66	53	3	0
R-37	C	1	66	47	4	0
R-38	C	1	66	46	4	0
R-39	C	1	66	47	4	0

Notes:

1. All receivers are shown in Figure 11.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 6; substantial increase impacts identified with **Bold-Red** type face.
7. The number of impacted residences with noise levels that meet or exceed the NAC.

9.4. Build Traffic Noise Levels, Wenatchee Confluence State Park Day-Use and Group Camping Area

Under the Build Alternative noise levels in the Wenatchee Confluence Park Day-Use and Group Camping Area are predicted to range from 48 to 67 dBA Leq. There is one impact that meets the NAC under the Build Alternative. The modeling results for the Wenatchee Confluence Park Day-Use and Group Camping Area are provided in Table 19.

Table 19. Future Build Traffic Noise Levels Wenatchee Confluence Park Day-Use and Group Camping Area

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-40	C	1	66	60	9	0
R-41	C	1	66	56	7	0
R-42	C	1	66	58	5	0
R-43	N/A	N/A	N/A	--[8]	N/A	N/A
R-44	C	1	66	58	7	0
R-45	C	1	66	55	5	0
R-46	C	1.02	66	59	9	0
R-47	C	1	66	51	6	0
R-48	C	1.02	66	55	8	0
R-49	B	0	66	59	--[9]	0
R-50	B	1	66	**67**	--[9]	1
R-51	C	1.51	66	53	3	0
R-52	C	1.51	66	51	5	0
R-53	C	1.51	66	50	2	0
R-54	C	1.51	66	48	0	0
R-55	C	1.51	66	51	5	0
R-56	C	1.51	66	49	3	0
R-57	C	1.51	66	48	3	0
R-59	C	0	66	59	--[9]	0
R-60	C	1.02	66	62	--[9]	0

Notes:

1. All receivers are shown in Figure 13.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.

Table 19. Future Build Traffic Noise Levels Wenatchee Confluence Park Day-Use and Group Camping Area						
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	

6. Increase in noise levels over the existing conditions noise levels provided in Table 7; substantial increase impacts identified with **Bold-Red** type face.
7. The number of impacted residences with noise levels that meet or exceed the NAC.
8. Receivers R-49, R-50, R-58, and R-60 were not modeled under the existing or no-build models, therefore the build model cannot be compared to existing noise levels to analyze increase in dB.
9. Receiver R-43 was located only the existing pedestrian bridge over Wenatchee River. A proposed new bridge would be built as part of the Project; therefore R-43 was not modelled under the build model.

9.5. Build Traffic Noise Levels, Wenatchee Confluence State Park Main Over-Night Camping Area

Under the Build Alternative noise levels at the Wenatchee Confluence Park Main Over-Night Camping Area are predicted to range from 48 to 53 dBA Leq. There are no impacts that would meet the NAC under the Build Alternative. The modeling results for the Wenatchee Confluence Park Main Over-Night Camping Area are provided in Table 20.

Table 20. Future Build Traffic Noise Levels Wenatchee Confluence Park Main Over-Night Camping Area

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-66	C	1	66	50	3	0
R-67	C	1	66	51	4	0
R-68	C	1	66	52	5	0
R-69	C	1	66	52	6	0
R-70	C	1	66	53	7	0
R-71	C	1	66	53	7	0
R-72	C	1	66	53	6	0
R-73	C	1	66	53	6	0
R-74	C	1	66	52	5	0
R-75	C	1	66	52	6	0
R-76	C	1	66	51	5	0
R-77	C	1	66	50	4	0
R-78	C	1	66	50	5	0

Table 20. Future Build Traffic Noise Levels Wenatchee Confluence Park Main Over-Night Camping Area						
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-79	C	1	66	49	4	0
R-80	C	1	66	49	4	0
R-81	C	1	66	50	5	0
R-82	C	1	66	50	5	0
R-83	C	1	66	51	6	0
R-84	C	1	66	51	6	0
R-85	C	2	66	52	6	0
R-86	C	1	66	52	6	0
R-87	C	1	66	53	7	0
R-88	C	1	66	52	6	0
R-89	C	2	66	52	6	0
R-90	C	1	66	50	5	0
R-91	C	1	66	50	5	0
R-92	C	2	66	50	5	0
R-93	C	1	66	49	4	0
R-94	C	1	66	49	4	0
R-95	C	1	66	49	4	0
R-96	C	1	66	49	4	0
R-97	C	1	66	49	5	0
R-98	C	1	66	48	4	0
R-99	C	1	66	48	4	0
R-100	C	1	66	48	4	0
R-101	C	1	66	48	4	0
R-102	C	1	66	48	4	0
R-103	C	1	66	48	4	0
R-104	C	1	66	48	4	0
R-105	C	1	66	49	5	0
R-106	C	1	66	49	5	0
R-107	C	1	66	49	5	0
R-108	C	1	66	49	5	0
R-109	C	1	66	49	5	0
R-110	C	1	66	49	5	0
R-111	C	1	66	48	4	0

Table 20. Future Build Traffic Noise Levels Wenatchee Confluence Park Main Over-Night Camping Area						
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-112	C	1	66	48	4	0
R-113	C	1	66	48	4	0
R-114	C	1	66	48	4	0
R-115	C	2	66	48	4	0
R-116	C	1	66	48	4	0
R-117	C	1	66	48	4	0
R-118	C	1	66	49	5	0
R-119	C	1	66	49	5	0

Notes:

1. All receivers are shown in Figure 14.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 8; substantial increase impacts identified with **Bold-Red** type face.
7. The number of impacted residences with noise levels that meet or exceed the NAC.

9.6. Build Traffic Noise Levels, Residential, Hotel, and School Uses

Under the Build Alternative noise levels for the Residential, Hotel, and Schools Uses north of McKittrick are predicted to range from 50 to 62 dBA Leq. No sensitive uses would meet the NAC under the Build Alternative. The modeling results for the North Segment are provided in Table 21.

Table 21. Future Build Traffic Noise Levels Residential, Hotel, and School Uses						
Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-120	B	1	66	50	3	0
R-121	E	1	71	57	4	0
R-122	C	18.59	66	55	5	0
R-123	E	1	71	53	8	0
R-124	C	7.74	66	55	-1	0

Table 21. Future Build Traffic Noise Levels Residential, Hotel, and School Uses

Receiver[1]	Land Use[2]	Units[3]	Sound Level in Leq (dBA)			Traffic Noise Impacts[7]
			Criteria[4]	Build[5]	Increase vs. Existing (in dB)[6]	
R-125	C	8.3	66	54	0	0
R-126	C	8.3	66	62	-1	0
R-127	B	1	66	61	2	0
R-128	C	1	66	59	5	0

Notes:

1. All receivers are shown in Figures 12, 13, and 15.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria.
5. Predicted peak hour noise levels, with levels meeting NAC in **Bold-Red** typeface.
6. Increase in noise levels over the existing conditions noise levels provided in Table 9; substantial increase impacts identified with **Bold-Red** type face.
7. The number of impacted residences with noise levels that meet or exceed the NAC.

10. NOISE LEVELS SUMMARY

Table 22 provides a full summary of existing, 2040 No-Build Alternative, and 2040 Build Alternative noise levels for all receivers. The table also identifies locations that have noise levels which meet the WSDOT NAC, traffic noise impacts under the Build Alternative, and the change in noise levels between the existing, 2040 No-Build, and 2040 Build Alternatives.

Most traffic noise impacts occur south of the Wenatchee River, occurring primarily within and near the Horan Natural Area and the Monterey Senior Community. North of the Wenatchee River the only impact will occur at the proposed relocated park staff housing in Confluence State Park.

Table 22. Traffic Noise Level Summary – All Areas Combined										
Receiver[1]	Land Use[2]	Units[3]	Criteria (dBA Leq)[4]	Existing Conditions	No-Build Alternative		Build Alternative			
				Level (Leq dBA)[5]	Level (Leq dBA)[5]	Vs. Exist (in dB)[6]	Level (Leq dBA)[5]	Vs. Exist (in dB)[7]	No. of Impacts[8]	Vs. No-Build (in dB)[9]
R-1	B (E)[10]	2 (1)[11]	66 (71)	58	58	0	65	7	0	7
R-2	B	4	66	58	58	0	64	6	0	6
R-3	B	7	66	52	53	1	59	7	0	6
R-4	B	2	66	50	50	0	56	6	0	6
R-5	B	2	66	50	50	0	56	6	0	6
R-6	B	5	66	53	54	1	59	6	0	5
R-7	B	3	66	55	55	0	61	6	0	6
R-8	B	2	66	64	64	0	**68**	4	2	4
R-9	B	1	66	63	63	0	**67**	4	1	4
R-10	E	1	71	62	63	1	67	5	0	4
R-11A	C	1.02	66	--[12]	--[12]	N/A	59	N/A	0	0
R-11B	C	1.02	66	--[12]	--[12]	N/A	55	N/A	0	0
R-12A	C	1.02	66	--[12]	--[12]	N/A	53	N/A	0	0
R-12B	C	1.02	66	--[12]	--[12]	N/A	54	N/A	0	0
R-13A	C	1.02	66	--[12]	--[12]	N/A	55	N/A	0	0
R-13B	C	1.02	66	--[12]	--[12]	N/A	60	N/A	0	0
R-14	C	1.02	66	46	47	1	**67**	**21**	1.02	20
R-15	C	1.02	66	47	47	0	**70**	**23**	1.02	23
R-16	C	0.23	66	45	46	1	52	7	0	6
R-17	C	1.02	66	49	50	1	62	**13**	1.02	12
R-18	C	1.02	66	51	51	0	65	**14**	1.02	14

Table 22. Traffic Noise Level Summary – All Areas Combined										
Receiver[1]	Land Use[2]	Units[3]	Criteria (dBA Leq)[4]	Existing Conditions	No-Build Alternative		Build Alternative			
				Level (Leq dBA)[5]	Level (Leq dBA)[5]	Vs. Exist (in dB)[6]	Level (Leq dBA)[5]	Vs. Exist (in dB)[7]	No. of Impacts[8]	Vs. No-Build (in dB)[9]
R-19	C	1.02	66	51	52	1	64	13	1.02	12
R-20	C	0.23	66	49	50	1	55	6	0	5
R-21	C	0.23	66	48	48	0	53	5	0	5
R-22	C	0.23	66	47	48	1	53	6	0	5
R-23	C	0.23	66	46	47	1	52	6	0	5
R-24	C	0.23	66	47	47	0	51	4	0	4
R-25	C	0.23	66	45	46	1	50	5	0	4
R-26	C	0.23	66	45	46	1	50	5	0	4
R-27	C	0.23	66	44	45	1	49	5	0	4
R-28	C	0.23	66	44	45	1	48	4	0	3
R-29	C	0.23	66	44	45	1	48	4	0	3
R-30	C	0.23	66	43	44	1	48	5	0	4
R-31	C	0.23	66	43	44	1	47	4	0	3
R-32	C	0.23	66	44	44	0	47	3	0	3
R-33	C	0.23	66	43	43	0	47	4	0	4
R-34	C	0.23	66	43	44	1	47	4	0	3
R-35	C	1	66	42	44	2	49	7	0	5
R-36	C	1	66	50	52	2	53	3	0	1
R-37	C	1	66	43	44	1	47	4	0	3
R-38	C	1	66	42	43	1	46	4	0	3
R-39	C	1	66	43	44	1	47	4	0	3

Table 22. Traffic Noise Level Summary – All Areas Combined										
Receiver[1]	Land Use[2]	Units[3]	Criteria (dBA Leq)[4]	Existing Conditions	No-Build Alternative		Build Alternative			
				Level (Leq dBA)[5]	Level (Leq dBA)[5]	Vs. Exist (in dB)[6]	Level (Leq dBA)[5]	Vs. Exist (in dB)[7]	No. of Impacts[8]	Vs. No-Build (in dB)[9]
R-40	C	1	66	51	52	1	60	9	0	8
R-41	C	1	66	49	50	1	56	7	0	6
R-42	C	1	66	53	54	1	58	5	0	4
R-43	C	1	66	54	55	1	--[13]	N/A	0	0
R-44	C	1	66	51	52	1	58	7	0	6
R-45	C	1	66	50	49	-1	55	5	0	6
R-46	C	1.02	66	50	51	1	59	9	0	8
R-47	C	1	66	45	47	2	51	6	0	4
R-48	C	1.02	66	47	48	1	55	8	0	7
R-49	B	0	66	--[12]	--[12]	N/A	59	N/A	0	0
R-50	B	1	66	--[12]	--[12]	N/A	67	N/A	1	0
R-51	C	1.51	66	50	50	0	53	3	0	3
R-52	C	1.51	66	46	47	1	51	5	0	4
R-53	C	1.51	66	48	49	1	50	2	0	1
R-54	C	1.51	66	48	50	2	48	0	0	-2
R-55	C	1.51	66	46	48	2	51	5	0	3
R-56	C	1.51	66	46	47	1	49	3	0	2
R-57	C	1.51	66	45	47	2	48	3	0	1
R-58	C	1.02	66	49	50	1	63	14	1.02	13
R-59	C	0	66	--[12]	--[12]	N/A	59	N/A	0	0
R-60	C	1.02	66	--[12]	--[12]	N/A	62	N/A	0	0

Table 22. Traffic Noise Level Summary – All Areas Combined										
Receiver[1]	Land Use[2]	Units[3]	Criteria (dBA Leq)[4]	Existing Conditions	No-Build Alternative		Build Alternative			
				Level (Leq dBA)[5]	Level (Leq dBA)[5]	Vs. Exist (in dB)[6]	Level (Leq dBA)[5]	Vs. Exist (in dB)[7]	No. of Impacts[8]	Vs. No-Build (in dB)[9]
R-66	C	1	66	47	47	0	50	3	0	3
R-67	C	1	66	47	48	1	51	4	0	3
R-68	C	1	66	47	47	0	52	5	0	5
R-69	C	1	66	46	47	1	52	6	0	5
R-70	C	1	66	46	47	1	53	7	0	6
R-71	C	1	66	46	47	1	53	7	0	6
R-72	C	1	66	47	48	1	53	6	0	5
R-73	C	1	66	47	48	1	53	6	0	5
R-74	C	1	66	47	48	1	52	5	0	4
R-75	C	1	66	46	47	1	52	6	0	5
R-76	C	1	66	46	47	1	51	5	0	4
R-77	C	1	66	46	46	0	50	4	0	4
R-78	C	1	66	45	46	1	50	5	0	4
R-79	C	1	66	45	46	1	49	4	0	3
R-80	C	1	66	45	46	1	49	4	0	3
R-81	C	1	66	45	46	1	50	5	0	4
R-82	C	1	66	45	46	1	50	5	0	4
R-83	C	1	66	45	46	1	51	6	0	5
R-84	C	1	66	45	46	1	51	6	0	5
R-85	C	2	66	46	47	1	52	6	0	5
R-86	C	1	66	46	47	1	52	6	0	5

Table 22. Traffic Noise Level Summary – All Areas Combined										
Receiver[1]	Land Use[2]	Units[3]	Criteria (dBA Leq)[4]	Existing Conditions	No-Build Alternative		Build Alternative			
				Level (Leq dBA)[5]	Level (Leq dBA)[5]	Vs. Exist (in dB)[6]	Level (Leq dBA)[5]	Vs. Exist (in dB)[7]	No. of Impacts[8]	Vs. No-Build (in dB)[9]
R-87	C	1	66	46	47	1	53	7	0	6
R-88	C	1	66	46	47	1	52	6	0	5
R-89	C	2	66	46	47	1	52	6	0	5
R-90	C	1	66	45	46	1	50	5	0	4
R-91	C	1	66	45	46	1	50	5	0	4
R-92	C	2	66	45	46	1	50	5	0	4
R-93	C	1	66	45	46	1	49	4	0	3
R-94	C	1	66	45	46	1	49	4	0	3
R-95	C	1	66	45	46	1	49	4	0	3
R-96	C	1	66	45	46	1	49	4	0	3
R-97	C	1	66	44	46	2	49	5	0	3
R-98	C	1	66	44	45	1	48	4	0	3
R-99	C	1	66	44	45	1	48	4	0	3
R-100	C	1	66	44	45	1	48	4	0	3
R-101	C	1	66	44	45	1	48	4	0	3
R-102	C	1	66	44	45	1	48	4	0	3
R-103	C	1	66	44	45	1	48	4	0	3
R-104	C	1	66	44	45	1	48	4	0	3
R-105	C	1	66	44	45	1	49	5	0	4
R-106	C	1	66	44	45	1	49	5	0	4
R-107	C	1	66	44	45	1	49	5	0	4

Table 22. Traffic Noise Level Summary – All Areas Combined										
Receiver[1]	Land Use[2]	Units[3]	Criteria (dBA Leq)[4]	Existing Conditions	No-Build Alternative		Build Alternative			
				Level (Leq dBA)[5]	Level (Leq dBA)[5]	Vs. Exist (in dB)[6]	Level (Leq dBA)[5]	Vs. Exist (in dB)[7]	No. of Impacts[8]	Vs. No-Build (in dB)[9]
R-108	C	1	66	44	45	1	49	5	0	4
R-109	C	1	66	44	45	1	49	5	0	4
R-110	C	1	66	44	45	1	49	5	0	4
R-111	C	1	66	44	45	1	48	4	0	3
R-112	C	1	66	44	45	1	48	4	0	3
R-113	C	1	66	44	45	1	48	4	0	3
R-114	C	1	66	44	45	1	48	4	0	3
R-115	C	2	66	44	45	1	48	4	0	3
R-116	C	1	66	44	45	1	48	4	0	3
R-117	C	1	66	44	45	1	48	4	0	3
R-118	C	1	66	44	45	1	49	5	0	4
R-119	C	1	66	44	45	1	49	5	0	4
R-120	B	1	66	47	46	-1	50	3	0	4
R-121	E	1	71	53	54	1	57	4	0	3
R-122	C	18.59	66	50	51	1	55	5	0	4
R-123	E	1	71	45	46	1	53	8	0	7
R-124	C	7.74	66	56	58	2	55	-1	0	-3
R-125	C	8.3	66	54	55	1	54	0	0	-1
R-126	C	8.3	66	63	64	1	62	-1	0	-2
R-127	B	1	66	59	60	1	61	2	0	1
R-128	C	1	66	54	56	2	59	5	0	3

Table 22. Traffic Noise Level Summary – All Areas Combined

Receiver[1]	Land Use[2]	Units[3]	Criteria (dBA Leq)[4]	Existing Conditions	No-Build Alternative		Build Alternative			
				Level (Leq dBA)[5]	Level (Leq dBA)[5]	Vs. Exist (in dB)[6]	Level (Leq dBA)[5]	Vs. Exist (in dB)[7]	No. of Impacts[8]	Vs. No-Build (in dB)[9]
Summary		Minimum		42	43	-1	46	-1	--	-3
		Maximum		64	65	2	70	23	--	23
		Total Meeting NAC							10.12	
Substantial increase noise impacts with future noise levels 10 dB or more above existing =									7.12	

Notes:

Receivers R-49, R-50, R-58, and R-60 represent receivers that are only valid under the Future-Build and therefore no existing and No-Build noise modelling noise levels are available.

1. All receivers are shown in Figures 11 through 15.
2. FHWA land use: See Table 1.
3. Number of dwellings represented by each receiver.
4. WSDOT traffic noise abatement criteria by land use type.
5. Predicted peak hour noise levels in dBA Leq for condition stated, taken from TNM version 2.5 with bold red typeface used to indicate noise levels that are equal to or greater than the NAC of 66 dBA Leq for Category B uses.
6. Change in noise: No-Build compared to existing conditions.
7. Change in noise: Build compared to existing conditions with bold red typeface used to indicate noise level increases of 10dB or greater (substantial increase impacts).
8. Number of uses predicted to meet or exceed the WSDOT NAC, either the level criteria or substantial increase criteria.
9. Change in noise: Build compared to No-Build for reference only.
10. Receiver R-1 represents residential (B) and commercial (E) land uses.
11. Receiver R-1 includes two residences at the Monterey Senior Community (FHWA Cat B: 66 dBA Leq) and one unit for the exterior of the Red Lion Hotel (FHWA Cat E: 71 dBA Leq).
12. Receivers were not included with the existing and no-build models, and therefore no existing or no-build model noise levels are available.
13. Receiver was not included with the build model, and therefore no build model noise level is available.

10.1. Noise Impact Summary

The following locations were identified with noise levels meeting the noise abatement criteria for WSDOT:

10.1.1. Noise Impact Summary: North Wenatchee Avenue and North Miller Street

Noise impacts are predicted at the three first row residences at the Monterey Senior Community manufactured home park. Two of the residences are located directly on North Wenatchee Avenue on each side of the entrance, with the third located at the north end of mobile home park, next to a commercial structure.

10.1.2. Noise Impact Summary: Horan Natural Area

Noise impacts were identified at seven locations along or near the proposed relocated Apple Capital Recreation Loop Trail and bike path along the east side of Confluence Parkway. In the south end, impacts would start where the trail begins moving closer to Confluence Parkway (R-13B). The remaining receivers moving north along the trail are also predicted to have noise impacts (R-14, R-15, R-17, R-18, R-19, and R-58). However, impacts were not identified along the new Apple Capital Recreation Loop Trail that runs behind the existing PUD power station and storage area (R-11A, R-11B, R-12A, R-12B, and R-13A). It is important to note that R-13A has a noise level increase of 9 dB, and a slight movement to the north would increase the change in noise levels to 10 dB, resulting in an impact. For receivers along the trail north of the PUD and south of the bridge (R-13B through R-20 and R-58), only R-16, located 300 feet from Confluence Parkway, did not have a substantial increase impact. Receiver R-13B to R-15, R-17 to R-19, and R-58 are predicted to have increase in traffic noise ranging from 12 to 23 dB over the existing conditions. This high level of increase is due to the new Confluence Parkway.

Noise levels farther east, inside the Horan Natural Area, are predicted to have increases of 3 to 6 dB over the existing conditions (R-20 through R-34), Although no noise impacts are predicted in this area, noise levels are predicted to increase from the mid 40's dBA Leq range to the upper 40's to mid 50's dBA Leq during peak hour.

