

## **Exhibit G: Noise Impact Study**

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Sound . Vibration . Air

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Subject Noise Analysis: Gas Station and Convenience Store with Car Wash

## Introduction

This technical memorandum was produced to evaluate noise from a proposed gas station, convenience store, and automatic car wash facility at 2115 Molalla Road. This analysis includes a brief introduction to acoustics, regulatory information, methods of analysis, land use and analysis results. Where impacts are possible, noise mitigation measures would be examined.

## Project Description

A new gas station, convenience store, and automatic car wash is planned at 2115 Molalla Road in Woodburn. The new facility will cover three lots, 051W09B001200, 051W09B001100, and 051W09B001000. The site will have direct access to Molalla Road in addition to abutting properties at the site's west, north, and east boundary. The convenience store building will have a square footage of 4,394 square feet (sq. ft.) with an attached 3,162 sq. ft. automatic car wash. Figure 1 shows the location of the proposed site and surrounding area.



## Introduction to Acoustics

Noise is generally defined as unwanted sound. Human response to noise is subjective and can vary greatly from person to person. Factors that can influence individual response to noise include the loudness, frequency, amount of background noise present before an intruding noise, and the nature of the work or activity (e.g., sleeping) that the noise affects.

The unit used to measure the loudness of noise is the decibel (dB). To better approximate the sensitivity of the human ear to sounds of different frequencies, the A-weighted decibel scale was developed. Because the human ear is less sensitive to higher and lower frequencies, the A-weighted scale reduces the sound level contributions of these frequencies. When the A-weighted scale is used, the decibel levels are denoted as dBA. The A-scale is used in most ordinances and standards that regulate noise levels.

A 10-dBA change in noise levels is judged by most people as a doubling of the sound level. The smallest change in noise level that a human ear can perceive is about 3 dB and increases of 5 dBA or more are clearly noticeable. Normal conversation ranges between 44 and 65 dBA when speakers are 3 to 6 feet apart.

Noise levels in a quiet rural area at night are typically between 32 and 35 dBA. Quiet urban nighttime noise levels range from 40 to 50 dBA. Noise levels during the day in a noisy urban area are frequently as high as 70 to 80 dBA. Noise levels above 110 dBA become intolerable and then painful, while levels higher than 80 dBA over continuous periods can result in hearing loss.

To account for the time-varying nature of noise, several noise metrics are useful. The equivalent sound pressure level (Leq) is defined as the average noise level, on an energy basis, for a stated time-period (for example, hourly). The Leq is the preferred noise descriptor for most noise studies.