10.1.3. Noise Impact Summary: Walla Walla Point Park

No traffic noise impacts are predicted at any frequent use area at the Walla Walla Point Park. Future traffic noise levels are predicted to increase by 3 to 7 dB when compared to the existing conditions with future noise levels of 47 to 53 dBA Leq with a criteria of 66 dBA Leq.

10.1.4. Noise Impact Summary: Wenatchee Confluence State Park Day-Use and Group Camping Area

This analysis area includes the new two-level Confluence Parkway Bridge, which is planned to have a pedestrian crossing on a lower level under the travel lanes. Because TNM will not

model a receiver directly under a bridge, no predicted noise levels for the exact location are possible. However, receiver R-59 was modeled as close to the bridge as possible, and at an elevation that would locate the receiver under the bridge. The predicted noise levels of 59 dBA Leq meets the impact criteria.

Additional noise modeling was performed for receivers near, or on, the relocated Apple Capital Recreation Loop Trail as they approach the bridge (R-58 and R-60), where noise levels of 62 and 63 dBA Leq are predicted. The low noise levels are due to the topography of the relocated trail transitioning to the underside of the bridge. Other receivers located near the ends of the bridge (See R-40 and R-46) are predicted to have traffic noise increases of 9 dB over the existing conditions.

Receivers on the small island and along the Wenatchee River (R-41, R-42, R-44, R-45), modeled at the request of the Washington State Parks Department, have modeled noise levels of 55 to 58 dBA Leq, an increase of 5 to 7 dB over the existing conditions. Impacts were not identified at these receivers.

North of the bridge, in the Wenatchee Confluence State Park Day-Use and Group Camping Area, Receivers R-46 to R-48, along the Apple Capital Recreation Loop Trail just north of the camping area, have predicted increases of 6 to 9 dB over the existing conditions, with receiver R-46 just below the criteria with an increase of 9 dB.

Two new receivers are located in the front and back yard of the proposed relocated park staff housing (R-49 and R-50, FHWA Cat B). Impacts were identified in the front yard (R-50) with a level of 67 dBA. The back yard, represented by R-49, would be shielded by the park staff housing, resulting in lower noise levels, and therefore did not meet the impact criteria.

All camping sites are located over 400 feet from the new Confluence Parkway and are well below the grade of the new roadway. The distance and topographical conditions between the Confluence Parkway and the camping sites reduced traffic noise levels to 48 to 53 dBA, which are increases over the existing conditions of 3 to 7 dB. Therefore, with no increases of 10 dB or more, and no noise levels over 66 dBA, there were no impacts identified in the camping areas. (see R-66 to R-119).

Noise levels in the day use area, represented by receivers R-51 to R-57, are also shielded from Confluence Parkway by topographical conditions, including a very steep hillside. Traffic noise levels are predicted to remain below the criteria, with levels of 47 to 50 dBA Leq, and increases of 1 to 2 dB over the existing conditions.

10.1.5. Noise Impact Summary: Residential, Hotel, and School Uses

Several residences, school and other noise sensitive uses near the corridor north of McKittrick were also examined for noise impacts (see R-120 to R-128). No impacts were identified at any of these locations due to distance from the Confluence Parkway, physical or structural shielding, and existing noise from other roadways.

11. NOISE ABATEMENT ANALYSIS

In accordance with the current 2020 WSDOT Policy, when traffic noise impacts are identified, noise abatement measures must be considered for those developments that existed or have been issued a building permit prior to the date of public knowledge of the Project. This includes identifying noise abatement measures that are feasible and reasonable and that are likely to be incorporated into the Project. In addition, the noise analysis must also identify noise impacts for which no apparent solution is available and an explanation of why noise abatement was not recommended.

Whenever noise impacts are expected, noise abatement measures, including noise barriers and earthen berms, are evaluated. Construction of noise barriers between the roadways and the affected receivers would reduce noise levels by physically blocking the transmission of traffic-generated noise. Barriers can be constructed as walls or earthen berms. Earthen berms require more right-of-way than walls and are usually constructed with a 3-to-1 slope. Noise barriers should be high enough to break the line-of-sight between the noise source and the receiver. They must also be long enough to prevent significant flanking of noise around the ends of the barriers. Due to limited right-of-way within the study area, only noise walls were considered for noise abatement.

11.1. WSDOT Noise Abatement Criteria

For noise abatement to be recommended for inclusion with a project, the abatement must meet the feasibility and reasonability criteria set forth by WSDOT. Feasibility deals primarily with engineering considerations, such as whether substantial or meaningful noise level reductions can be achieved or whether there would be a negative effect on property access. Reasonableness assesses the practicality of the abatement measure based on a number of factors. Required factors are cost effectiveness, consideration of the viewpoints of the property owners and residents of benefited receivers, and noise abatement performance (noise reduction design goal). Details on the requirements are provided in the following sections.

11.1.1. Feasibility of Noise Abatement

In evaluating whether a particular noise abatement measure is feasible, WSDOT considered acoustics and engineering, and requires the following to occur for noise abatement to be feasible:

- Abatement must be physically constructible.
- A minimum of three (3) first row impacted receivers must obtain a minimum 5 dBA of noise reduction as a result of abatement (insertion loss), assuring that every reasonable effort will be made to assess outdoor use areas as appropriate.

In general, noise barriers are ineffective at reducing traffic noise levels when constructed along roadways that have uncontrolled access points (e.g., driveways and pedestrian access)

due to the openings in the noise barrier required to accommodate access. These openings can allow sufficient noise onto the property, making it difficult if not impossible to meet the required noise reduction requirement for residences adjacent to the roadway. While noise abatement measures are considered for all project-related impacts, some noise barriers that would clearly not meet the feasibility criteria are evaluated qualitatively without extensive modeling efforts.

The noise abatement must be physically constructible as well to meet feasibility requirements. WSDOT also considers engineering factors when determining feasibility. Safety factors that should be considered in the feasibility assessment of noise abatement include: maintaining a clear recovery zone, redirection of errant vehicles, ensuring adequate sight distance, and fire/emergency vehicle access. The consideration of abatement may also include potential environmental impacts to wetlands, property access, placement of utilities and stormwater control facilities, and construction on steep slopes. Engineering considerations should be made in concert with the project engineering office.

11.1.2. Reasonableness of Noise Abatement

Once noise abatement is determined feasible, the abatement is evaluated for its reasonableness. Two primary criteria are used in considering the reasonableness of a particular abatement measure: Cost-effectiveness and the WSDOT Design Goal Achievement. In areas where homes are scattered too far apart for noise barriers to be built at a reasonable cost, the noise abatement analysis is limited to qualitative discussion without extensive modeling efforts.

11.1.3. Cost Effectiveness

The cost of noise abatement sufficient to provide at least the minimum feasible noise reductions must be equal to or less than the allowable cost of abatement for each noise wall location analyzed. Based on noise wall costs from 2010 to 2015, the current average costs for Washington State for a Type I project is $51.61 per square foot of noise wall.

Either the barrier size or cost outlined in Table 23 below can be used to describe the reasonableness evaluation. However, a cost description must be included if there are non-standard additional costs, or costs that would not occur “but for” the barrier (e.g., additional foundation costs for steep slopes, unique drainage requirements, etc.). Additional cost estimates for abatement are added to the planning level costs as part of the reasonableness evaluation.

Barriers are evaluated independently for feasibility and reasonableness, with some exceptions for barrier systems. On projects where noise barriers are considered for multiple locations, a feasibility and reasonableness evaluation will be done for each area independently.

Table 23 provides the allowable costs which are a function of the current planning level barrier cost ($51.61) multiplied by the allowable wall size for the receiver benefitting from the noise wall. The table shows the allowable costs for each receiver based on the predicted

Build condition noise levels or sound level increases. Higher noise levels, or larger sound level increases, are allowed more money for abatement.

The cost evaluation used to determine WSDOT planning level cost estimates for a standard noise wall includes the following elements:

1) Noise barrier construction labor and materials, including clearing and grubbing and the acquisition of property needed for the noise barrier;

2) Traffic management measures, as necessary only for the barrier construction;

3) A percent of the total project's workforce mobilization costs;

4) Sales tax.

Table 23. Reasonableness Allowances

Column A	Column B	Column C	Column D
Design Year Traffic Sound Decibel Level (dBA)	**Noise level increase as a result of the project (dBA)[2]**	**Allowed Wall Surface Area Per Qualified Residence or Residential Equivalent**	**Allowed Cost Per Qualified Residence or Residential Equivalent[1]**
66		700 Sq. Feet	$36,127
67		768 Sq. Feet	$39,636
68		836 Sq. Feet	$43,146
69		904 Sq. Feet	$46,655
70		972 Sq. Feet	$50,165
71	10 (substantial, step 1)[3]	1,040 Sq. Feet	$53,674
72	11 (substantial, step 1)	1,108 Sq. Feet	$57,184
73	12 (substantial, step 1)	1,176 Sq. Feet	$60,693
74	13 (substantial, step 1)	1,244 Sq. Feet	$64,203
75	14 (substantial, step 1)	1,312 Sq. Feet	$67,712
76	15 (substantial, step 2)[4]	1,380 Sq. Feet	$71,222

Notes:

1. Current costs based on $51.61 per square foot constructed cost developed in 2010.
2. If the noise level increases 10 dBA or more as the result of the project (Column B), follow the allowed wall surface and cost for the level of increase in Column C in lieu of the total design year sound decibel level in Column A. For total highway related sound levels at 76 or more dBA or the project results in an increase of 15 or more decibels, continue increasing the allowance at the rate provided in this table unless circumstances determined on a case-by-case basis require an alternative methodology for determining allowance.
3. Step 1 is when the noise levels are 10 to 14 dBA over existing conditions traffic noise as a result of the transportation project.
4. Step 2 is when the noise levels are 15 or more dBA over existing conditions traffic noise as a result of the transportation project (or total highway related noise levels are between 76 and 79 decibels). Additional consideration for abatement may be considered under these circumstances.
5. Sq. Feet = square feet.

11.1.4. Design Goal Achievement

The minimum design goal for abatement is at least 7 dBA of reduction at one receiver. Noise walls cannot be recommended if they do not achieve the design goal. In addition to the design goal requirement, WSDOT will make a reasonable effort to achieve a 10 dBA or greater insertion loss (noise reduction) at the first row of receivers for all projects where abatement is recommended.

11.1.5. Other Considerations

A larger noise barrier than the minimum feasible and reasonable size shall be constructed when a barrier is highly cost effective. A barrier is considered highly cost effective when it reduces noise levels behind the barrier by 10 dBA, or more, for the majority of first row receivers at less than 75 percent of the maximum reasonable cost allowed for abatement.

11.1.6. Summary of Abatement Requirements

In summary, in order to be recommended for construction, noise abatement must meet the three criteria:

1) **Feasibility:** At least three first row receivers with noise impacts must have an insertion loss (noise reduction) of 5 dB or more.
2) **Reasonableness:** The total allowable cost or square footage (SF) for benefited receivers (using the allowable cost or SF from Table 23), must equal, or exceed the costs or SF of the noise abatement measure (noise barrier).
3) **Design Goal:** At least one receiver must have a noise reduction of 7 dB (insertion loss of 7 dB or more).

For any considered noise abatement, these three criteria are reviewed, in order. If, for example, the Feasibility Criteria cannot be met, there will no comparison of the Reasonability or Design Goal criteria.

11.2. Noise Abatement Measures, North Wenatchee Avenue and North Miller Street

Noise impacts were identified at 3 residences at the Monterey Senior Community. Several different noise walls were considered and evaluated for this area, and no abatement was effective at meeting the WSDOT reasonability and insertion loss requirements due to community driveways.

Under the WSDOT policy, three receivers with noise impacts mush achieve a 5 dB reduction, and in this case, all three residences with noise impacts are located directly adjacent to vehicle driveways and pedestrian access. If a noise wall were constructed, the two driveway openings would allow a large amount of traffic noise to flank around the end of the walls, effecting the exterior use at all three of these residences. Due to the openings for vehicles, achieving a 5 dB reduction at all three of these residences could not be achieved. Therefore, at this time, no traffic noise abatement is recommended for the Monterey Senior Community.

11.3. Noise Abatement Measures, Apple Capital Recreation Loop Trail and Horan Natural Area

Projects with new roadways in new locations are often complicated when considering noise abatement measures. It can be even more complicated when the new roadway is located near a sensitive bird and wildlife sanctuary and viewing area like the Horan Natural Area. Further complicating the abatement is the new bridge over the Wenatchee River and the nearby Wenatchee Confluence State Park Campgrounds. In addition, for parks and other areas with common outdoor uses like the Horan Natural Area and the Apple Capital Recreation Loop Trail, WSDOT uses a residential equivalent for the analysis of reasonability of noise abatement. Finally, it is also important to note that even if an abatement measure is not reasonable and feasible, it can still be constructed at the discretion of the agency, however federal funding may not be available to aid in the cost.

Further, the noise impacts for this project in some locations along the Horan Natural Area exceed the 15 dB increase criteria that allows for consideration of additional abatement (see footnote 4 in Table 23). Increases of over 20 dB are predicted at some parts of the Apple Capital Recreation Loop Trail. This caveat allows for noise abatement that may not normally be considered reasonable and feasible to be included in the project and also included as part of the project funding mechanisms, state and federal, at the discretion of the state agency. Keeping these facts in mind, and also considering the sensitivity of the Horan Natural Area, its frequent year-round use, and public concern over adverse effects from noise, several efforts to abate the noise were considered.

The new Confluence Parkway Bridge would be equipped with a traffic safety barrier. For this noise analysis it was assumed that a solid barrier at least 32 inches above the roadway surface would be included along the entire bridge structure. This barrier was included in the noise model as they can be effective at reducing tire-roadway noise.

The design team also provided detailed drawings for three earth berms that could be constructed with the proposed project. The proposed berms would be located along the east side of Confluence Parkway, with heights above the roadway of approximately 4 feet. One of the berms would be located near and between R-13b and R-14, with the second berm beginning north of R-15 and ending just before the new Confluence Parkway Bridge. The third berm is north of the river, and extends for approximately 550 feet, ending near the proposed relocated park staff housing.

Berms are similar to noise walls, physically blocking noise from reaching the receiver. Berms do require more right-of-way than walls, for example, with a slope of 3 to 1, a four-foot berm would require 12 feet of right-of-way. Berms can also be planted with shrubs or other foliage to prevent erosion and allow for steeper slopes. Any plantings, while softening the site and adding a more pleasing aesthetics, will not provide any meaningful noise reduction. To provide a more effective barrier, and more noise reduction, the overall height of the barrier can be increased by adding a noise wall on the top of a berm.

For this project both berms and walls, along with a noise wall on top of the berm, were considered and modeled for noise reduction. The initial analysis, with the results provided in Tables 16 through 21 and also in Table 22, did not include a berm or noise wall, and is referred to as the baseline build conditions.

Finally, near receivers R-14 and R-15 the Apple Capital Recreation Loop Trail and the new Confluence Parkway would be located very close to each other and there would not be enough right-of-way for a berm. Therefore, for this short part of the corridor, approximately 250 feet long, the only feasible form of noise mitigation would be a noise wall.

Based on the berms provided by the project design team and limitations described above, the following baseline build condition noise abatement measures were modeled:

- **Four Foot Barrier:** Baseline build condition with three separate 4-foot-tall berms, one south berm, near R-14, a second berm extending from R-15 to the bridge near R-58, and a third and final berm north of the bridge continuing to the proposed relocated park staff housing. In addition to the berms, a 4-foot-tall noise wall was included in the pinch point. The overall affect is an effective barrier of 4 feet tall from just south of the pinch point to the bridge, 42 inches across the bridge, and back to a 4-foot berm to the park staff housing.

- **Six Foot Barrier:** Same as above, but with a 6-foot wall starting just north of the old Hawley Street rail crossing, between R-13A and R-13B, merging the wall into the south earth berm, and reducing the wall height to 2 feet on top of the 4-foot berm, expanding the wall back to 6 feet tall through the pinch point, transitions back to the berm and reducing back down to 2 feet, and ending at the bridge. The 4-foot berm on the north side of the bridge to the park staff housing is also included in this modeling effort. This is an affective 6-foot noise wall in the Horan Natural Area, with a 4-foot wall north of the bridge.

- **Eight Foot Barrier:** Same as Six-Foot Barrier, except the effective height of the noise walls and berm-noise wall combinations would be 8 feet. The berm north of the bridge would remain at 4-feet.

To aid in understanding the different combinations of noise abatement measures several figures were prepared. Figure 16 is a general overview of the noise wall area, showing noise modeling locations, noise walls and berms, identifying the pinch point, and showing the new Apple Capital Recreation Loop Trail. Figures 17 through 20 provide representative cross sections near four receivers along the trail, R-15, R-17, R-19, and R-58. The location of the cross sections is also identified on Figure 16 for reference. The cross sections provide views of the baseline modeling conditions, baseline with the 4-foot berm, and with the berm noise wall combination.

Finally, it is important to note that noise walls are most effective for receivers within 350 feet of the wall. Between 350 feet and 500 feet, slight reduction of less than 3 to 5 dB will typically occur. Receivers outside 500 feet will rarely see any meaningful noise reduction

from the wall. Therefore, because many of the receivers in the Horan Natural Area are more than 500 feet from the wall, many may not show any noise reduction. This is also the case for the overnight camping areas in the Confluence State Park, as all camping sites are over 400 feet from the berm and Confluence Parkway.

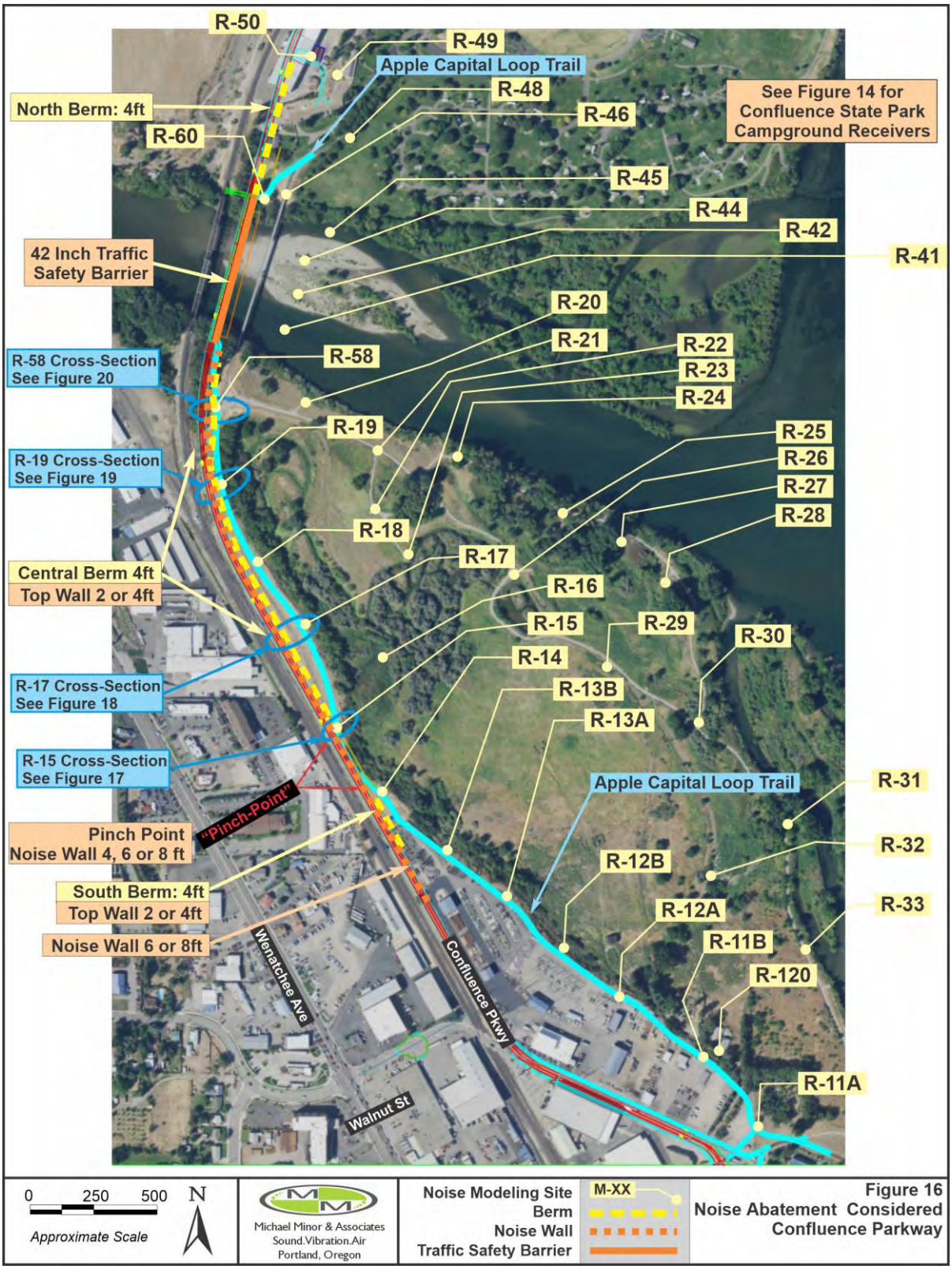
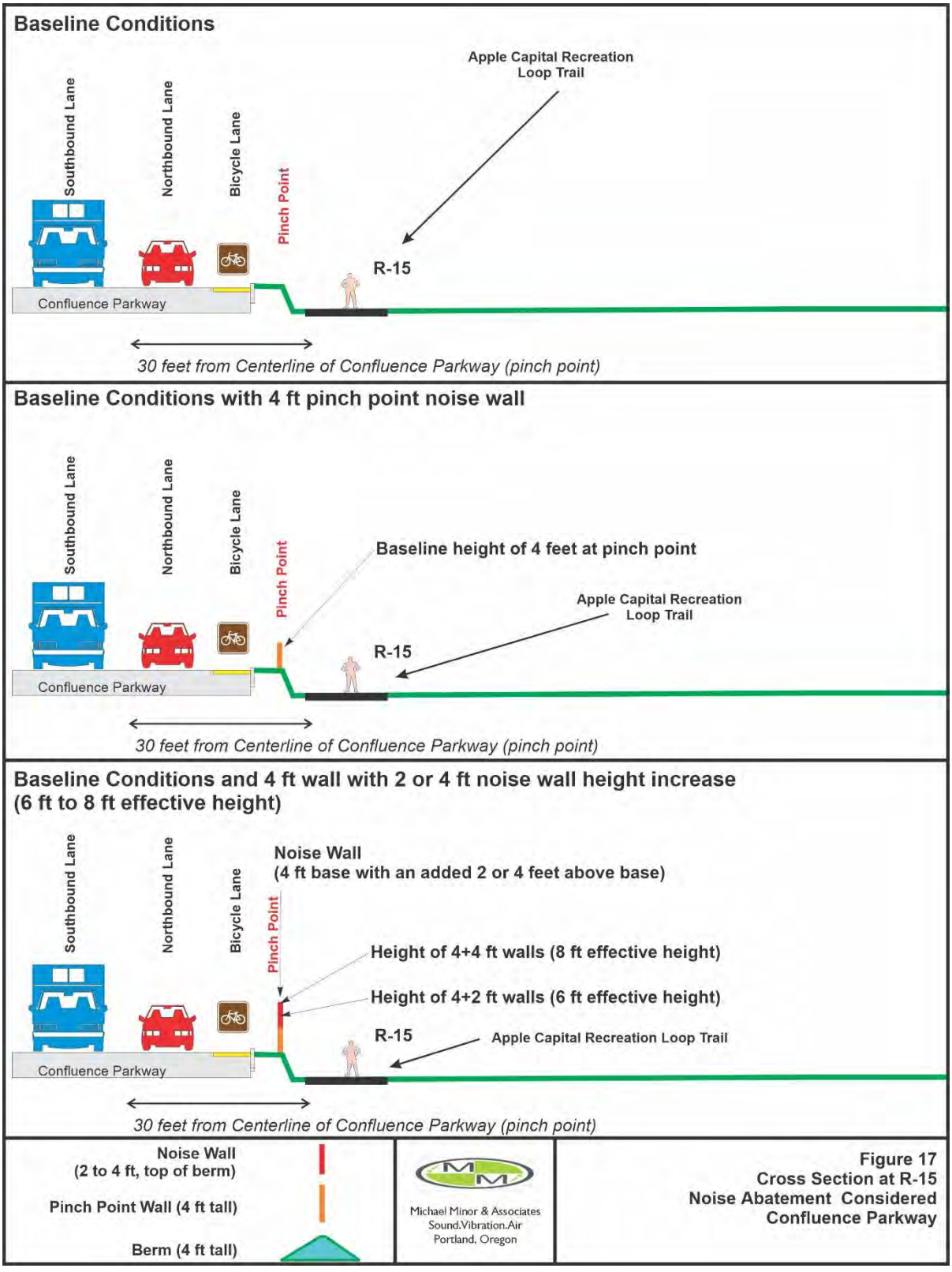
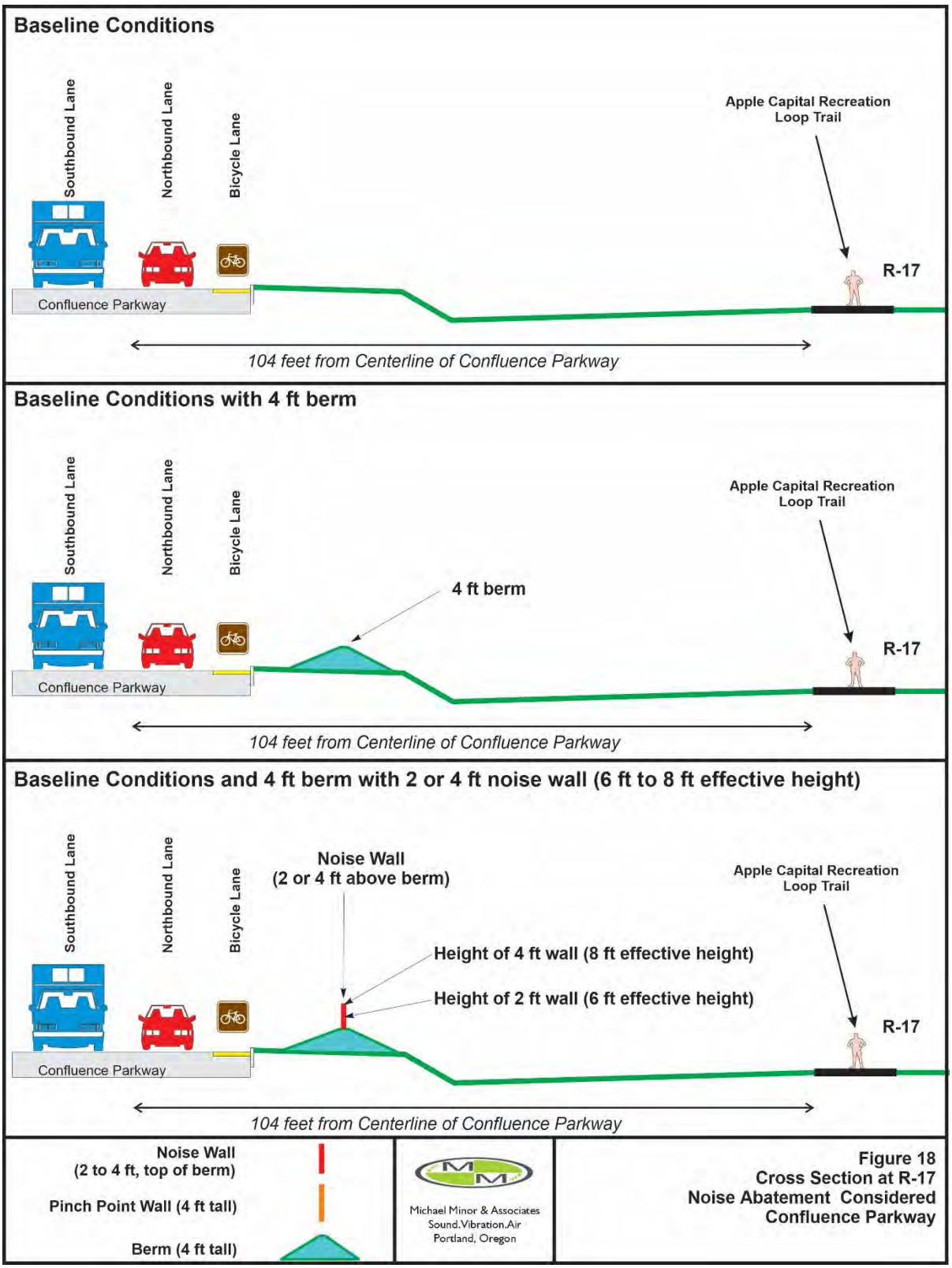


Figure 16
Noise Abatement Considered
Confluence Parkway


Baseline Conditions
Apple Capital Recreation Loop Trail
Southbound Lane
Northbound Lane
Bicycle Lane
Pinch Point
R-15
Confluence Parkway
30 feet from Centerline of Confluence Parkway (pinch point)
Baseline Conditions with 4 ft pinch point noise wall
Southbound Lane
Northbound Lane
Bicycle Lane
Pinch Point
Baseline height of 4 feet at pinch point
Apple Capital Recreation Loop Trail
R-15
Confluence Parkway
30 feet from Centerline of Confluence Parkway (pinch point)
Baseline Conditions and 4 ft wall with 2 or 4 ft noise wall height increase (6 ft to 8 ft effective height)
Southbound Lane
Northbound Lane
Bicycle Lane
Noise Wall
(4 ft base with an added 2 or 4 feet above base)
Pinch Point
Height of 4+4 ft walls (8 ft effective height)
Height of 4+2 ft walls (6 ft effective height)
R-15
Apple Capital Recreation Loop Trail
Confluence Parkway
30 feet from Centerline of Confluence Parkway (pinch point)
Noise Wall
(2 to 4 ft, top of berm)
Pinch Point Wall (4 ft tall)
Berm (4 ft tall)
Michael Minor & Associates
Sound.Vibration.Air
Portland, Oregon
Figure 17
Cross Section at R-15
Noise Abatement Considered
Confluence Parkway


Baseline Conditions
Southbound Lane
Northbound Lane
Bicycle Lane
Apple Capital Recreation Loop Trail
R-17
Confluence Parkway
104 feet from Centerline of Confluence Parkway
Baseline Conditions with 4 ft berm
Southbound Lane
Northbound Lane
Bicycle Lane
Apple Capital Recreation Loop Trail
4 ft berm
R-17
Confluence Parkway
104 feet from Centerline of Confluence Parkway
Baseline Conditions and 4 ft berm with 2 or 4 ft noise wall (6 ft to 8 ft effective height)
Southbound Lane
Northbound Lane
Bicycle Lane
Noise Wall
(2 or 4 ft above berm)
Apple Capital Recreation Loop Trail
Height of 4 ft wall (8 ft effective height)
Height of 2 ft wall (6 ft effective height)
R-17
Confluence Parkway
104 feet from Centerline of Confluence Parkway
Noise Wall
(2 to 4 ft, top of berm)
Pinch Point Wall (4 ft tall)
Berm (4 ft tall)
Michael Minor & Associates
Sound.Vibration.Air
Portland, Oregon
Figure 18
Cross Section at R-17
Noise Abatement Considered
Confluence Parkway

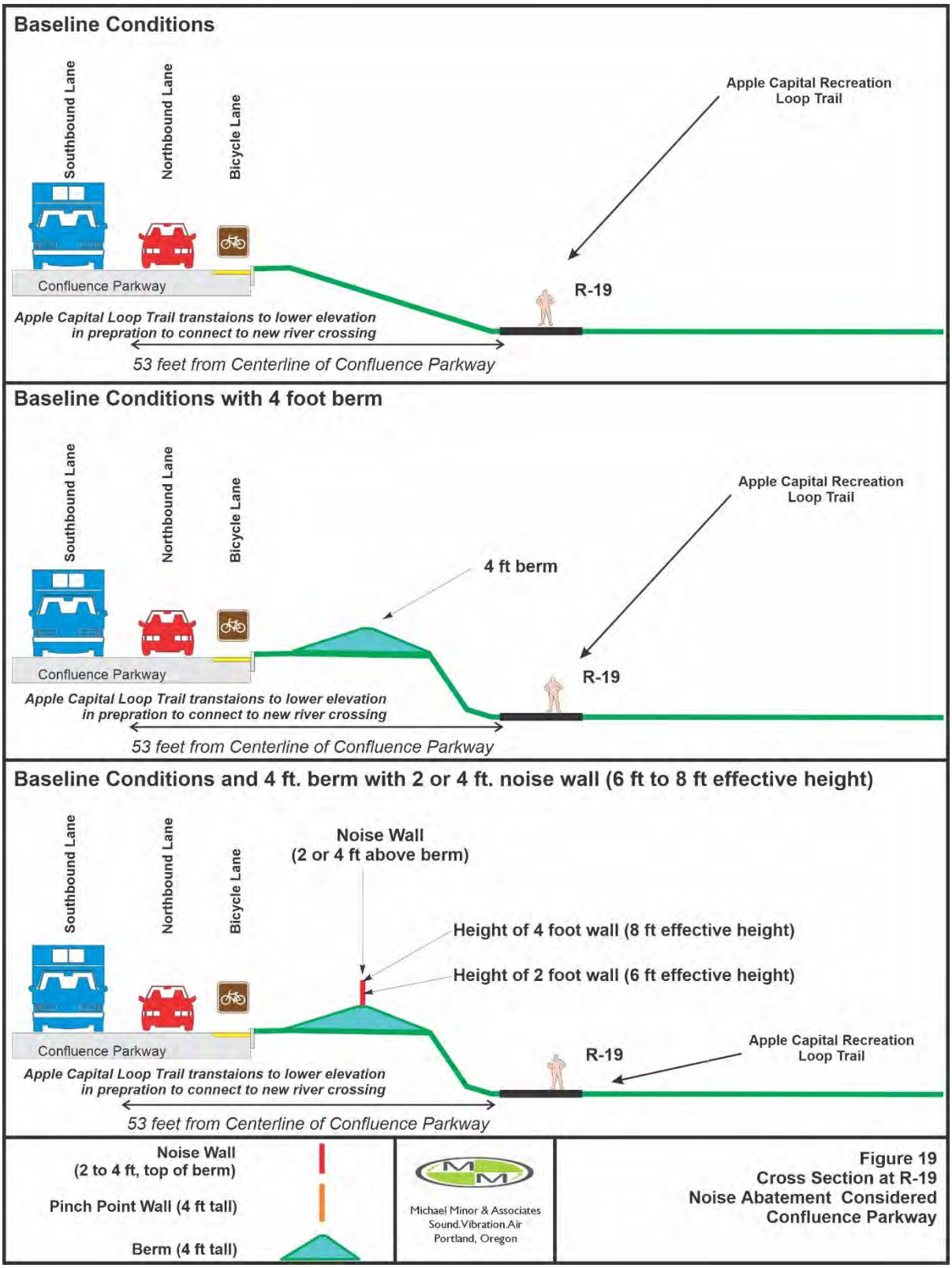


Figure 19
Cross Section at R-19
Noise Abatement Considered
Confluence Parkway

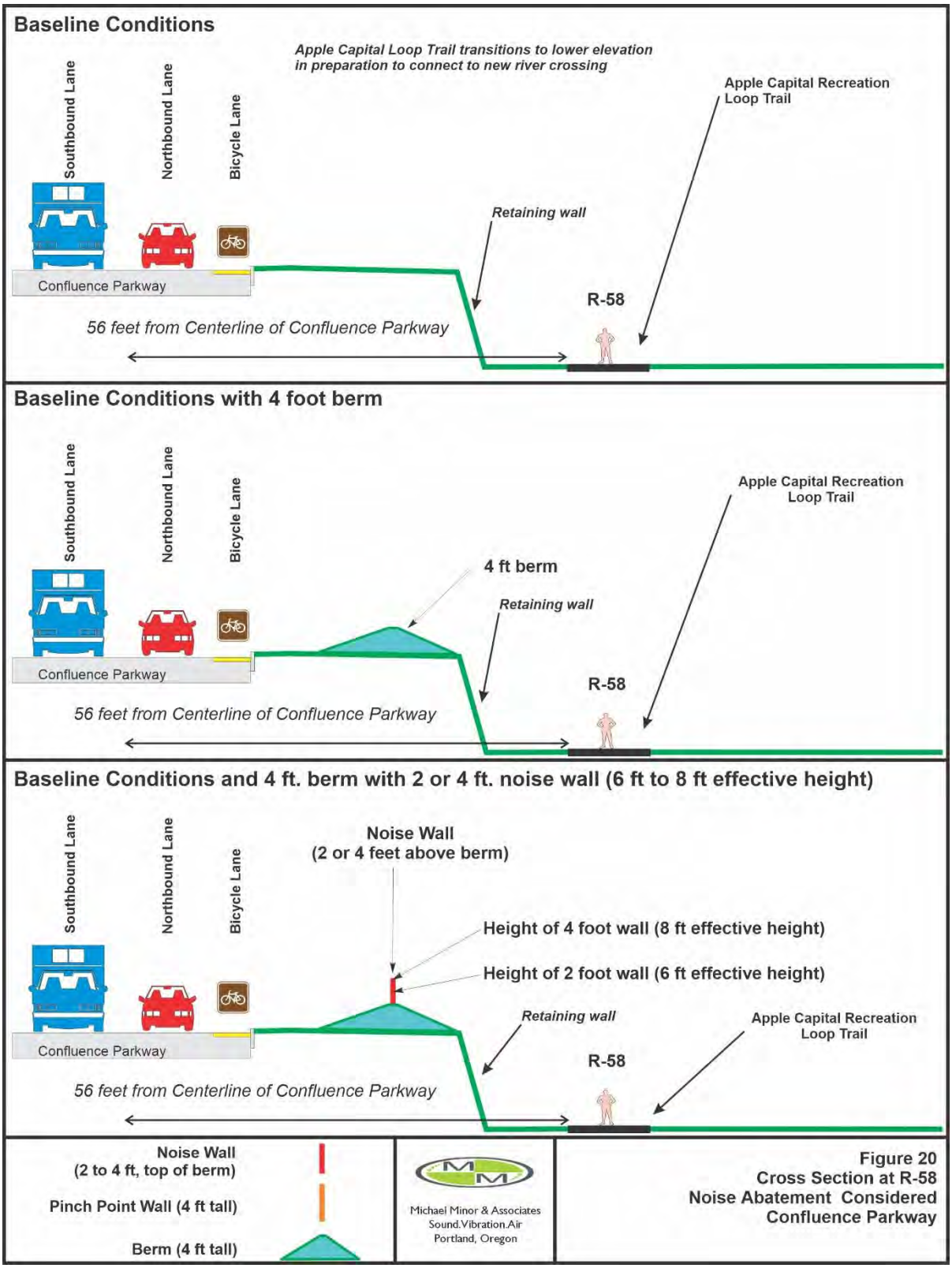


Figure 20
Cross Section at R-58
Noise Abatement Considered
Confluence Parkway

11.3.1. Noise Modeling Results and Comparison of Abatement Measures

Each of the three abatement measures considered are discussed in the following sections. The analysis is focused on those receivers with a potential noise reduction from the abatement measures. This includes all receivers along the Apple Capital Recreation Loop Trail (R-11A to R-19 and R-46, R-48, R-58, and R-60), receivers in the Horan Natural Area (R-20 through R-33), and receivers along the waterway (R-41, R-42, R-44, R-45).

Noise modeling for the Confluence State Park overnight camping site receivers (R-66 through R-119) where included in the modeling, however, none received more than a 1 dB noise reduction due to the distance and topographical conditions between Confluence Parkway and the camping sites. There were no noise impacts at any of the overnight camping sites, with future level of 48 to 51 dBA Leq and increase of 3 to 7 dB over existing conditions.

Table 24 provides a summary of the noise reduction for each of the three abatement reviews. The table is color coded to allow for easy comparison based on the area of concern, Apple Capital Recreation Loop Trail is orange, the Horn Nature Area is green, water receivers are blue, and the park staff housing is purple.

Table 24. Summary of Noise Abatement Reduction and Comparison to Existing Conditions

Receiver Information[1]				Existing to Build and Change in Level W/O Abatement[2]			With 4-ft Berm and 4-ft Pinch Wall Noise Abatement[3]			With 4-ft Berm + 2-ft Wall and 6-ft Pinch Wall Noise Abatement[4]			With 4-ft Berm + 4-ft Wall and 8-ft Pinch Wall Noise Abatement[5]		
Rec	**Area**	**Use**	**Units**	**Exist**	**Bld**	**Chg-Ext**	**Bld/W**	**Red**	**Chg-Ext**	**Bld/W**	**Red**	**Chg-Ext**	**Bld/W**	**Red**	**Chg-Ext**
R-11A	ACLT	C	3	--[6]	59	0	59	--[6]	--[6]	59	--[6]	--[6]	59	--[6]	--[6]
R-11B	ACLT	C	3	--[6]	55	0	55	--[6]	--[6]	55	--[6]	--[6]	55	--[6]	--[6]
R-12A	ACLT	C	3	--[6]	53	0	53	--[6]	--[6]	53	--[6]	--[6]	53	--[6]	--[6]
R-12B	ACLT	C	3	--[6]	54	0	54	--[6]	--[6]	54	--[6]	--[6]	54	--[6]	--[6]
R-13A	ACLT	C	1.02	--[6]	55	0	55	--[6]	--[6]	54	1[7]	--[6]	54	1[7]	--[6]
R-13B	ACLT	C	1.02	--[6]	60	0	59	1[7]	--[6]	57	3[7]	--[6]	57	3[7]	--[6]
R-14	ACLT	C	1.02	46	**67**	**21**	62	***5***	**16**	61	***6***	**15**	59	***8***	**13**
R-15	ACLT	C	1.02	47	**70**	**23**	65	***5***	**18**	63	***7***	**16**	59	***11***	**12**
R-16	ACLT	A	0.23	45	52	7	51	1	6	51	1	6	51	1	6
R-17	ACLT	C	1.02	49	62	**13**	59	3	**10**	59	3	**10**	58	4	9
R-18	ACLT	C	1.02	51	65	**14**	61	4	**10**	60	***5***	9	59	***6***	8
R-19	ACLT	C	1.02	51	64	**13**	60	4	9	57	***7***	6	56	***8***	5
R-20	Horan	C	0.23	49	55	6	54	1	5	54	1	5	54	1	5
R-21	Horan	C	0.23	48	53	5	52	1	4	52	1	4	52	1	4
R-22	Horan	C	0.23	47	53	6	52	1	5	52	1	5	52	1	5
R-23	Horan	C	0.23	46	52	6	51	1	5	51	1	5	51	1	5
R-24	Horan	C	0.23	47	51	4	51	0	4	51	0	4	51	0	4
R-25	Horan	C	0.23	45	50	5	50	0	5	50	0	5	50	0	5
R-26	Horan	C	0.23	45	50	5	50	0	5	50	0	5	50	0	5
R-27	Horan	C	0.23	44	49	5	49	0	5	49	0	5	49	0	5
R-28	Horan	C	0.23	44	48	4	48	0	4	48	0	4	48	0	4
R-29	Horan	C	0.23	44	48	4	48	0	4	48	0	4	48	0	4
R-30	Horan	C	0.23	43	48	5	48	0	5	47	1	4	47	1	4

Table 24. Summary of Noise Abatement Reduction and Comparison to Existing Conditions

Receiver Information[1]				Existing to Build and Change in Level W/O Abatement[2]			With 4-ft Berm and 4-ft Pinch Wall Noise Abatement[3]			With 4-ft Berm + 2-ft Wall and 6-ft Pinch Wall Noise Abatement[4]			With 4-ft Berm + 4-ft Wall and 8-ft Pinch Wall Noise Abatement[5]		
Rec	**Area**	**Use**	**Units**	**Exist**	**Bld**	**Chg-Ext**	**Bld/W**	**Red**	**Chg-Ext**	**Bld/W**	**Red**	**Chg-Ext**	**Bld/W**	**Red**	**Chg-Ext**
R-31	Horan	C	0.23	43	47	4	47	0	4	47	0	4	47	0	4
R-32	Horan	C	0.23	44	47	3	48	-1	4	47	0	3	47	0	3
R-33	Horan	C	0.23	43	47	4	47	0	4	47	0	4	47	0	4
R-41	Water	C	1	49	56	7	56	0	7	55	1	6	55	1	6
R-42	Water	C	1	53	58	5	58	0	5	58	0	5	58	0	5
R-44	Water	C	1	51	58	7	58	0	7	58	0	7	58	0	7
R-45	Water	C	1	50	55	5	55	0	5	55	0	5	55	0	5
R-46	ACLT	C	1.02	50	59	9	58	1	8	58	1	8	58	1	8
R-47	ACLT	C	1	45	51	6	51	0	6	50	1	5	50	1	5
R-48	ACLT	C	1.02	47	55	8	54	1	7	54	1	7	54	1	7
R-49	Staff	B	0	--[6]	59	0	58	1[7]	--[6]	58	1[7]	--[6]	58	1	--[6]
R-50	Staff	B	1	--[6]	**67**	0	67	0	--[6]	67	0	--[6]	67	0	--[6]
R-58	ACLT	C	1.02	49	63	**14**	58	***5***	9	56	***7***	7	55	***8***	6
R-60	ACLT	C	1.02	--[6]	62	0	61	1	--[6]	61	1	--[6]	61	1	--[6]

Notes: **Bold Red** type face meet WSDOT abatement criteria and ***Bold Italic Dark-Red*** type face are benefited receivers (reduction of 5 dB or more).