## Regulatory Information

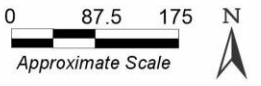
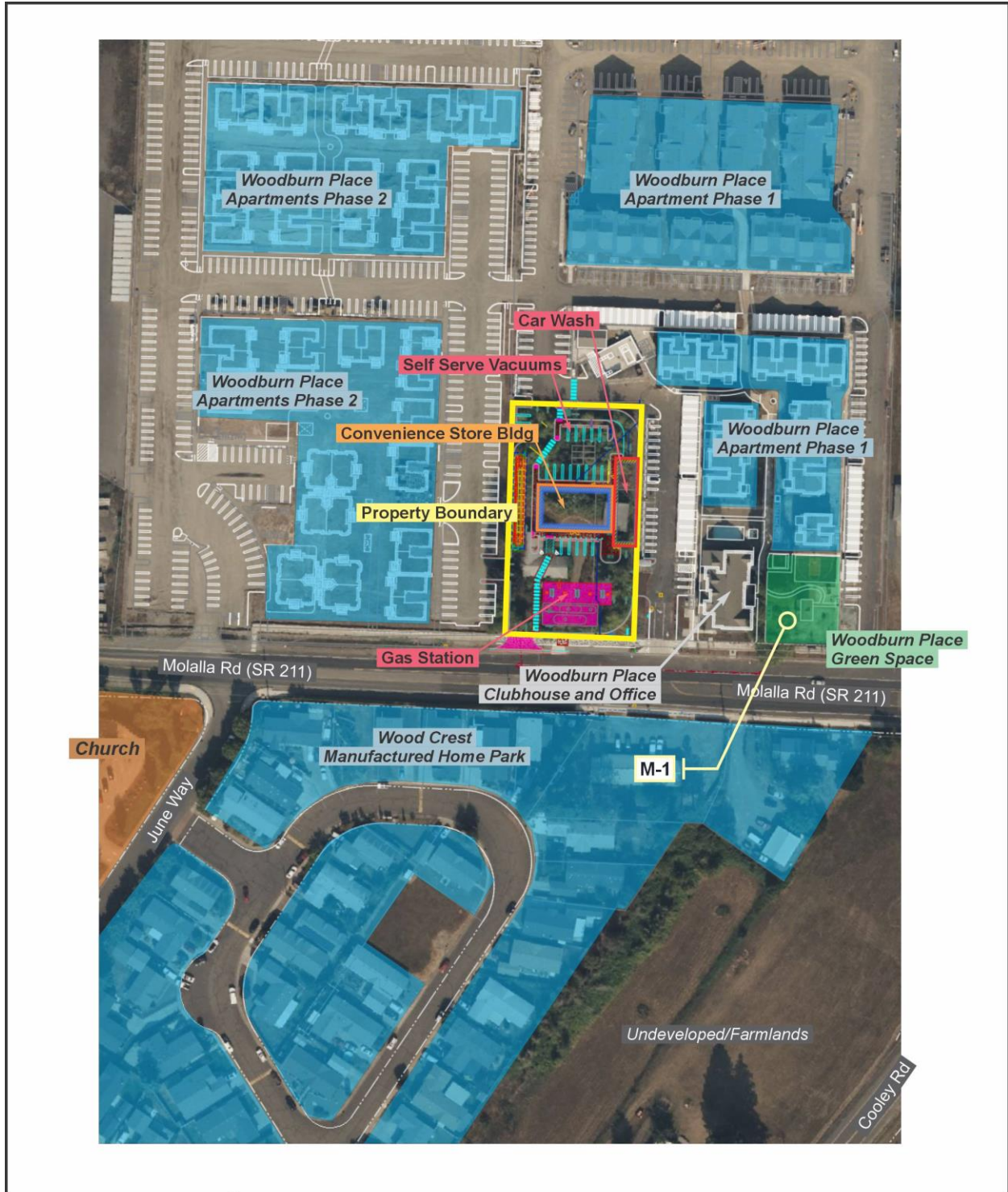
The City of Woodburn has a noise control ordinance found in the Woodburn General Ordinances, Chapter 5, Section 29.1 (Ordinance 2312). For residential zones, the criteria limits noise levels to 65 dBA between 7:00 am and 9:00 pm, reducing by 10 dB to 55 dBA between the overnight hours of 9:00 pm and 7:00 am the following day. For nonresidential properties, the criteria are 75 dBA between 7:00 am and 9:00 pm, reducing by 15 dB to 60 dBA between the overnight hours of 9:00 pm and 7:00 am the following day.

The criteria also exempt construction activities between the hours of 7:00 am and 9:00 pm daily. Construction activities outside of these hours would require a noise variance from the City of Woodburn.

Based on the limits of the Woodburn noise control ordinance, operation of the car wash and self-serve vacuums will likely be limited to daytime hours of 7:00 am to 9:00 pm.

## Affected Environment

Figure 2 is a land use figure that also shows the location of the noise monitoring site M-1. The figure also identifies the different land uses surrounding the proposed new gas station, convenience store, and automatic car wash. A summary of noise levels is also provided in this section.



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Figure 2. Project Area Land Use and Noise Monitoring Location





## Land Use

Land use in this area includes the undeveloped lot for the new gas station, convenience store, and car wash, single and multi-family residences, a church, commercial and light industrial uses and some undeveloped and/or farmlands. The site and surrounding properties on the north side of Molalla Road (OR 211) are zoned General Commercial. The properties directly south of the site, across Molalla Road, are zoned Medium Density Residential. There are two new multi-family complexes surrounding the site, one recently completed (Phase 1) and one under construction at this time (Phase 2). These two new complexes are the Woodburn Place Apartment Phase 1 and Phase 2, with Phase 2 set for completion in 2024. The building nearest to Molalla Road is the rental office and clubhouse, which also has a green space and playground to the east of the office. Woodburn Place Apartments Phase 2 will have residential units directly west of the proposed gas station, convenience store, and automatic car wash.