Heading Abbreviations: Rec = Receiver; Exist = Existing noise level; Bld = Build scenario noise level; Bld/W = Build scenario noise level with abatement; Chg-Ext = Change relative to existing; Red = Noise reduction

1. Receiver area: (ACLT = Apple Capital Recreation Loop Trail), FHWA land use type (see Table 1), and number of units or residential equivalents
2. Existing conditions noise levels, Build condition noise levels and change in noise from existing to Build with no noise abatement.
3. Information with a 4-foot berm and 4-ft wall at pinch point and change in noise from existing to Build with 4-ft noise abatement.
4. Information with a 4-foot berm with 2-ft toper wall and 6-ft wall at pinch point and change in noise from existing to Build with 6-ft noise abatement.
5. Information with a 4-foot berm with 4-ft toper wall and 8-ft wall at pinch point and change in noise from existing to Build with 8-ft noise abatement.
6. Receivers that are not applicable under existing conditions, and therefore have no existing conditions levels or change in noise level under any Build alternative.
7. For comparison, these are the noise reductions from the barrier systems at select receivers, Build w/o abatement to Build with abatement.

11.3.1.1. Abatement Option 1: Four Foot Berm with Four Foot Wall at Pinch Point

Addition of only the 4-foot berm and 4-foot-tall wall at the pinch point will do little for overall noise reduction. In the south end (Apple Capital Recreation Loop Trail receivers R-11A to R-13B), future noise levels are predicted to range from 53 to 59 dBA, with the highest levels near the new McKittrick Roundabout. The berm is only predicted to reduce noise at R-13B by approximately 3 dB, with 1 dB R-13A and no reduction at R-11A to R-12B.

In the central part of the Apple Capital Recreation Loop Trail, (see R14 through R-19, R-46 through R-48, and R-58), the berms are effective at reduction noise by up to 5 dB near the pinch point where the berm and 4-foot-tall wall at the pinch point will block traffic noise as shown on Figure 17 (R-15cross section). Noise levels are also reduced by 5 dB near the entrance to the new river crossing under the Confluence Parkway Bridge (see R-58). Overall future noise levels along the trail receivers range from 51 to 65 dBA Leq with the 4-foot abatement, with increase of 6 to 18 dB over existing conditions. Receivers R-14, R-15, R-17, and R-18 have predicted noise level increase of 10 to 18 dB over existing even with the 4-foot abatement.

Noise levels at other receivers in the Horan Natural Area (R-20 through R-33), and receivers along the waterway (R-41, R-42, R-44, R-45) are not predicted to see any reduction in noise levels beyond 1 dB. These receivers are predicted to have future noise levels with the 4-foot abatement ranging from 47 to 55 dBA Leq, an increase of 4 to 5 dB over the existing conditions. Note that the receivers along the waterway are so far below the bridge that they receive no benefit from the berm but will have some reduction from the bridge mounted traffic safety barrier.

The cost of the 4-foot wall at the pinch point was calculated using standard WSDOT policy. The cost of the berm was not included in the cost projections. The cost of the wall based on a length of 408 feet, and heights from 0 to 4 feet, is $79,737. The three benefited receivers allow for up to $214,359, and therefore meets WSDOT criteria without consideration of the berm cost. Although the 4-foot abatement reduces noise at three modeling sites by 5 dB or more, the abatement fails to meet the required 7 dB insertion loss (reduction) at one modeling site. Furthermore, if the square footage of the berm is included, the abatement would not meet WSDOT policy.

11.3.1.2. Abatement Option 2: Four Foot Berm with Two Foot Noise Wall and Six-Foot Wall at Pinch Point

Adding a 2-foot noise wall on the top of the 4-foot berm and 6-foot-tall wall at the pinch point will increase maximum noise reduction to 7 dB at three receivers, while achieving a 5 to 6 dB reduction at two additional receivers. Therefore, this wall would meet the noise reduction requirements with three first row receivers with impact achieving the 5 dB reduction and one receiver achieving the 7 dB reduction.

In the south end (Apple Capital Recreation Loop Trail receivers R-11A to R-13B), future noise levels are predicted to range from 53 to 59 dBA, which is the same as under the 4-foot abatement. The lack of noise reduction at these receivers are due to the location, which is south of any noise abatement measures. The berm is only predicted to reduce noise at R-13B by approximately 3 dB, with 1 dB R-13A and no reduction at R-11A to R-12B.

In the central part of the Apple Capital Recreation Loop Trail, (see R14 through R-19, R-46 through R-48, and R-58), the 4-foot berm with the 2-foot topper walls and 6-foot wall at pinch point are effective at reduction noise by up to 7 dB near the pinch point (see R-15cross section). Noise levels are also reduced by 5 to 7 dB at R-14, R-18, R-19, and R-58. Overall future noise levels along the trail receivers range from 50 to 63 dBA Leq with the 6-foot abatement package. An overall increase of 5 to 16 dB over the existing conditions is predicted with the berm wall combination, with receivers R-14, R-15, and R-17 predicted to noise level increase of 10 to 16 dB over existing conditions.

Noise levels at other receivers in the Horan Natural Area (R-20 through R-33), and receivers along the waterway (R-41, R-42, R-44, R-45) are not predicted to see any reduction in noise levels beyond 1 dB. These receivers are predicted to have future noise levels with the 6-foot abatement ranging from 47 to 54 dBA Leq, an increase of 3 to 5 dB over the existing conditions. The receivers along the waterway will not see any additional noise reduction.

The cost of the 2-foot topper wall and the 6-foot wall at the pinch point was calculated using standard WSDOT policy. The cost of the berm was not included in the cost projections. The cost of the wall based on a length of 2600 feet, and heights from 0 to 6 feet, is $429,963. The five benefited receivers (R-14, R-15 R-18, R-19, and R-58) allow for up to $348,912, and therefore did not meet WSDOT criteria, even without consideration of the berm cost. The 6-foot abatement package exceeds WSDOT policy for reasonable noise abatement by approximately $80,050 without consideration of the berm cost.

11.3.1.3. Abatement Option 3: Four Foot Berm with Four Foot Noise Wall and Eight Foot Wall at Pinch Point

Adding an additional 2-feet, for a total of 4-feet, to the noise wall on the top of the 4-foot berm and an 8-foot-tall wall at the pinch point will increase the maximum noise reduction to 11 dB at one receiver, while achieving a 6 to 8 dB reduction at four additional receivers. Therefore, this wall would meet the noise reduction requirements with three first row receivers with impact achieving the 5 dB reduction and one receiver achieving the 7 dB reduction.

In the south end (Apple Capital Recreation Loop Trail receivers R-11A to R-13B), future noise levels are the same as under the 4-foot abatement due to the location, which is south of any noise abatement measures. The berm is only predicted to reduce noise at R-13B by approximately 3 dB, with 1 dB R-13A and no reduction at R-11A to R-12B.

In the central part of the Apple Capital Recreation Loop Trail (see R14 through R-19, R-46 through R-48, and R-58), the 4-foot berm with the 4-foot topper walls and 8-foot wall at

pinch point are effective at reduction noise by up to 11 dB near the pinch point (see R-15 cross section). Noise levels are also reduced by 6 to 8 dB at R-14, R-18, R-19, and R-58. Overall future noise levels along the trail receivers range from 50 to 61 dBA Leq with the 8-foot abatement package. An overall increase of 5 to 13 dB over the existing conditions is predicted with the berm wall combination, with only two receivers R-14, and R-15, predicted to noise level increase of 10 dB or more dB over existing conditions (R-14 has a 13 dB increase and R-15 has a 12 dB increase).

Noise levels at other receivers in the Horan Natural Area (R-20 through R-33), and receivers along the waterway (R-41, R-42, R-44, R-45) are not predicted to see any reduction in noise levels beyond 1 dB for the same reasons already provided.

The cost of the 4-foot topper wall and the 8-foot wall at the pinch point was calculated using standard WSDOT policy. The cost of the berm was not included in the cost projections. The cost of the wall based on a length of 2600 feet, and heights from 0 to 8 feet, is $696,993. The five benefited receivers (R-14, R-15 R-18, R-19, and R-58) allow for up to $348,912, and therefore the wall would exceed the WSDOT criteria without consideration of the berm cost.

11.3.2. Final Traffic Noise Abatement Considerations

Additional analysis will be needed prior to developing a final noise abatement package for the Confluence Parkway Project. The information provided in this initial noise analysis is intended to serve as a guide to planners in developing the final roadway design package. Other consideration could include the type of noise wall to use. For example, clear walls are available that would prevent the taller walls from blocking views, and absorbent walls capture noise rather than reflecting the noise, allowing for shorter walls.

The typical transparent noise barrier may use panel material made of either glass or a clear plastic product such as Plexiglas, Butacite, Surlyn, Lexan, or acrylic. Glass panels are commonly made of single tempered or laminated tempered glass sheets. Both plastics and glass can be tinted and can also be etched or given a frosty appearance to prevent birds from hitting the walls. It should be noted that clear walls have increased maintenance costs, which should be considered before constructing this type of noise barrier. Transparent barriers can also be much more expensive than solid barriers.

There are also walls that absorb sound, rather than reflect it, like most common concrete walls. Absorbing walls are normally made up of a composite material, aluminum, or steel, with hollow interiors filled with absorptive material that allow for increased noise reduction with shorter overall wall height. The side of the wall facing the traffic would be perforated with small holes allowing for noise to enter the cavity and be absorbed by the interior materials. Using absorbing walls instead of a reflective wall on the top of the berm could result in some increased noise reduction, however, given the short height of the walls on the berms, the added reduction would likely be minimal. Again, these walls are more expensive than standard walls.

Including foliage and landscaping, while not achieving a measurable noise reduction, can make it appear to be quieter. Adding plantings along the berm can aid in shielding the view of Confluence Parkway and the traffic from the Apple Capital Recreation Loop Trail, the Horan Natural Area, and camping areas within the Wenatchee Confluence State Park.

Finally, the noise abatement package selected for this project will likely need to include some combination of berms, walls, and plantings. Additional noise modeling will be performed after comments from Project Stakeholders, the City of Wenatchee, and WSDOT are received and considered.

12. CONSTRUCTION NOISE ANALYSIS

Construction noise levels for the proposed Project improvements would result from normal construction activities. Noise levels for construction activities can be expected to range from 70 to 95 dBA at sites 50 feet from the activities. Table 25 lists equipment typically used for constructing this type of Project, the activities for which the equipment would be used, and the corresponding maximum noise levels under normal use measured at 50 feet.

Table 25. Construction Equipment List, Use, and Reference Maximum Noise Levels

Equipment	Typical Expected Project Use	Lmax[a]
Air Compressor	Used for pneumatic tools and general maintenance—all phases	70–76
Backhoe	General construction and yard work	78–82
Concrete Pump	Pumping concrete	78–82
Concrete Saw	Concrete removal, utilities access	75–80
Compactor	Compacts soil and fill for roadway paving	82–88
Crane	Materials handling, removal, and replacement	78–84
Excavator	General construction and materials handling	82–88
Haul Truck	Materials handling, general hauling	86
Jackhammer	Pavement removal	74–82
Loader	General construction and materials handling	86
Paver	Roadway paving	88
Power Plant	General construction use, nighttime work	72
Pump	General construction use, water removal	62
Pneumatic Tools	Miscellaneous construction work	78–86
Service Truck	Repair and maintenance of equipment	72
Tractor Trailer	Material removal and delivery	86
Utility Truck	General project work	72
Vibratory Equipment	Shore up hillsides, preventing slides, soil compacting	82–88
Welder	General project work	76

Source: FHWA RNCM and measured noise levels
a Maximum noise level measured at a distance of 50 feet under normal operation.

12.1. Construction Phasing

Confluence Parkway would include a combination of new road construction and upgrades to the existing roadway. The existing roadway would be preserved to the largest extent possible and will follow the existing alignment and profile. In many areas, construction would include

grinding the roadway and placing asphalt in the travel lanes and constructing planters and sidewalks adjacent to the roadway. In other places, construction of the roadway would include the removal of existing asphalt and concrete surfaces, clearing and grading of adjacent areas, and placing subgrade material to form a stable roadbed. New road surfaces would be primarily asphalt and concrete.

Fill would be required on both sides of the new bridge and in the area where the roadway would be constructed on a new alignment. Fill would also be required between the BNSF right-of-way and the top of the portion of roadway that borders the west edge of the wetlands in the Horan Natural Area. All fill would come from existing off-site, permitted sources.

Construction equipment could include, but is not limited to, cranes, backhoes, excavators, front loaders, pavement grinders, jack hammers, drilling rigs, pile drivers, trucks, and concrete pumping equipment. Staging areas would be located within the right of way and adjacent City-owned parcels where possible to allow for parking, large equipment storage, and material stockpiles.

The new bridge across the Wenatchee River would likely be supported on drilled shaft foundations within the river. Drilled shafts are created by installing a steel casing, excavating the soil and sediment from within the casing, and placing steel and concrete within the excavated casing.

Construction of the bridge foundations, columns, pier caps, and girders would require the installation of a temporary, pile-supported work access trestle. The details would be developed as design progresses and would likely consist of driven steel pipe piles with steel framing that support timber decking. This trestle would allow for heavy equipment to access the foundation locations and for the delivery of construction materials. The bridge deck, barriers, and pedestrian walkway would likely be constructed without the need of the trestle. The existing pedestrian/bicycle trail would remain open during construction of the new bridge.

A large portion of Confluence Parkway, including the new bridge structure, would be constructed without requiring road closures or detours as it will be along a new roadway alignment. It is anticipated that Miller Street would be closed during constructing of the railroad underpass, with local access provided via Maple Street to the south and McKittrick Street to the north. Short-term local detours will be required as needed for improvements along existing roadways. The Apple Capital Recreation Loop Trail would be kept open to the extent possible during construction of the roadway and trail realignment.

12.2. Construction Noise Levels

Major noise-producing equipment in use during the site preparation phase would include saw cutters, concrete pumps, cranes, excavators, haul trucks, loaders, tractor-trailers, and vibratory equipment. Maximum noise levels could reach 82 to 88 dBA at the nearest noise sensitive areas (i.e., within 50 to 100 feet) for normal construction activities during this phase. Other less notable noise-producing equipment expected to be used during this phase

would be backhoes, air compressors, forklifts, pumps, power plants, service trucks and utility trucks.

During construction of the new bridge structure, the equipment needed would include cement mixers, concrete pumps, cranes, pavers, haul trucks and tractor-trailers. Cement mixers, cranes and concrete pumps would be required for construction of the parking garages. Saw cutters, back-hoes, pavers, haul trucks and material deliveries on flatbed trucks are likely to be used to provide the final surface and structures at stations. Maximum noise levels from these activities would range from 82 to 88 dBA at 50 feet.

Following heavy construction, general construction would still be required, such as installation of signage as well as other miscellaneous activities such as roadway stripping. These less intensive activities are not expected to produce noise levels above 80 dBA at 50 feet except during rare occasions. Even then, noise levels from these activities would exceed 80 dBA at 50 feet only for short periods of time, during which combined maximum noise levels could reach 86 dBA Lmax at 50 feet.

12.3. Pile Driving

Although not expected to be needed for most of the corridor, the use of pile-driving of support piles or sheet piles may be required for construction of the new bridge or for retaining walls. Workers would install piles using a standard pile-drivers, which can produce an impact noise of 90 to 105 dBA depending on the type of piles being driven and the type of pile driver used. Alternative methods for pile installation could be considered, such as driving the piles using an auger instead of an impact driver. In addition, any pile-driving would be subject to the regulatory requirements of the local jurisdiction. Pile-driving at night is typically prohibited.

To provide an estimate of sound level versus distance for worst case pile driving, Figure 21 was prepared. The figure shows how pile driving would reduce with distance based on a reference level of 105 dBA at 50 feet.

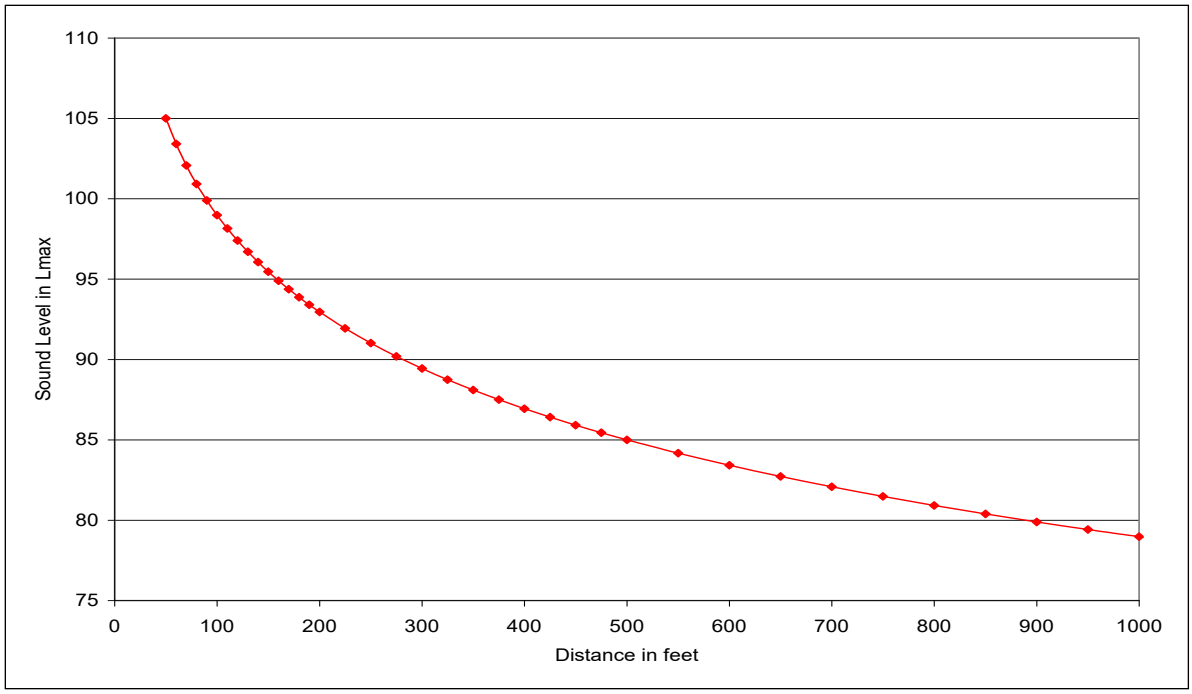


Figure 21. Pile Driving Noise Levels versus Distance.

12.4. Construction Noise Mitigation

As described in the City of Wenatchee noise control ordinance, construction is restricted between the hours of 10:00 p.m. and 6:00 a.m. Monday through Saturday, and between the hours of 6:00 p.m. and 8:30 a.m. on Sunday. Construction work during these hours would require a noise variance from the City of Wenatchee

These noise levels, although temporary in nature, can be annoying. The following is a list of potential construction noise mitigation measures that could be included in the contract specifications:

- Require all engine-powered equipment to have mufflers that were installed according to the manufacturer's specifications.
- Require all equipment to comply with pertinent EPA equipment noise standards.
- Limit jackhammers, concrete breakers, saws, and other forms of demolition to daytime hours of 7:00 a.m. to 7:00 p.m. on weekdays, with more stringent restrictions on weekends.
- Minimize noise by regular inspection and replacement of defective mufflers and parts that do not meet the manufacturer's specifications.
- Install temporary or portable acoustic barriers around stationary construction noise sources and along the sides of the temporary bridge structures, where feasible.

- Locate stationary construction equipment as far from nearby noise-sensitive properties as possible.
- Shut off idling equipment.
- Reschedule construction operations to avoid periods of noise annoyance identified in complaints.
- Notify nearby residents whenever extremely noisy work would be occurring.
- Use non-pure tone back-up alarms or restrict the use of back-up beepers during evening and nighttime hours and use spotters. In all areas, Occupational Safety and Health Administration (OSHA) will require back-up warning devices and spotters for haul vehicles.
- Use pile driving noise shroud and / or employ auguring techniques where possible to limit effects of pile driving.
- Additional noise mitigation measures might be implemented as more details on the actual construction processes are identified.

Appendix A: References

Washington State Department of Transportation. 2011 Traffic Noise Policy and Procedures. WSDOT October 2020.

Supplemental Guidance on the Application of FHWA's Traffic Noise Model (TNM), NCHRP Report, 791, 2014.

U.S. Department of Transportation. FHWA Highway Traffic Noise Model User's Guide, Report No. FHWA-PD-96-009. Federal Highway Administration, Washington, D.C. January 1998.

U.S. Department of Transportation. FHWA Highway Traffic Noise Model User's Guide (Version 2.5 Addendum) Final Report. Federal Highway Administration, Washington, D.C. April 2004.

Appendix B: Introduction to Acoustics

Sound is defined as any pressure variation that the human ear can detect, from barely perceptible sounds to sound levels that can cause hearing damage. The magnitude of the variations of the air pressure from the static air pressure is a measure of the sound level. The number of cyclic pressure variations per second is the frequency of sound. When sounds are unpleasant, unwanted, or disturbingly loud, we tend to classify them as noise.

Compared with the static air pressure, the audible sound pressure variations range from the threshold of hearing, a very small 20 μPa (20 x 10^{-6} Pascal), to 100 Pa, a level so loud it is referred to as the threshold of pain. Because the ratio between these numbers is more than a million to one, using Pascal to describe sound levels can be awkward. The "dB" measurement is a logarithmic conversion of air pressure level variations from Pascal to a unit of measure with a more convenient numbering system. This conversion not only allows for a more convenient scale but is also a more accurate representation of how the human ear reacts to variations in air pressure. Measurements made using the decibel scale will be denoted dB.

The smallest noise level change that can be detected by the human ear is approximately 3 dB. A doubling in the static air pressure amounts to a change of 6 dB, and an increase of 10 dB is roughly equivalent to a doubling in the perceived sound level. Under free-field conditions, where there are no reflections or additional attenuation, sound is known to decrease at a rate of 6 dB for each doubling of distance. This is commonly known as the inverse square law. For example, a sound level of 70 dB at a distance of 100 feet would decrease to 64 dB at 200 feet, or 58 dB at 400 feet. The mathematical definition of sound pressure level in dB is listed below.

L_p (sound pressure level). The sound pressure in dB is 20 times the log of the ratio of the measured pressure, p, to the static pressure, p_o, where p_o is 20 μPa.

$$L_{pa} = 20Log_{10}\left(\frac{p}{p_o}\right)dB \quad (re\ 20\mu Pa)$$

In acoustic measurements where the primary concern is the effect on humans, the sound readings are sometimes compensated by an "A"-weighted filter. The A-weighted filter accounts for people's limited hearing response in the upper and lower frequency bands. Sound pressure level measurements made using the A-weighted filter are denoted dBA.

General Measurement Descriptors

- **Leq (equivalent continuous sound level).** The constant sound level in dBA that, lasting for a time "T," would have produced the same energy in the same time period "T" as an actual A-weighted noise event.

$$L_{eq} = 20Log_{10}\frac{1}{T}\int_{T}^{0}\left(\frac{p(t)}{p_o}\right)^2 dt$$

- **MaxPeak (maximum A-weighted sound level).** The greatest continuous sound level, in dBA, measured during the preset measurement period.
- **Lmax (maximum A-weighted RMS sound level).** The greatest RMS (root-mean square) sound level, in dBA, measured during the preset measurement period.
- **Lmin (minimum A-weighted RMS sound level).** The lowest RMS (root-mean square) sound level, in dBA, measured during the preset measurement period.

Statistical Noise Level Descriptors

Public response to sound depends greatly upon the range that the sound varies in a given environment. For example, people generally find a moderately high, constant sound level more tolerable than a quiet background level interrupted by high-level noise intrusions. In light of this subjective response, it is often useful to look at a statistical distribution of sound levels over a given time period. Such distributions identify the sound level exceeded and the percentage of time exceeded. Therefore, it allows for a more complete description of the range of sound levels during the given measurement period.

The sound level descriptor L_{xx} is defined as the sound level exceeded XX percent of the time. Some of the more common versions of this descriptor and their corresponding definitions are listed below:

- L01 The sound level is exceeded 1 percent of the time. This is a measure of the loudest sound levels during the measurement period. Example: During a 1-hour measurement, an L01 of 95 dBA means the sound level was at or above 95 dBA for 36 seconds.
- L50 The sound level is exceeded 50 percent of the time. This level corresponds to the median sound level. Example: During a 1-hour measurement, an L50 of 67 dBA means the sound level was at or above 67 dBA for 30 minutes.
- L90 The sound level is exceeded 90 percent of the time. This is a measure of the nominal background level. Example: During a 1-hour measurement, an L90 of 50 dBA means the sound level was at or above 50 dBA for 54 minutes.

Other commonly used LXX values include L2.5, L8.3, and L25. These correspond to the 5-, 10-, and 15-minute time levels for a 1-hour measurement period, respectively.

Typical Sound Levels

Table B-1 contains some common noise sources, their nominal maximum sound level in dBA, and the usual public response. The levels in this graph are comparable to the Lmax noise level descriptor. This graph would be useful when comparing the loudest noise produced with other familiar noise sources a person may have experienced.

Table B-1. Typical Maximum Sound Levels

Noise Source or Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (human judgment of different sound levels)
Jet aircraft takeoff from carrier (50 feet)	140	Threshold of pain	64 times as loud
50-horsepower siren (100 feet)	130		32 times as loud
Loud rock concert near stage, Jet takeoff (200 feet)	120	Uncomfortably loud	16 times as loud
Float plane takeoff (100 feet)	110		8 times as loud
Jet takeoff (2,000 feet)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 feet)	90		2 times as loud
Garbage disposal, food blender (2 feet), Pneumatic drill (50 feet)	80	Moderately loud	Reference loudness
Vacuum cleaner (10 feet), Passenger car at 65 mph (25 feet)	70		1/2 as loud
Large store air-conditioning unit (20 feet)	60		1/4 as loud
Light auto traffic (100 feet)	50	Quiet	1/8 as loud
Bedroom or quiet living room Bird calls	40		1/16 as loud
Quiet library, soft whisper (15 feet)	30	Very quiet	
High quality recording studio	20		
Acoustic Test Chamber	10	Just audible	
	0	Threshold of hearing	

Sources: Beranek (1988) and U.S. EPA (1971).

Appendix C: Noise Monitoring

Photo 1: Aerial View

Photo 2: Looking West

Photo 3: Looking North west

Photo 4: Looking Northeast

Monitoring Location M-1
Residences, 1305 N Wenatchee Ave
Northwest corner of lot, facing west

Michael Minor & Associates
Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

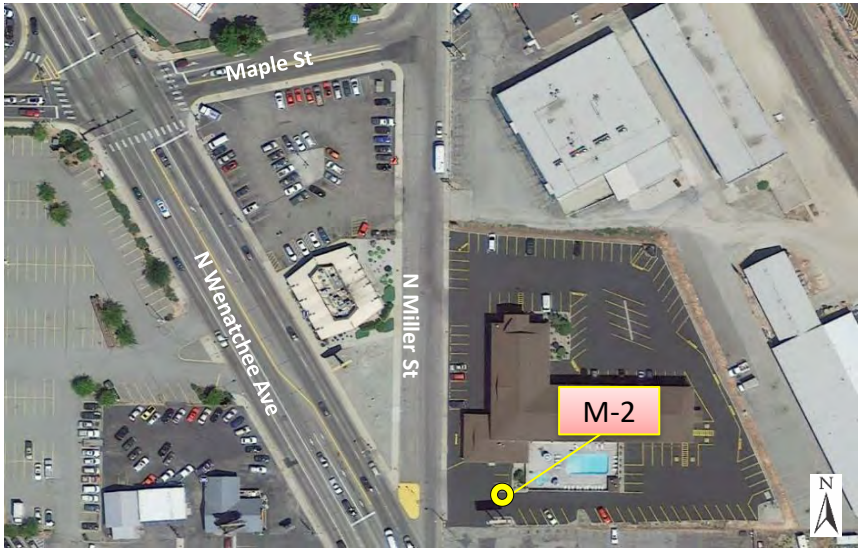


Photo 1: Aerial View

Photo 2: Looking Northeast

Photo 3: Looking Northwest

Photo 4: Looking South

Monitoring Location M-2
Hotel, 1401 N Miller St
Southwest corner, facing west

Michael Minor & Associates
Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

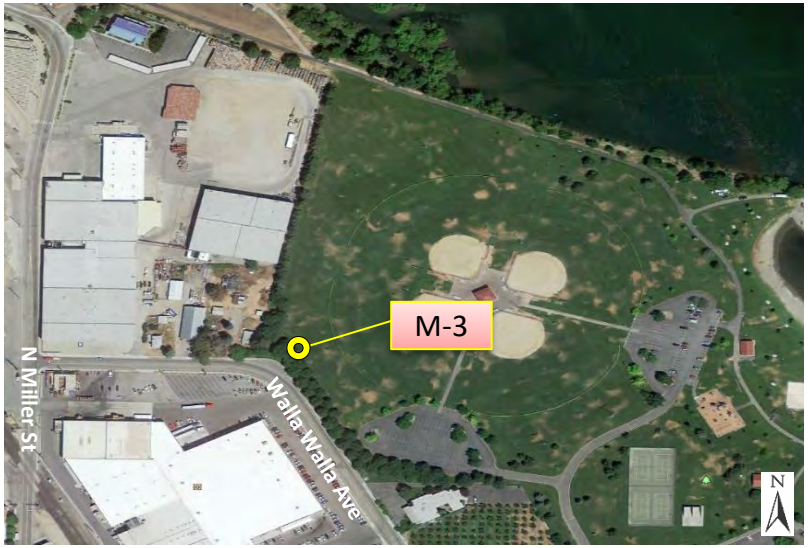


Photo 1: Aerial View

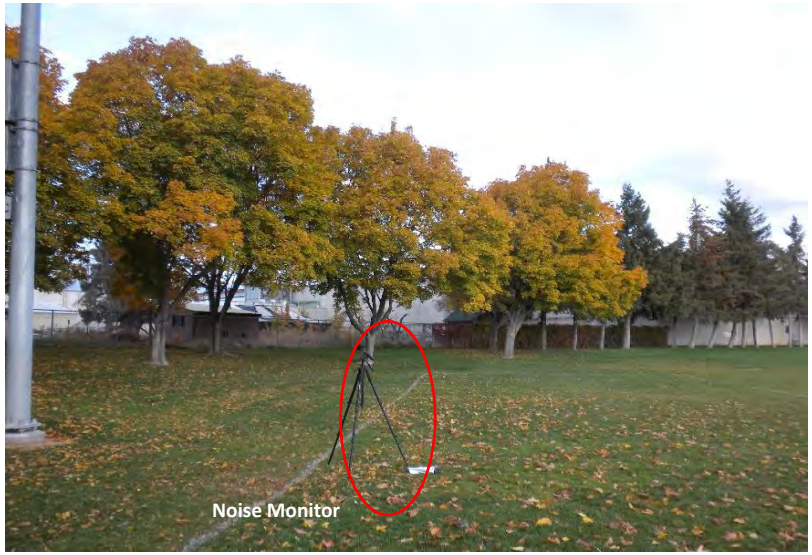


Photo 2: Looking North

Photo 3: Looking Northwest

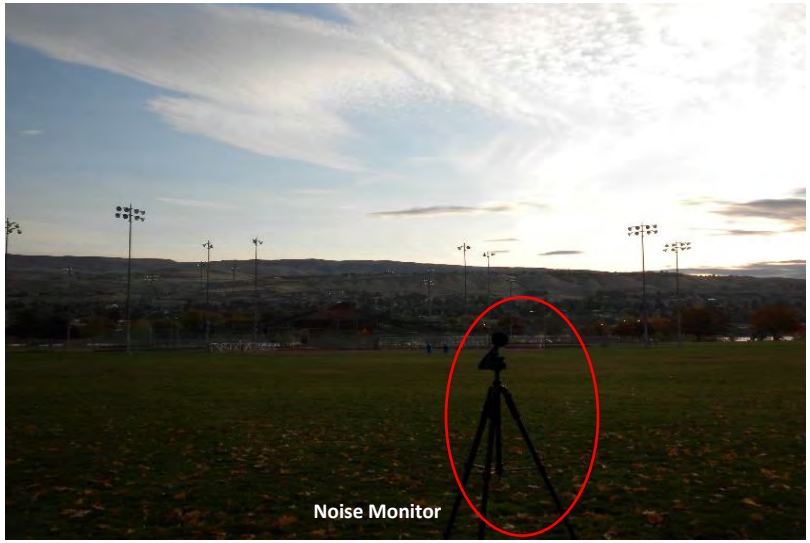


Photo 4: Looking Northeast

Monitoring Location M-3
Walla Walla Park, 1500 Walla Walla Ave
Southwest corner, looking northwest

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Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

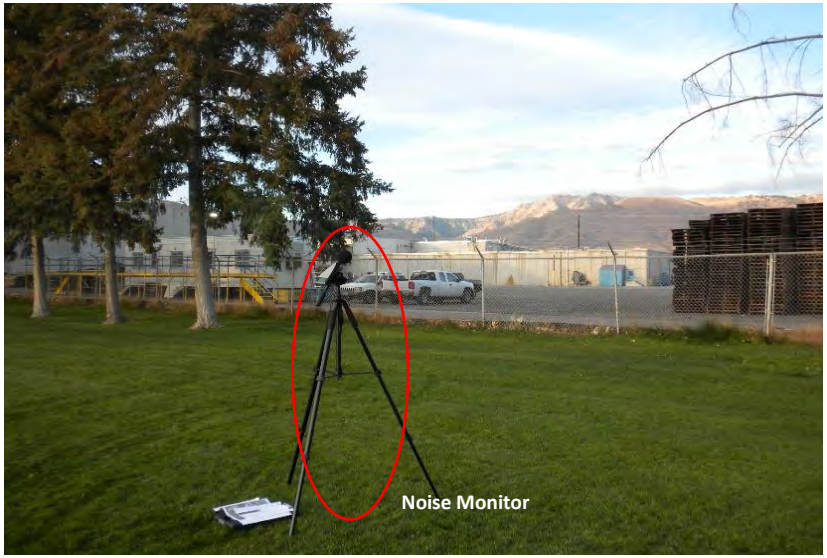

Photo 2: Looking Southwest

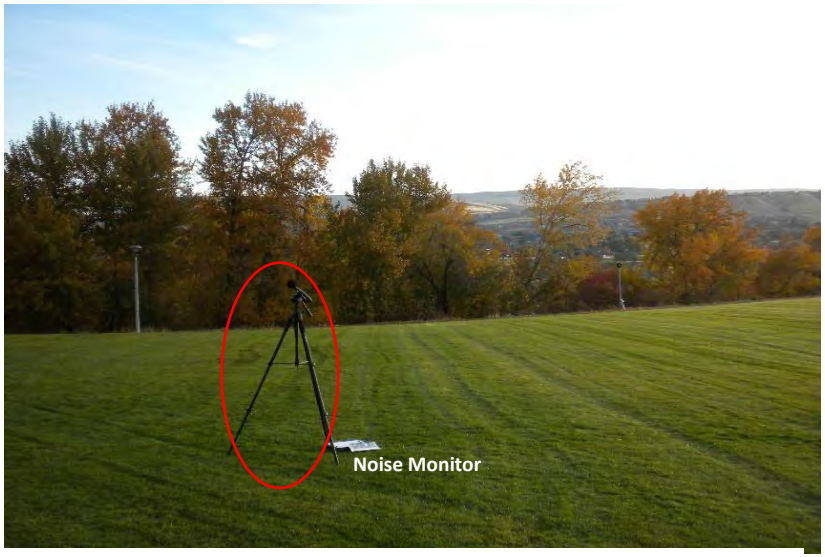

Photo 3: Looking Northeast

Photo 4: Looking Southeast

Monitoring Location M-4
Walla Walla Park, 1500 Walla Walla Ave
Northwest corner, facing west

Michael Minor & Associates
Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking Southwest

Photo 3: Looking Southeast

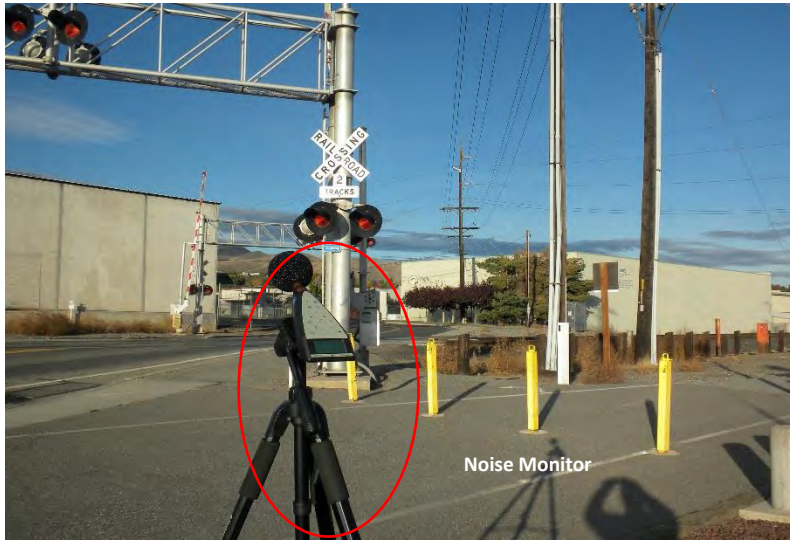

Photo 4: Northwest

Monitoring Location M-5
Commercial, 16 E Hawley St
Hawley St Connection, facing west

Michael Minor & Associates
Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking Southwest

Photo 3: Looking North

Photo 4: Looking Northeast

Monitoring Location M-6
Hotel, 1921 N Wenatchee Ave
Southeast corner, facing northeast

Michael Minor & Associates
Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

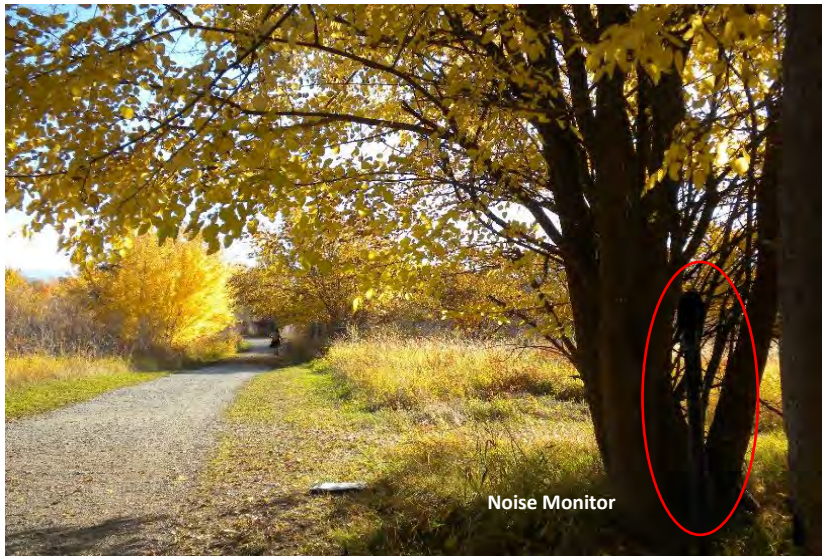

Photo 2

Photo 3

Photo 4

Monitoring Location M-7
Horan Natural Area
Park trail intersection

Michael Minor & Associates
Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking East

Photo 3: Looking Northeast

Photo 4: Looking South

Monitoring Location M-8
Horan Natural Area
South of the Observation Point, facing east

Michael Minor & Associates
Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

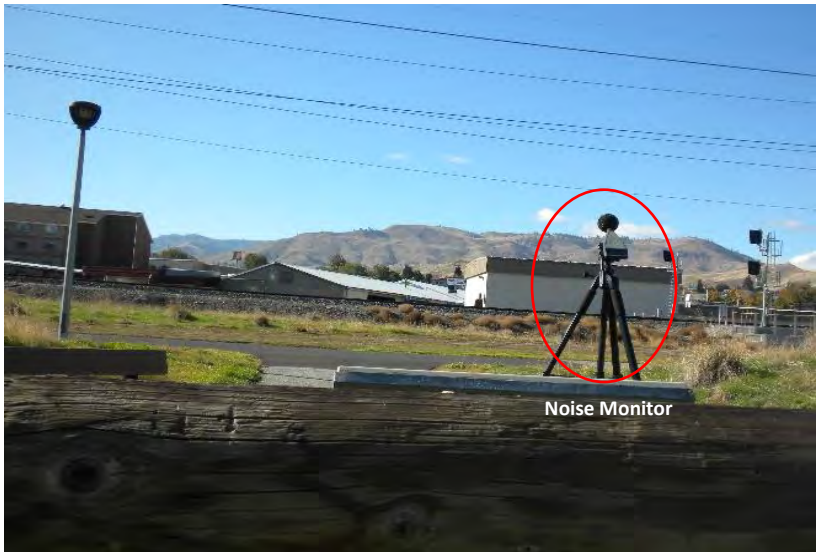

Photo 2: Looking Northwest

Photo 3: Looking East

Photo 4: Looking North

Monitoring Location M-9
Horan Natural Area
Observation Point, facing west

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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking Northeast

Photo 3: Looking Northwest

Photo 4: Looking Southeast

Monitoring Location M-10
Horan Natural Area
North of park trail intersection near river

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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2

Photo 3

Photo 4

Monitoring Location M-11
Horan Natural Area
Park Viewing Area

Michael Minor & Associates
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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking Northeast

Photo 3: Looking South

Photo 4: Looking East

Monitoring Location M-12
Horan Natural Area
South end of bridge, facing northwest

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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking North

Photo 3: Looking West

Photo 4: Looking Southeast

Monitoring Location M-13
Horan Natural Area-Wenatchee Confluence State Park
Center of bridge, facing west

Michael Minor & Associates
Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking Southwest

Photo 3: Looking Northwest

Photo 4: Looking Northeast

Monitoring Location M-14
Area-Wenatchee Confluence State Park
Along Old Station Rd cul-de-sac

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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