South of the proposed convenience store, on the south side of Molalla Road is the Wood Crest Manufactured Home Park and the Jehovah's Witness Kingdom Hall at 1557 June Way. There are also some single family residences southeast of the proposed site, along Cooley Road. All other noise sensitive land uses are too far away to be affected by the operation of the gas station, convenience store, and automatic car wash.

## Existing Noise Levels

Noise measurements were taken over a 24-hour period on October 31, 2023. The overall hourly Leq noise levels ranged from 53 to 70 dBA Leq, with most noise coming from traffic along Molalla Road. Daytime noise levels between the hours of 7:00 am and 9:00 pm, following the Woodburn Noise Control Ordinance, ranged from 64 dBA Leq to 70 dBA Leq, with the lower noise levels occurring after 8:00 pm. Noise levels during the overnight period of 9:00 pm to 7:00 am ranged from 53 dBA Leq to 67 dBA Leq. Noise levels overnight begin to increase with the early morning commute, with noise levels of 66 to 67 dBA Leq starting around 5:00 am.

## Analysis Methods

Noise modeling was performed using SoundPlan Noise Modeling Software (Version 5.1). The calculations conducted by SoundPlan to model noise levels are based on and compliant with the International Standards Organization (ISO) 9613-2 methods for outdoor propagation of noise sources, like those from commercial and industrial sources. The software allows the input of geographical and topographical information and provides a true 3-D acoustical model for noise propagation.

Input to the model used for this analysis included topographical information and computer-aided drafting (CAD) information, outlines of all building structures, including the convenience store, car wash, nearby Woodburn Apartment buildings and office and first row of manufactured homes along Molalla Road. The CAD information included the locations of facility equipment to be constructed as part of the project. This includes the roof top mounted building heating ventilation and air conditioning systems (HVAC), cooler systems, coin operated vacuums, car wash sprayers and car wash blower fans. Noise from vehicles accessing the site to access the gas pumps, convenience store or car wash were also included in the noise analysis.

The car wash blower fans are typically the loudest of the mechanical systems associated with the project. Other noise sources include the car washing system, vacuums, heating ventilation and air conditioning systems (HVAC). Noise from vehicles accessing the site was performed for peak daytime (7:00 am to 9:00 pm) and nighttime hours (9:00 pm to 7:00am). Peak daytime hours are projected at up to 190 vehicles per hour during peak daytime hours and up to 143 vehicles per hour during overnight

hours. The traffic noise levels were also modeled using SoundPlan, which includes the same traffic noise modeling methods as the Federal Highway Administration (FHWA).

At the time of this study, the final vendors for the car wash associated systems and HVAC had not been selected. The following sections provide reference noise levels used for the analysis and requirements for noise emissions for the car wash system and blowers that will meet the Woodburn noise control ordinance.

### HVAC Systems

It is important to note that noise from HVAC systems is not a significant source of noise when compared to the noise from the car wash system and blowers. The HVAC systems are typically installed on the roof of the building and newer units produce fairly low overall noise levels. The assumed HVAC system was an 8.5 Ton Carrier Weather Master Rooftop Heat Pump System. Noise levels for the system, which were provided by the manufacturer, are outlined in Table 1, with the specification sheet provided in Attachment A. Although an HVAC system with higher noise levels may be acceptable, it is recommended that any selected HVAC system meet the octave band sound power levels provided in Table 1 to assure compliance with the Woodburn noise control ordinance.

### Vacuums

There are two self-serve vacuums located near the entrance to the car wash, in the rear of the building as shown in Figure 2. The study used a standard coin operated vacuum system common to many self-serve and drive through car wash facilities. The standard octave band sound power levels are provided in SoundPlan. Any vacuum proposed for this facility must meet the specifications provided in Table 1.

### Car Wash and Blower Systems

The noise levels used for noise emissions from the car wash entrance and exit are based on octave band noise levels from International Drying Corporation, based on their Whisper Drying System. Complete octave band information used in the analysis for the proposed vacuums, car wash dryers and washing equipment are shown in Table 1.

Note that the information in Table 1 is presented using Sound Power, not the more commonly used sound pressure. The sound pressure levels for the entire wash system at 30 feet from the entrance and exit are calculated by SoundPlan and included later in this analysis and again in the noise mitigation section.

Equipment	Noise Levels for each Frequency Octave Bandwidths in dB									Sum in dB (dBA)
	31.5	63	125	250	500	1K	2K	4K	8K	
HVAC System	61.7	74.6	77.4	82.5	84.9	81.9	78.8	75.9	61.7	89.3 (88.6)
Blowers (Exit)	--	90	94	91	91	92	90	88	85	99.8 (96.8)
Car wash (Entrance)	--	84	88	88	86	85	84	82	79	94.3 (90.8)
Car Vacuums	80.9	91.1	77.2	81.8	77.0	76.7	78.0	80.3	83.4	93.2 (86.9)
Source:										
<ul style="list-style-type: none"> <li>• Manufacture's data and extrapolated noise levels from Whisper Drying System.</li> <li>• Wash entrance noise levels are based on blower noise measurements with all bay doors fully opened.</li> <li>• Levels with "--" listed are not available and would not change the overall noise level.</li> </ul>										

### Receiver Locations

The locations of noise-sensitive properties in relation to the facilities were obtained from aerial photography and plan drawings from Woodburn Apartment complex, which were integrated with the CAD files. Multi-floor units receivers are denoted with "abc" representing first, second and third floors,

respectively. Figure 3 provides a map of the area, identifying all the noise modeling locations, noise sources, and building structures.

To assure compliance with the Woodburn noise control ordinance, the noise analysis includes receiver locations for each of the balconies at each of the units within approximately 300 to 350 feet of the car wash exit, including two receivers in the shared green space. The majority of the new and planned units at the Woodburn Apartment complex are three floor buildings with six units, two units per floor with balconies. There is one – two story building (receiver E-8ab) located just east of the office clubhouse, north of the shared greenspace. Because of the size of the six-unit buildings, which function as a noise barrier for other buildings, the building structures are included in the noise model.

Receivers were also located at the property lines of the nearby single family residences in the Wood Crest Manufactured Home Park. There is also one single family residence just east of the Wood Crest Manufactured Home Park that was also included in this noise analysis.

Finally, there are two reference receiver locations denoted R-1 and R-2. R-1 is 30 feet directly north of the car wash entrance and R-2 is 30 feet directly south of the car wash exit. These two reference locations provide the maximum noise levels allowable from car wash operations to meet the noise levels projected at the receiver locations and meet the city of Woodburn noise ordinance. The noise modeling results are provided in the following section.





## Operational Noise Impact Analysis

Noise levels were modeled using only the noise sources associated with the gas station, car wash and convenience store. For traffic accessing the site, modeling was performed using the methods from the Federal Highway Administration (FHWA). The reference noise levels assumed were provided in Table 1. To aid in the understanding of the noise modeling results they are divided into four separate discussions, Woodburn Place Phase 1 (east of the project site), Woodburn Place Phase 2 (west of the project site), Southern Receivers, and the two reference modeling locations at 30 feet from the entrance and exit of the car wash.

Because the noise control criteria limits noise levels to 65 dBA between 7:00 am and 9:00 pm, reducing by 10 dB to 55 dBA between the overnight hours of 9:00 pm and 7:00 am the following day, both daytime and nighttime modeling was required. Also, because of the noise emissions from car wash blowers, it was assumed that the car wash operations would exceed the nighttime criteria, and the nighttime operations modeling only include the convenience store, gas station and equipment required for those operations. The results and tables are provided in the following sections.

### Daytime Operations with Car Wash

This section provides daytime operations including the gas station, convenience store, automatic car wash facility, self-serve vacuums and other ancillary equipment. The analysis also includes 190 vehicles per hour accessing the gas station and car wash during peak hour. Traffic noise from Molalla Road is not included in this phase of the study because Molalla Road is a public roadway and noise from the roadway is not associated with the operations of the proposed facility.

### Woodburn Place Phase 1

For the Woodburn Place Phase 1, east of the proposed site, there are 12 receivers representing two entrances, 15 three story units with decks on the 1st, 2nd, and 3rd floors, one - two floor units with decks on the 1st and 2nd floors, the shared pool, two outdoor activity areas and the main office and clubhouse entrance. Overall, noise levels ranged from 37.1 dBA to 64.1 dBA with a criteria of 65 dBA, and therefore, with the equipment specified there are no operational noise impacts. The highest noise levels are at units E-1 just north of the wash entrance and self-serve vacuums, where noise levels are predicted at 57.8 to 57.9 dBA. Other areas with higher noise levels include the office entrance (E-10; 64.1 dBA) and at building entrance E-4 with 59.7 dBA. Table 2 provides a summary of the peak daytime noise levels for Phase 1 of the Woodburn Place Apartments.