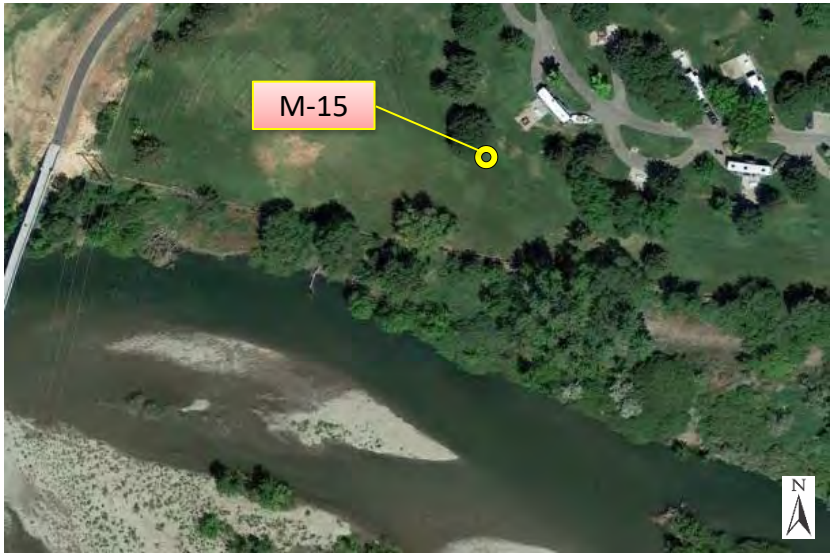

Photo 1: Aerial View

Photo 2

Photo 3

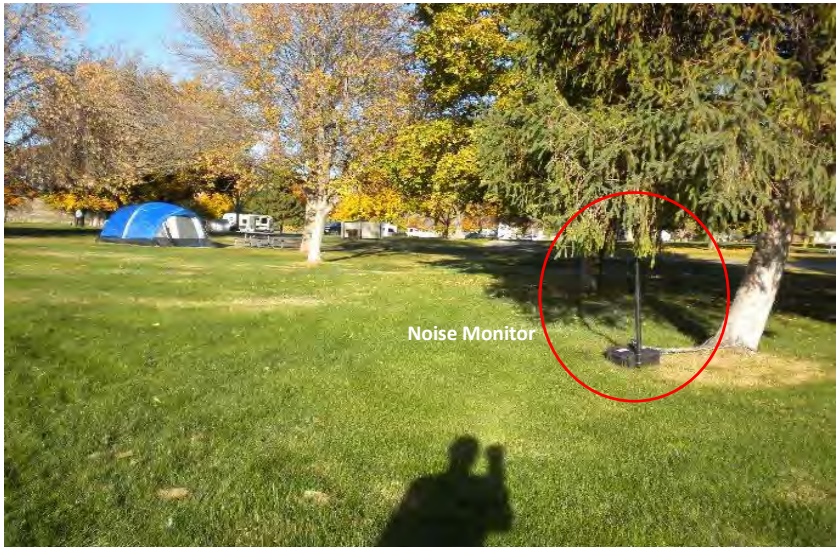

Photo 4

Monitoring Location M-15
Campground, Wenatchee Confluence State Park
Southwest corner of western camping area

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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking East

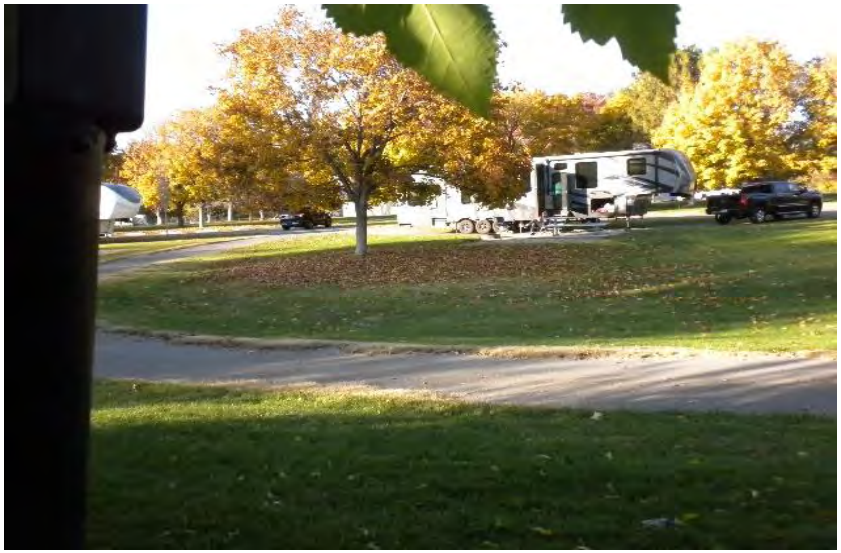

Photo 3: Looking Northwest

Photo 4: Looking West

Monitoring Location M-16
Campground, Wenatchee Confluence State Park
Southcentral edge of western camping area

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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking Northwest

Photo 3: Looking Northeast

Photo 4: Looking Southeast

Monitoring Location M-17
Campground, Wenatchee Confluence State Park
West of campground near trail parking

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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

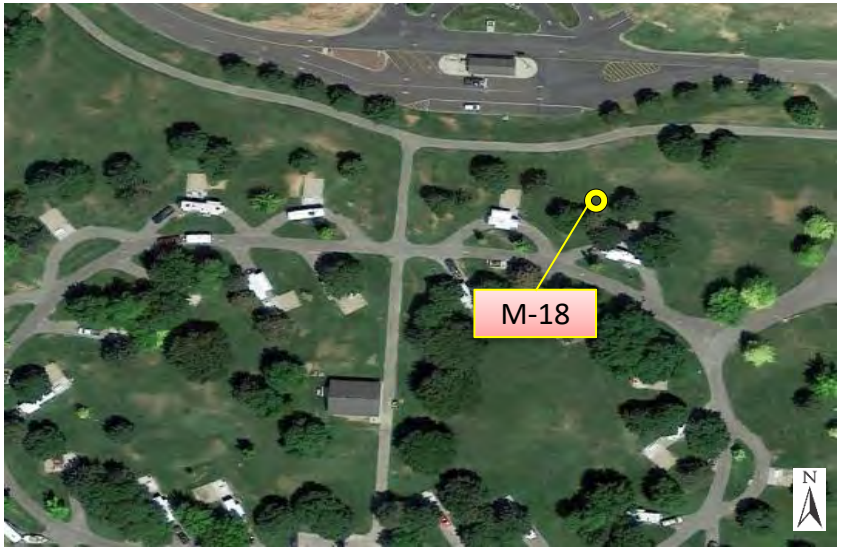

Photo 1: Aerial View

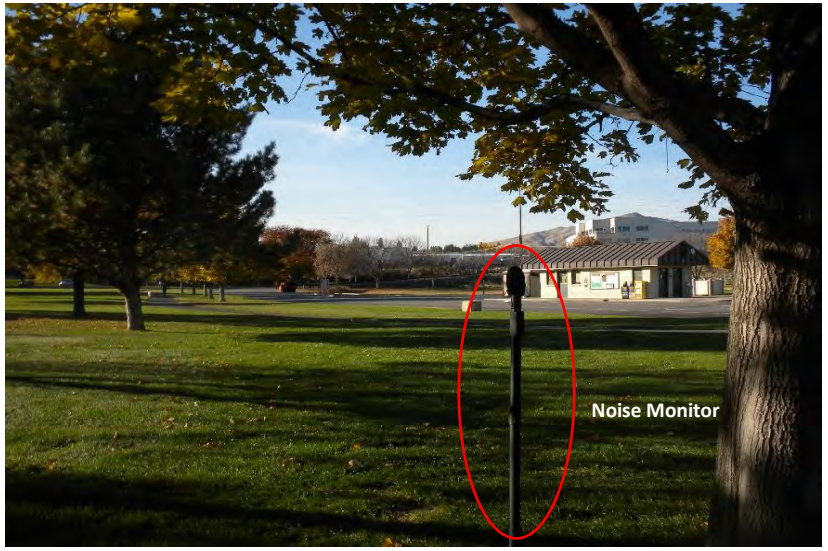

Photo 2: Looking Northwest

Photo 3: Looking Northeast

Photo 4: Looking South

Monitoring Location M-18
Campground, Wenatchee Confluence State Park
Northeast corner of western camping area

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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

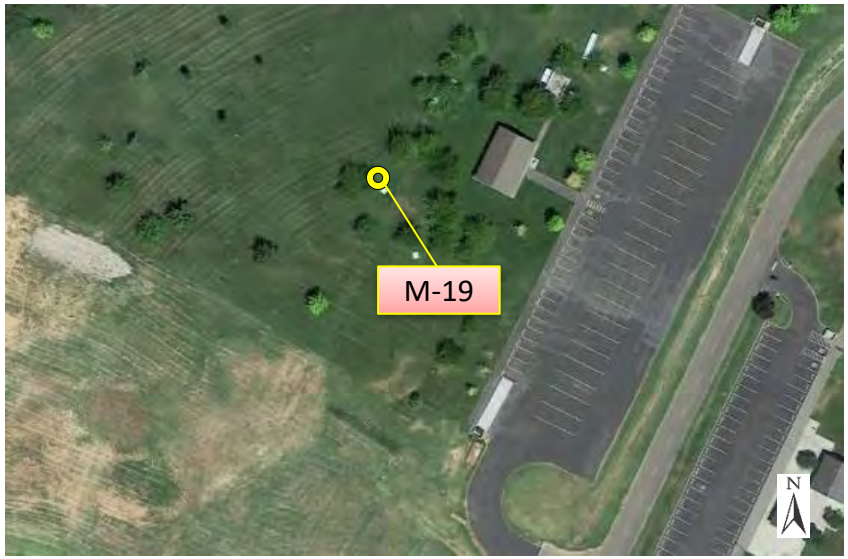

Photo 1: Aerial View

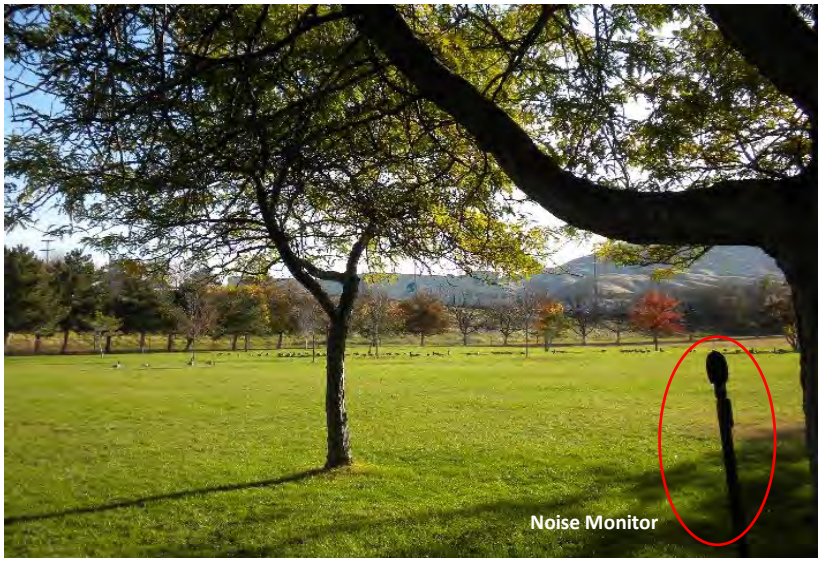

Photo 2: Looking Northwest

Photo 3: Looking East

Photo 4: Looking Southwest

Monitoring Location M-19
Campground, Wenatchee Confluence State Park
Group camping area covered picnic tables

Michael Minor & Associates
Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking Northwest

Photo 3: Looking South

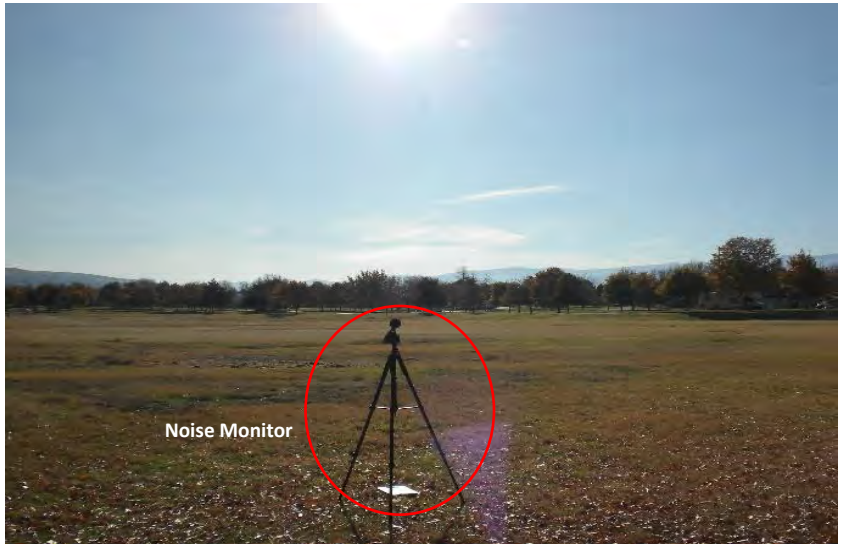

Photo 4: Looking East

Monitoring Location M-20
Wenatchee Confluence State Park
Along trail near group area, facing west

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Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking North

Photo 3: Looking West

Photo 4: Looking East

Monitoring Location M-21
Wenatchee Confluence State Park
Along trail near trail and group camping area

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Sound. Vibration. Air
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

Photo 1: Aerial View

Photo 2: Looking Southwest

Photo 3: Looking Southeast

Photo 4: Looking North

Monitoring Location M-22
Residence, 2710 Euclid Ct
Northeast corner, facing north

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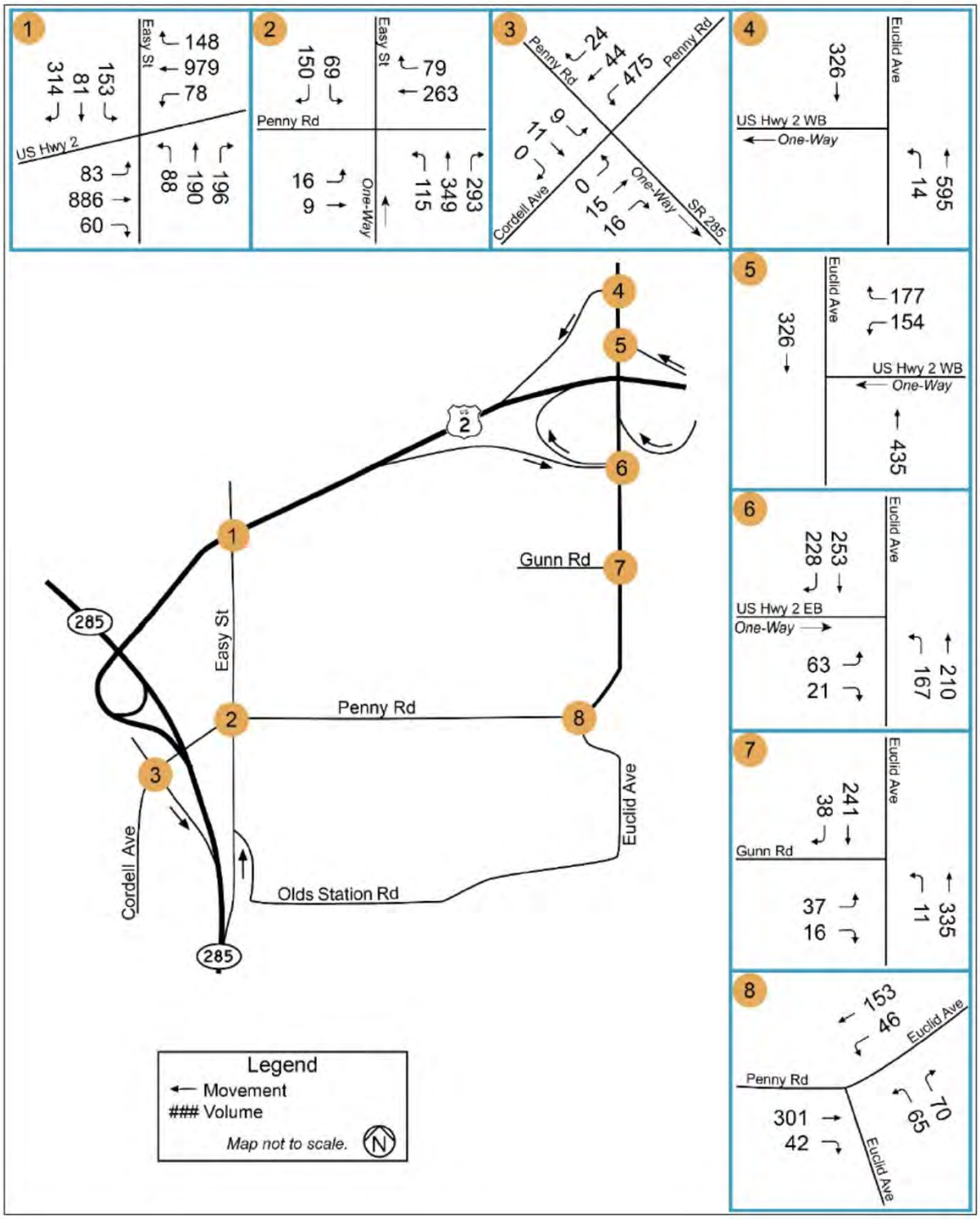
Portland, Oregon

Detailed Noise Monitoring Site Photos
Confluence Parkway Project

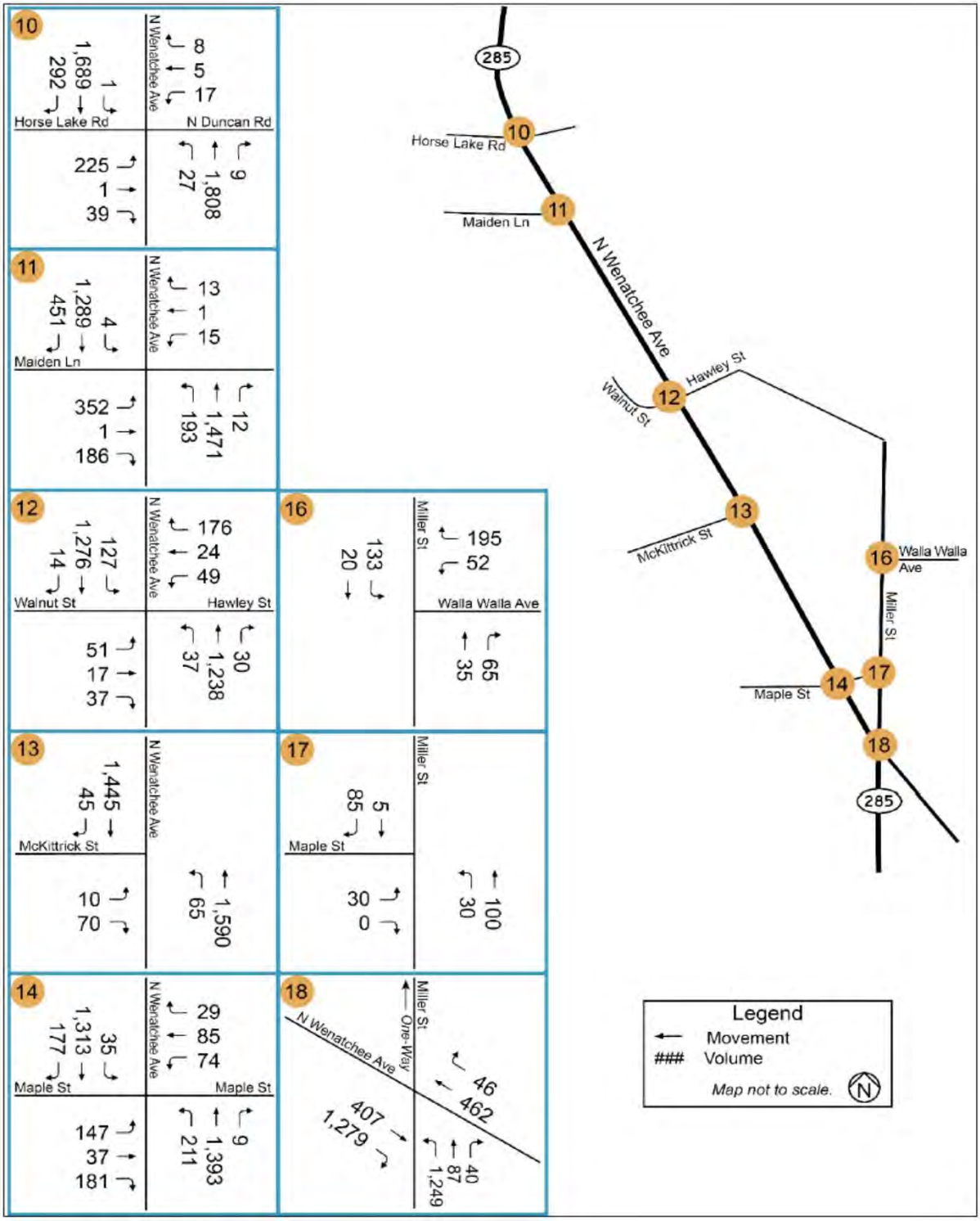
Appendix D: Traffic Volumes

Figure D-1. Existing PM Peak Hour Turning Movements (North)



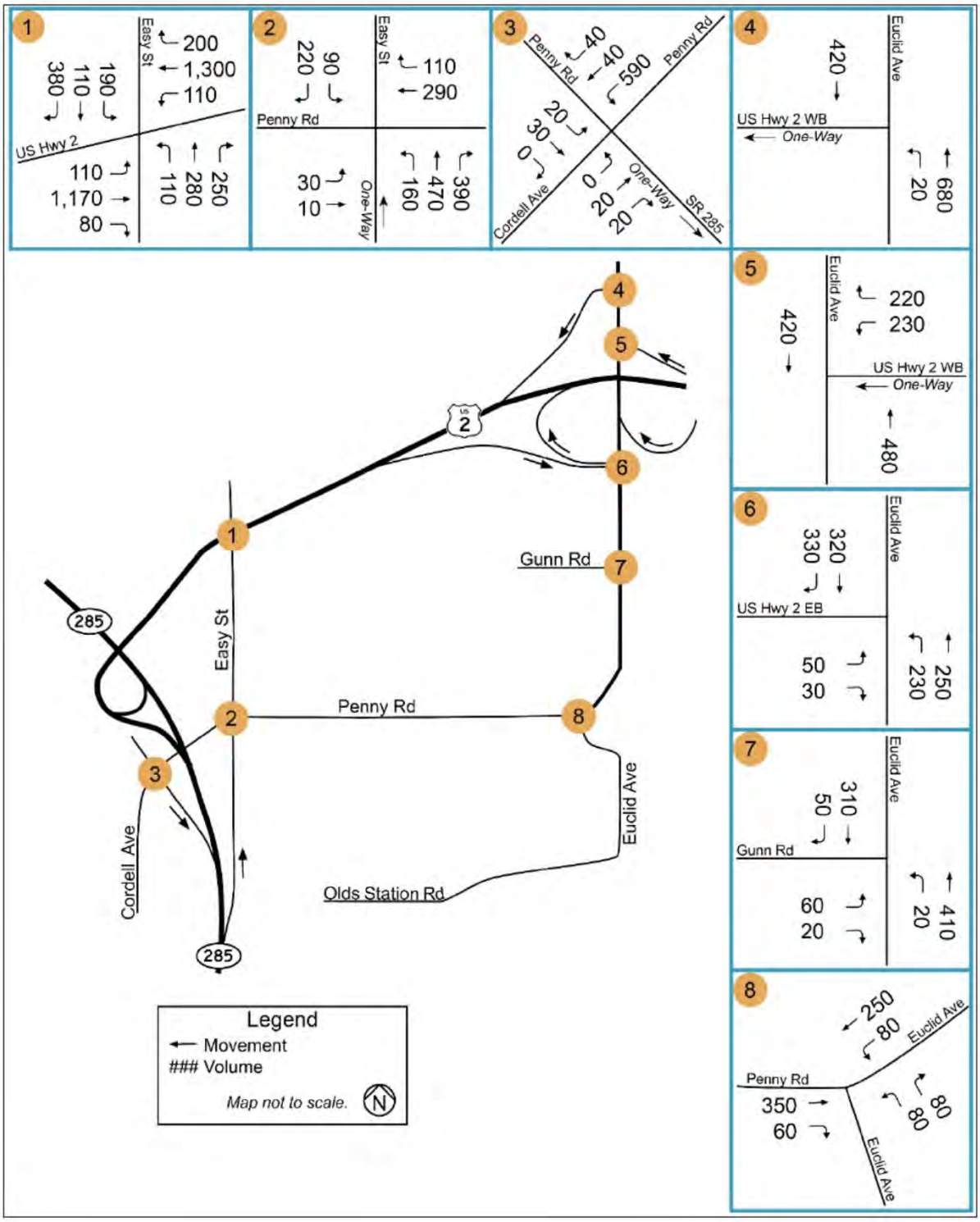
Source: Confluence Parkway Transportation Discipline Report. 2020.

Figure D-2. Existing PM Peak Hour Turning Movements (South)



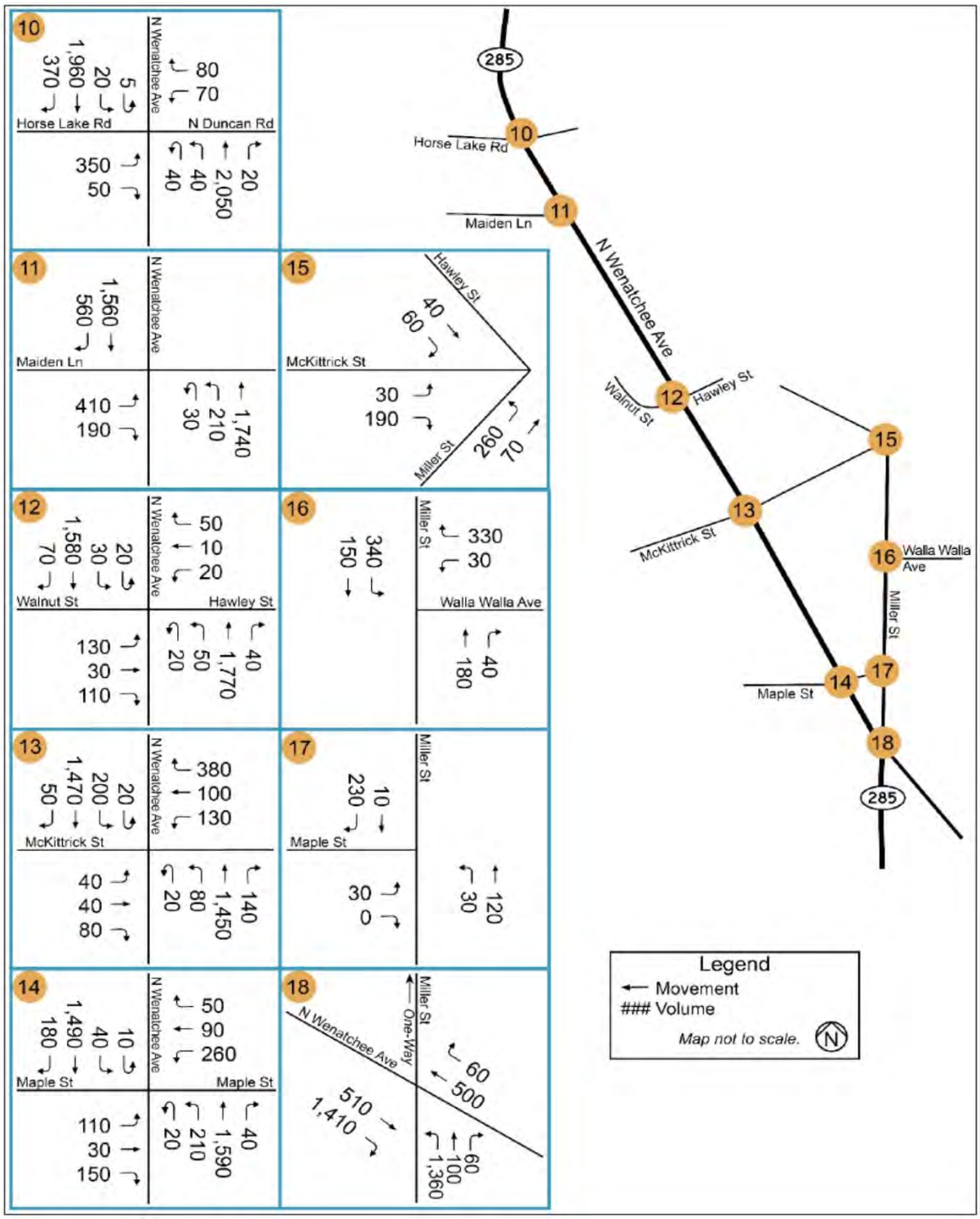
Source: Confluence Parkway Transportation Discipline Report. 2020.

Figure D-3. 2040 Intersection PM Peak Hour Volumes – No Build Alternative (North)



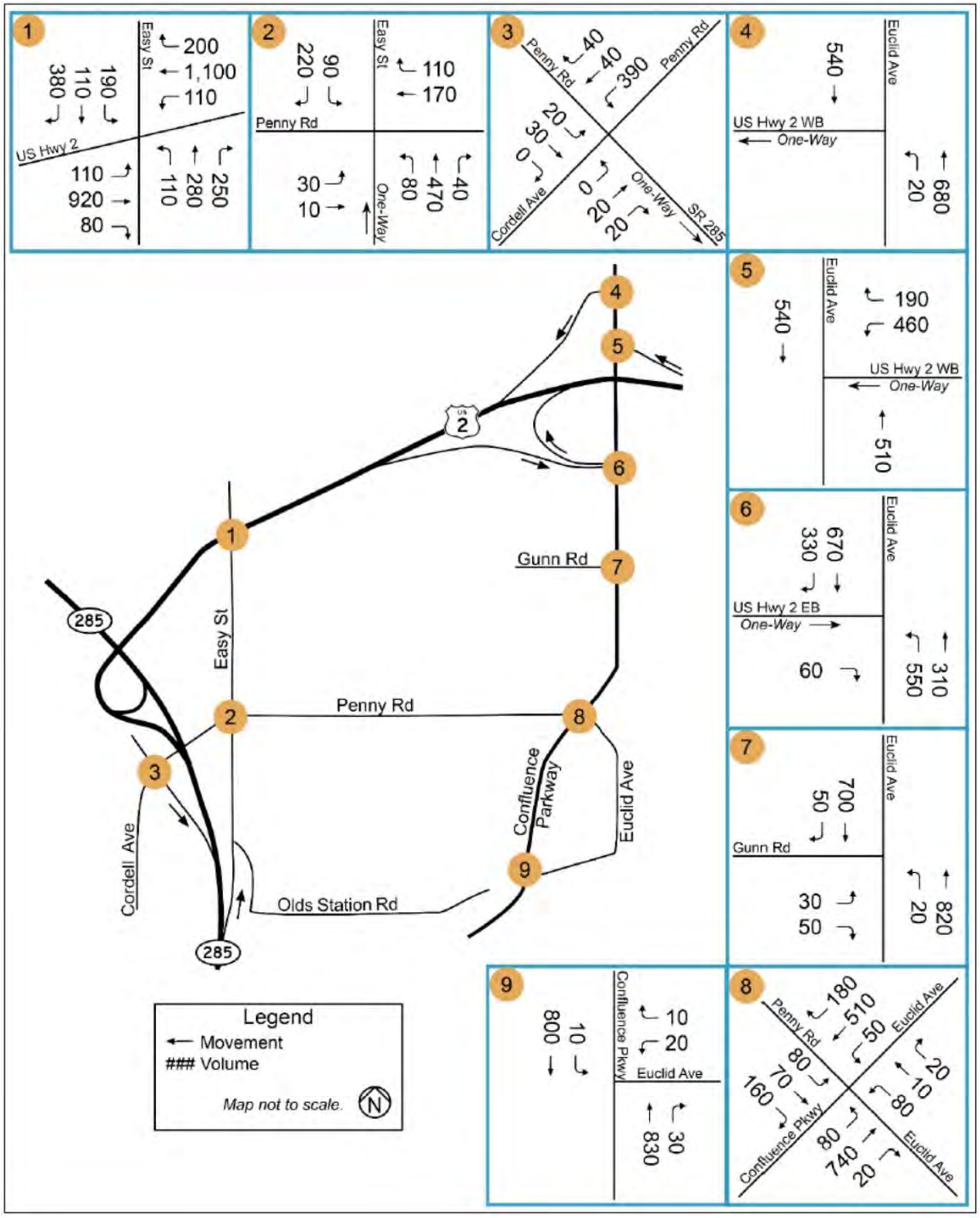
Source: Confluence Parkway Transportation Discipline Report. 2020.

Figure D-4. 2040 Intersection PM Peak Hour Volumes – No Build Alternative (South)



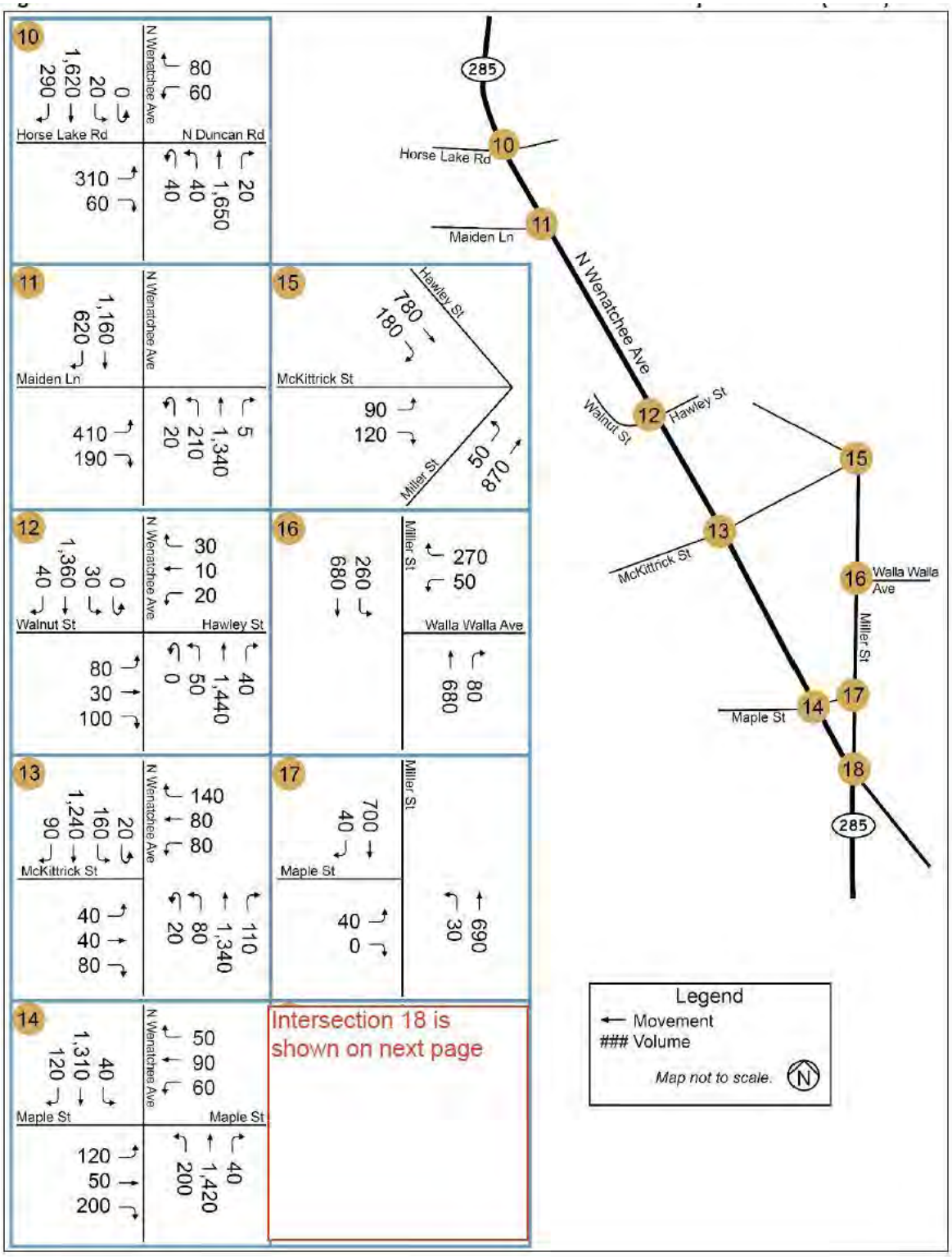
Source: Confluence Parkway Transportation Discipline Report. 2020.

Figure D-5. 2040 Intersection PM Peak Hour Volumes – Build Alternative (North)

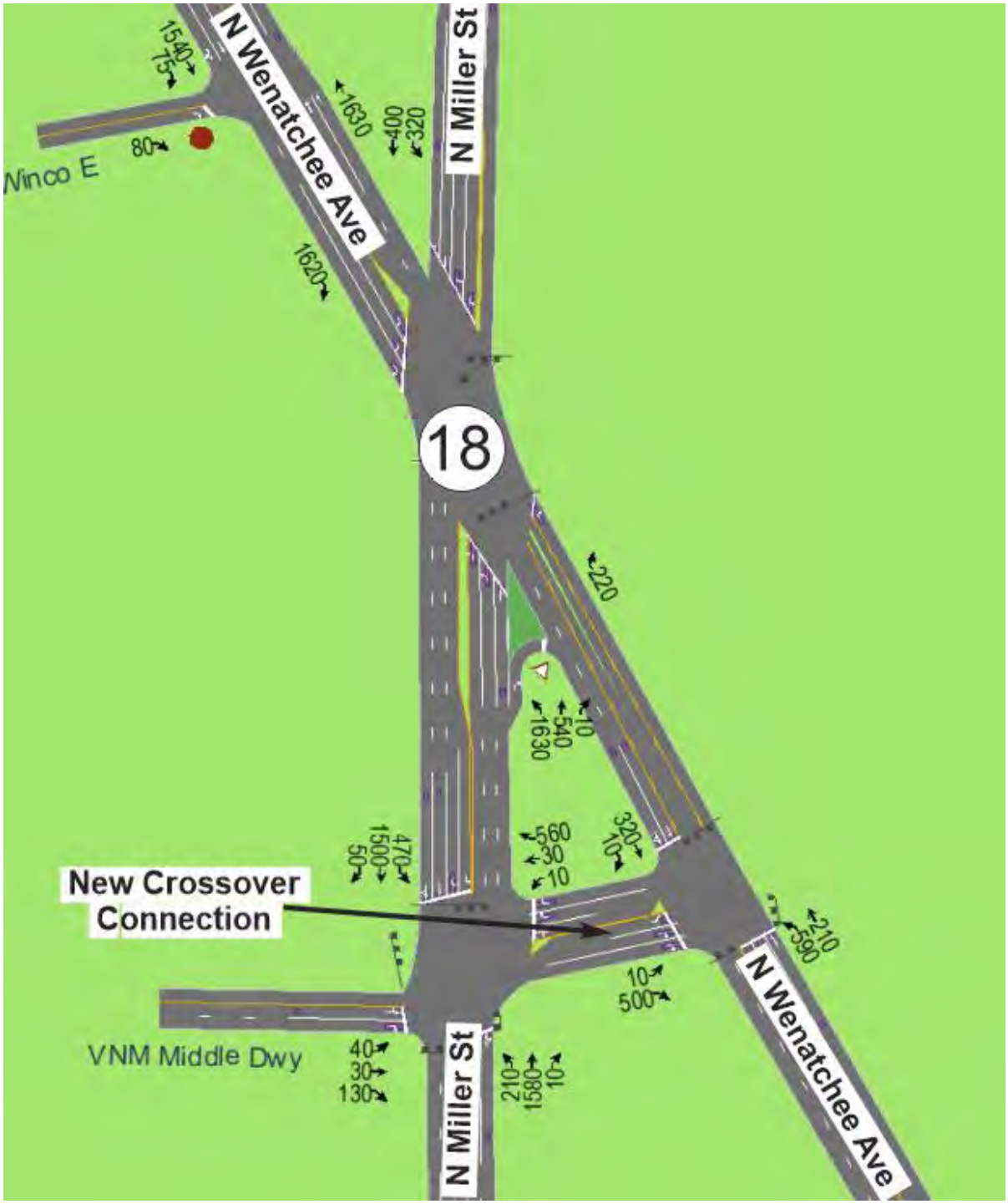


Source: Confluence Parkway Transportation Discipline Report. 2020.

Figure D-6. 2040 Intersection PM Peak Hour Volumes – Build Alternative (South)



Source: Confluence Parkway Transportation Discipline Report. 2020.



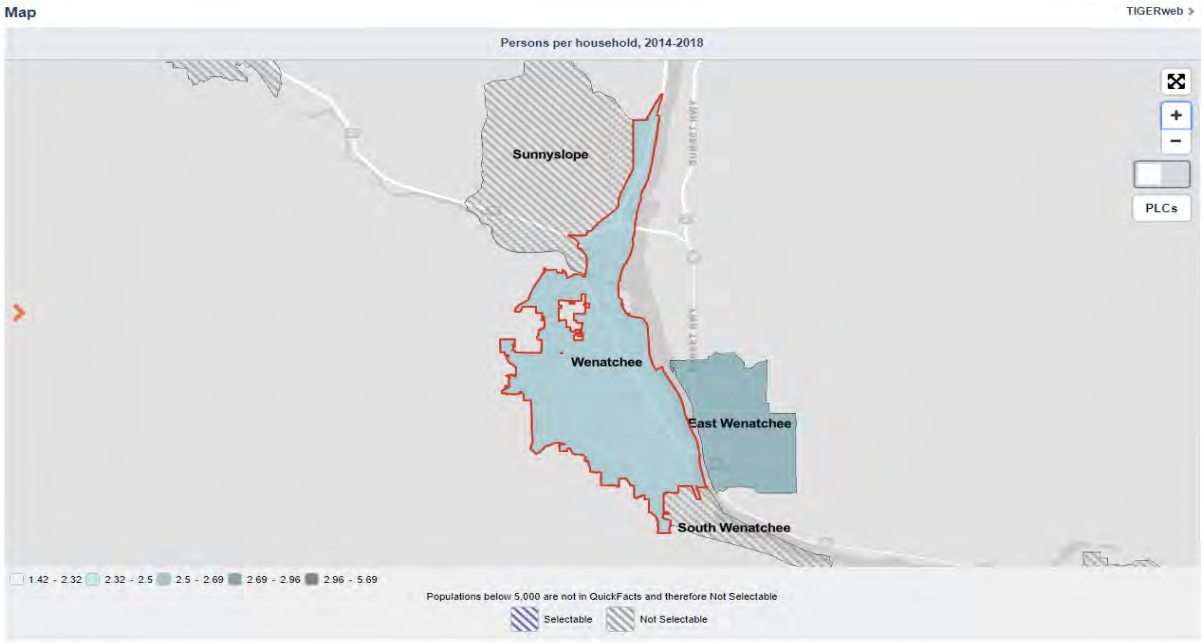
Source: Confluence Parkway Transportation Discipline Report. 2020.

Appendix E: Residential Equivalence and Supporting Information

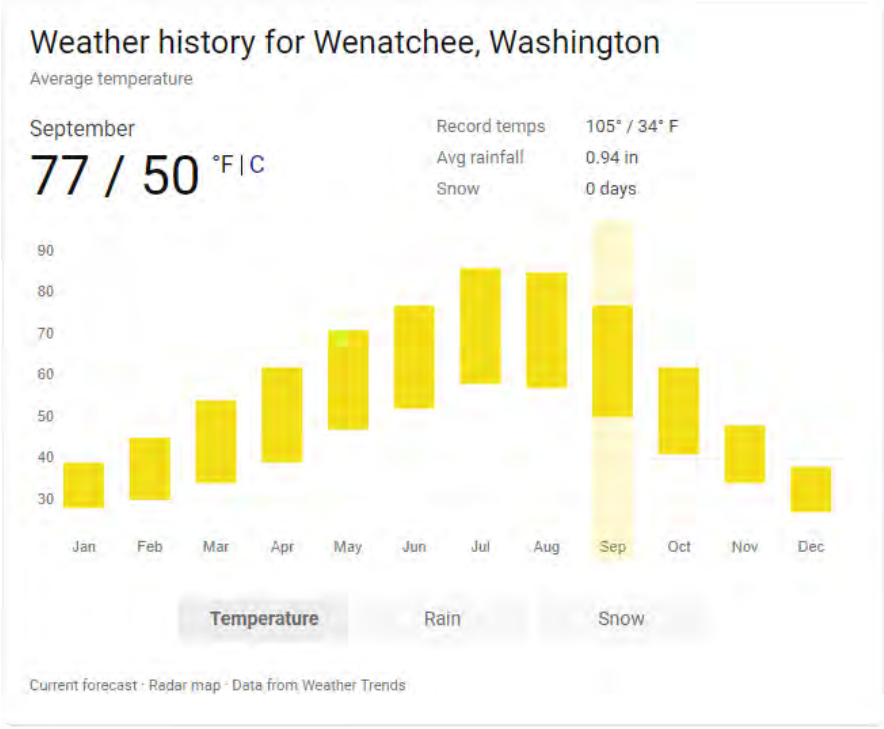
The following pages contain the residential equivalent calculations. Data used for these calculations were obtained from the City of Wenatchee, Wenatchee Confluence State Park Rangers and managers at the Wenatchee Confluence State Park and information from web sites and brochures for the Horan Natural Area. Supporting material is also included.

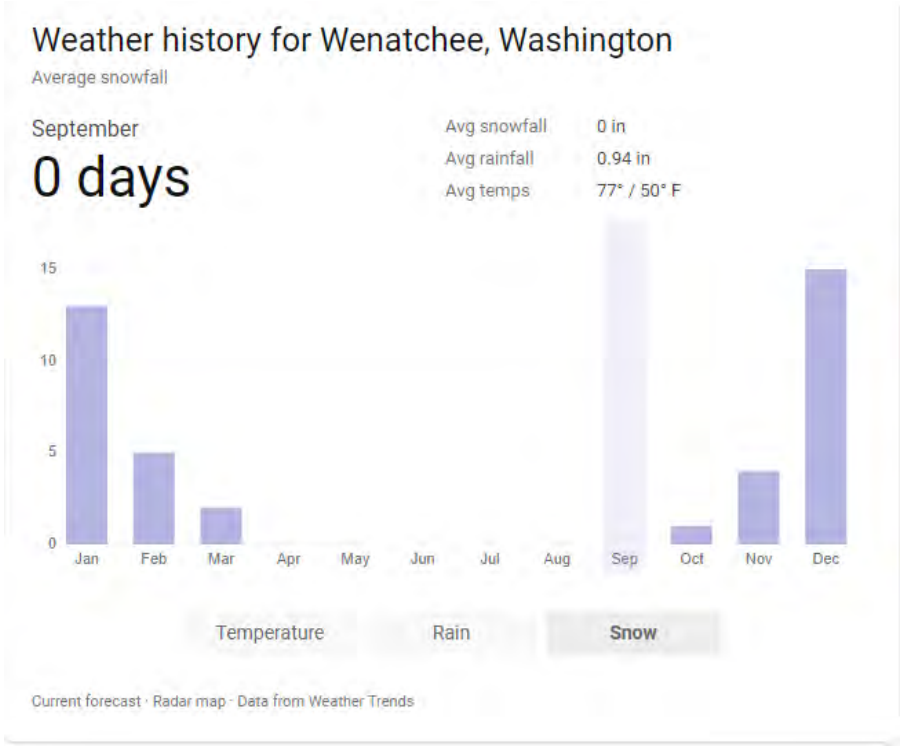
Residential Equivalent									
Horan Natural Area									
	Users/Hour	**Hours/Day**	**Days/Week**	**Months of Year**	**Months/Year**	**Usage Factor**	**Avg House**		**Res Eqs**
Peak	30	12	7	May-Sep	5	0.208333333	2.69		2.323
Off Peak	25	10	7	Oct, Nov, March, April	4	0.138888889	2.69		1.291
Winter	0	7	7	Dec-Feb	3	0.072916667	2.69		0.000
	Closed December 1 to March 1				12				3.614
						Receivers	5		0.723
Apple Capital Loop Trail									
	Users/Hour	**Hours/Day**	**Days/Week**	**Months of Year**	**Months/Year**	**Usage Factor**	**Avg House**		**Res Eqs**
Peak	100	12	7	April-Sep	6	0.25	2.69		9.294
Off Peak	60	10	7	Oct, Nov, March	3	0.104166667	2.69		2.323
Winter	25	7	7	Dec-Feb	3	0.072916667	2.69		0.678
					12				12.295
						Receivers	8		1.537
Confluence State Park Day Use									
	Users/Hour	**Hours/Day**	**Days/Week**	**Months of Year**	**Months/Year**	**Usage Factor**	**Avg House**		**Res Eqs**
Peak	100	12	7	May-Sep	5	0.208333333	2.69		7.745
Off Peak	50	10	7	Oct, March, April	3	0.104166667	2.69		1.936
Winter	25	7	7	Nov-Feb	4	0.097222222	2.69		0.904
					12				10.584
Valley Academy of Learning									
	Users/Hour	**Hours/Day**	**Days/Week**	**Months of Year**	**Months/Year**	**Usage Factor**	**Avg House**		**Res Eqs**
Peak	200	10	5	Sep-May	9	0.223214286	2.69		16.596
Off Peak							2.69		0.000
Winter							2.69		0.000
					9				16.596
Valley Academy of Learning									
	Users/Hour	**Hours/Day**	**Days/Week**	**Months of Year**	**Months/Year**	**Usage Factor**	**Avg House**		**Res Eqs**
Peak	320	7	5	Sep-May	9	0.15625	2.69		18.587
Off Peak							2.69		0.000
Winter							2.69		0.000
					9				18.587

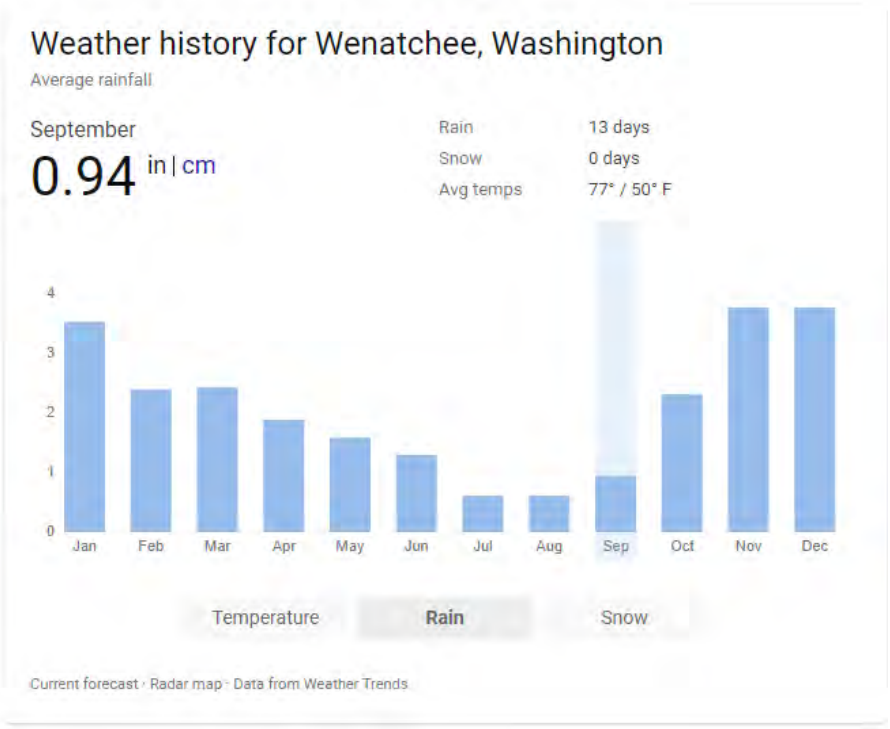
Average persons per household for Wenatchee



Weather and Climate




Weather history for Wenatchee, Washington
Average snowfall
September
0 days
Avg snowfall 0 in
Avg rainfall 0.94 in
Avg temps 77° / 50° F
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Temperature
Rain
Snow
Current forecast · Radar map · Data from Weather Trends


Weather history for Wenatchee, Washington
Average rainfall
September
0.94 in | cm
Rain 13 days
Snow 0 days
Avg temps 77° / 50° F
4
3
2
1
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Temperature
Rain
Snow
Current forecast · Radar map · Data from Weather Trends

Horan Natural Area Information

Make a difference

There are many ways you can help park staff keep the Horan Natural Area as pristine as possible, including:

- Remain on gravel trails.
- Keep pets on leash at all times.
- Leave bikes locked up at designated trailheads.
- Practice pack-it-in, pack-it-out principles. Take any trash with you and dispose of it in containers provided at either end of the trail.
- Respect the rights of others who may be on the trail by staying to the right as you go around corners with limited visibility.
- Tell park staff about any hazards you may see such as a tree fallen across the trail or a washout in the trail.
- Obey all signs and rules.
- Remain out of the closed area from Dec. 1 through March 1. This is necessary to protect bald eagles.
- Leave the wildlife in the wild. Please do not take any flowers, plants, bird eggs or driftwood.
- Leave birdhouses untouched. These give researchers valuable information that can help the Natural Area in the future.

Information for groups or organizations

School groups and other organizations that would like to have a guided tour of the Horan Natural Area may contact Wenatchee Confluence State Park at (509) 664-6373. To organize a tour, a group must:

- Have at least 20 members.
- Have an agenda for its tour.
- Contact park staff at least 20 days before the desired tour date.

The Discover Pass is required for day visits to state parks and access to other state-managed recreation lands. The pass provides access to millions of acres of parks, wildlife areas, trails, natural areas and water-access sites. The annual pass is transferable between two vehicles.

- Annual pass: $30
- One-day pass: $10 (transaction and dealer fees may apply)

The Discover Pass can be purchased online, by phone or in person. For details, visit www.discoverpass.wa.gov or call (866) 320-9933.

Thank you for supporting Washington state recreation lands.

Wenatchee Confluence State Park
333 Olds Station Road
Wenatchee, WA 98801
(509) 664-6373

State Parks information:
(360) 902-8844

Reservations: Online at www.parks.state.wa.us or call (888) CAMPOUT or (888) 226-7688

Other state parks located in the general area:
Lincoln Rock, Peshastin Pinnacles and Squilchuck

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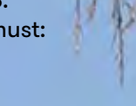

If you would like to support Washington State Parks even more, please consider making a donation when renewing your license plate tabs. You also may place a check in a donation box when you visit state parks.
Donations are a significant part of the State Parks budget and are needed to keep your parks open and operating.
For more information, visit www.parks.state.wa.us/donations

Washington State Parks and Recreation Commission

P.O. Box 42650
Olympia, WA 98504-2650
(360) 902-8500
www.parks.state.wa.us

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Diana Perez
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Agency director: Don Hoch

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Washington State Parks

The Horan Natural Area

Your Guide to the Wetlands

EMBRACE YOUR NATURE
www.parks.state.wa.us

History of the Horan Natural Area

The area's written history began in 1811 when explorer David Thompson paddled the Columbia River while trapping for the Northwest Fur Company. Many trappers and miners followed Thompson's first visit, leading to the establishment of the first trading post in 1866. During this time, alfalfa for livestock was one of the first crops, but orchards and vineyards soon followed.

In the past hundred plus years, the land was used for a variety of things, from a golf driving range to thriving pear orchards. In 1990, the Chelan County Public Utility District #1 acquired about 100 acres of pear orchard from the Horan family for the purpose of building a manmade wetland. After construction, the wetland was given to the Washington State Parks and Recreation Commission to administer and is now part of the Wenatchee Confluence State Park. The wetland was named the Horan Natural Area to honor the historic Horan family.

The Horan Natural Area consists of about 100 acres of wetlands. There are 2 miles of gravel trail that connect 15 viewing stations for walkers. These viewing stations allow individuals to learn about and experience a variety of habitats.

What to expect while on your walk

While taking your walk, try to use all of your senses. Each season brings new experiences.

Spring

In spring, the Horan Natural Area is used by numerous waterfowl, birds and mammals. Waterfowl use the tall green grass as a safe haven to lay their eggs and hatch their young. Song birds will build nests in the cottonwood trees and other high places so that predators like the skunk, raccoon or coyote don't disturb the eggs. Mammals of all shapes and sizes will use the Horan Natural Area. They will raise their young in the tall grass or under the shade of a tree. After a few hours, the baby deer (called fawns) will be up on their feet following their moms (called does) as they eat the tender green shoots to help feed both the does and their fawns. This also is the time flowers start blooming and fragrances fill the air.

Summer

Summer is a time for the wildlife to get fat and grow strong. The young birds need to develop strong muscles so that when fall arrives, they can fly south to their wintering grounds and be able to search for food on their own. The large mammals, such as skunks and deer, use this time to relax and eat. They don't move south during the winter. They will winter right in the Horan Natural Area. The more they are able to eat during the summer, the larger their fat reserves will be. This will help them survive the frigid winter months. This also is the time the majestic cottonwood trees start to expel seeds in the air with white puffs. These white puffs enable the tiny seeds to travel far distances in the air and start a new forest of cottonwoods. If you watch, it looks as though it's snowing.

Fall

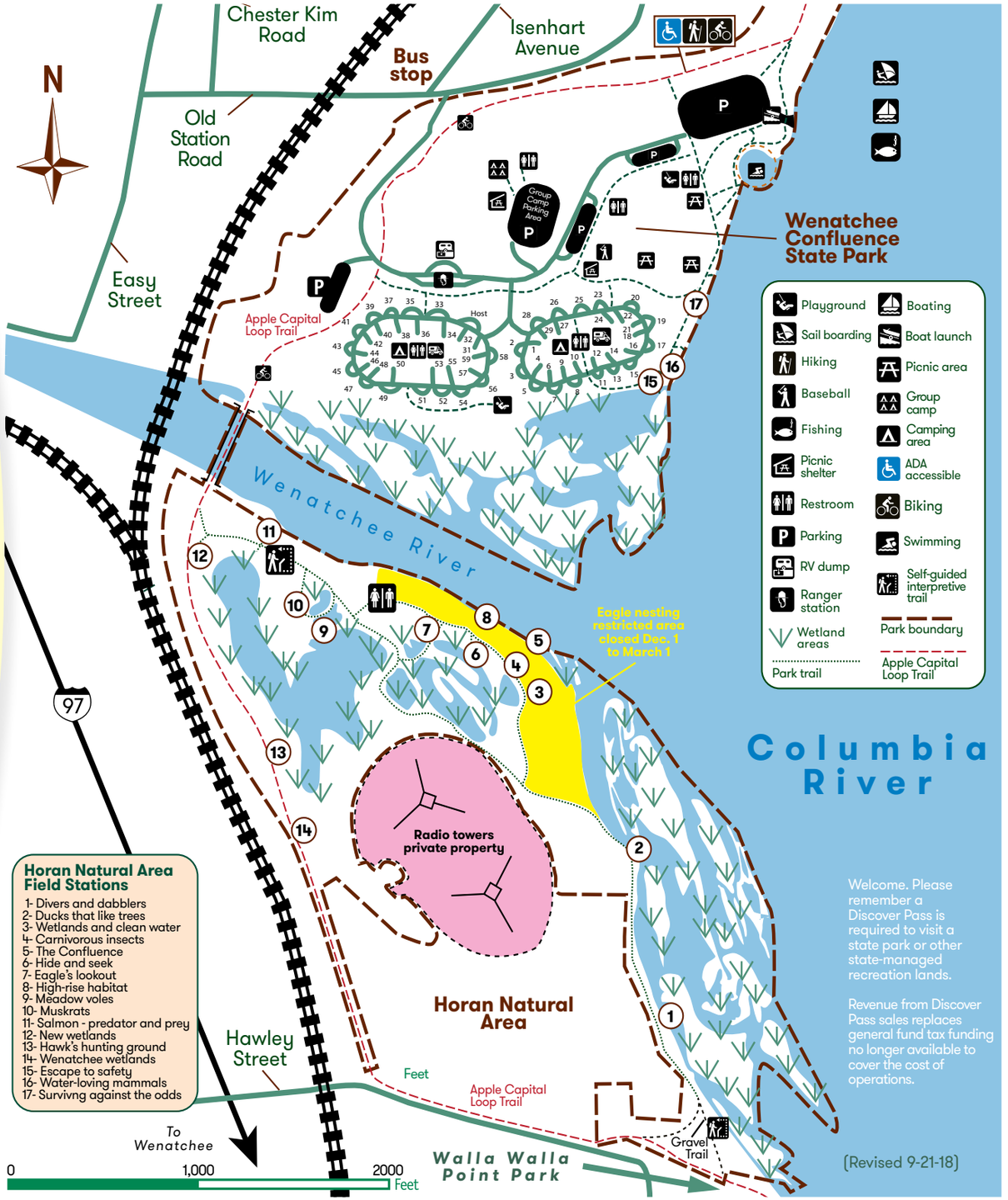
Fall brings in the colder air from the north. The cooler temperatures start to turn the grasses from green to brown. The waterfowl start to band together in flocks and eventually they will move south to warmer climates. The deer and other mammals start to grow their winter coats. Their coats will change from a reddish summer coat to a dark brown/gray winter coat. This also is the season the deer mate. If you listen, you may be able to hear two male deer (bucks) sparring in the brush. They will use their antlers and body size to win the courtship of the does.

Winter

Winter in the Natural Area can be one of the most exciting times. Most trees, shrubs and other plants lose their leaves, so watching your favorite wildlife species will be easier. This also is the time of year the bald eagles migrate to the warmer river valleys where fish and other food are easier to gather. You may see numerous bald eagles perched in trees or diving into the water to catch unlucky fish. For the wildlife, winter is the season they prepared for all year. Most years the snow depth is not too deep but the frigid winds can be ferocious. Turn your cheek toward the wind and feel how it bites. Then imagine yourself being a deer having to seek shelter away from the wind. Could you survive here all winter?

Whatever the season, the Horan Natural Area will have something for everyone to enjoy and see. There are numerous species of mammals, song birds, waterfowl and even species that migrate hundreds of miles to survive the winter. All the plants play an important role in the survival of the wildlife who call this area home. Please help the wildlife survive by not picking plants, flowers or berries.

Use common sense and caution when walking through the Horan Natural Area as biting and stinging creatures do call this home. Ants, bees, snakes and other species may cause injury if disturbed.



Wenatchee Confluence State Park Information

Things to remember

- **Park hours** – 6:30 a.m. to dusk.
- **Winter schedule** – 8 a.m. to dusk. Although most parks are open year round, some parks or portions of parks are closed during the winter. For a winter schedule and information about seasonal closures, visit www.parks.state.wa.us or call the information center at (360) 902-8844.
- Wildlife, plants and all park buildings, signs, tables and other structures are protected; removal or damage of any kind is prohibited. Hunting, feeding of wildlife and gathering firewood on state park property is prohibited.
- One camping party is allowed per site. Maximum of eight people per campsite.
- Campsites may not be held for other parties.
- Camping check-in time is 2:30 p.m., and checkout time is 1 p.m.
- Extra vehicle overnight - $10 per night in designated area for each vehicle in excess of the one allowed per site. Does not apply to vehicle towed by a recreational vehicle.
- Pets must be on leash and under physical control at all times. This includes trail areas and campsites. Pet owners must clean up after pets on all state park lands.
- Quiet hours are 10 p.m. to 6:30 a.m.
- Engine-driven electric generators may be operated only between the hours of 8 a.m. and 9 p.m.

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Other state parks located in the general area:
Lincoln Rock, Peshastin Pinnacles and Squilchuck

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Share your stories and photos: Adventure Awaits.com

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Washington State Parks

Wenatchee Confluence

State Park

EMBRACE YOUR NATURE

www.parks.state.wa.us

Welcome to Wenatchee Confluence

Wenatchee Confluence State Park is situated in central Washington and sits at the confluence of the Wenatchee and Columbia rivers. This 197-acre parks is separated into two distinctly different areas, the North Confluence is urban and recreational, while the South Confluence is a wetland natural area called the Horan Natural Area. A pedestrian bridge crosses the Wenatchee River to the Horan Natural Area.

The shaded, grassy areas and sports fields are popular year round, and the swimming beach area on the river is very popular in the hot summer months. Basketball and tennis courts are available, as are volleyball, baseball and soccer fields. Rock climbing and winter skiing opportunities are not far from the park. Occasionally, muskrat and beaver can be seen in the rivers.

Overnight accommodations

The park offers several options for overnight stays. There are eight standard campsites and 51 utility campsites that accommodate RVs up to 65 feet long. All sites have picnic tables and a campfire grill, and all hookup sites have full hookups with electricity, water and sewer.

An overnight group camp facility is available by reservation, accommodating 20 to 300 guests. The group camp fee varies by group size.

Reservations for individual campsites and the group camp may be made online at www.parks.state.wa.us or by calling (888) CAMPOUT or (888) 226-7688.

- Hiking
- Ranger station
- Wind surfing
- Sailing
- Fishing
- Swimming
- Canoe access
- Picnic area
- Camping
- Boat launch
- Trailer dump
- Group camp
- RV camping
- Biking
- Parking
- Park boundary

Park amenities and facilities

Wenatchee Confluence State Park offers several amenities and facilities to make your visit more enjoyable and comfortable, including:

- Group day-use kitchen shelter with electricity, 12 sheltered picnic tables and a barbeque. Reservable by calling (888) CAMPOUT or (888) 226-7688
- 70 picnic are available first come, first served
- Two-lane boat launch and boarding float (daily watercraft launching permit required)
- Two basketball courts, two horseshoe pits, one softball field, one soccer field and one volleyball field
- Six restrooms (ADA accessible) and 16 showers (eight are ADA accessible)
- 1 mile of interpretive trail and 1 mile of trail accessible to people with disabilities connects to the Apple Capital Loop Trail
- Trailer dump station