<b>Receiver Name<sup>1</sup></b>	<b>Bldg. Side<sup>2</sup></b>	<b>Floor<sup>3</sup></b>	<b>Noise Limit (dBA)<sup>4</sup></b>	<b>Site Noise (dBA)<sup>5</sup></b>	<b>Impact?<sup>6</sup></b>
E-1 a	South	1st Floor	65.0	57.9	No
E-1 b	South	2nd Floor	65.0	57.8	No
E-1 c	South	3rd Floor	65.0	57.8	No
E-2 a	South	1st Floor	65.0	55.5	No
E-2 b	South	2nd Floor	65.0	55.5	No
E-2 c	South	3rd Floor	65.0	55.5	No
E-3 a	South	1st Floor	65.0	53.3	No
E-3 b	South	2nd Floor	65.0	53.4	No
E-3 c	South	3rd Floor	65.0	53.4	No
E-4	Entrance	Ground	65.0	59.7	No
E-5	Entrance	Ground	65.0	54.6	No
E-6 a	East	1st Floor	65.0	37.1	No
E-6 b	East	2nd Floor	65.0	37.2	No
E-6 c	East	3rd Floor	65.0	37.7	No
E-7 a	West	1st Floor	65.0	45.2	No
E-7 b	West	2nd Floor	65.0	44.9	No
E-7 c	West	3rd Floor	65.0	45.4	No
E-8 a	West	1st Floor	65.0	48.4	No
E-8 b	West	2nd Floor	65.0	48.7	No
E-9	Pool	Ground	65.0	54.2	No
E-10	Office	Ground	65.0	64.1	No
E-11	Outdoor	Ground	65.0	39.2	No
E-12 (M-1)	Outdoor	Ground	65.0	41.2	No
<ol style="list-style-type: none"> <li>1. See Figure 3 for receiver locations.</li> <li>2. Side of building for receiver.</li> <li>3. Floor of receiver.</li> <li>4. City of Woodburn noise control ordinance criteria.</li> <li>5. Noise level from gas station, convenience store, vacuums, and car wash.</li> <li>6. Potential noise impacts under Woodburn code.</li> </ol>					

## Woodburn Place Phase 2

The Woodburn Place Phase 2 apartments, located west of the site, had 17 receivers, with 5 representing entrances and 12 representing decks on the 1st, 2nd, and 3rd floors of the units. Overall noise levels ranged from 36.7 to 56.8 dBA, and no exceedance of the city of Woodburn 65 dBA criteria was identified. Noise levels at the entrances near the parking lot were the highest, ranging from 51.6 to 56.8 dBA, while noise levels at the decks ranged from 36.7 to 47.4 dBA. Table 3 provides a summary of the peak daytime model noise levels at the Woodburn Place Phase 2 apartments.

<b>Receiver Name<sup>1</sup></b>	<b>Bldg. Side<sup>2</sup></b>	<b>Floor<sup>3</sup></b>	<b>Noise Limit (dBA)<sup>4</sup></b>	<b>Site Noise (dBA)<sup>5</sup></b>	<b>Impact?<sup>6</sup></b>
W-1	Entrance	Ground	65.0	53.4	No
W-2	Entrance	Ground	65.0	53.9	No
W-3	Entrance	Ground	65.0	51.6	No
W-4	Entrance	Ground	65.0	56.8	No
W-5	Entrance	Ground	65.0	56.5	No
W-6 a	West	1st Floor	65.0	37.8	No
W-6 b	West	2nd Floor	65.0	37.5	No
W-6 c	West	3rd Floor	65.0	38.1	No
W-7 a	East	1st Floor	65.0	38.4	No
W-7 b	East	2nd Floor	65.0	38.0	No
W-7 c	East	3rd Floor	65.0	38.3	No
W-8 a	East	1st Floor	65.0	47.4	No
W-8 b	East	2nd Floor	65.0	47.4	No
W-8 c	East	3rd Floor	65.0	47.4	No
W-9 a	West	1st Floor	65.0	36.7	No
W-9 b	West	2nd Floor	65.0	37.0	No
W-9 c	West	3rd Floor	65.0	37.6	No

1. See Figure 3 for receiver locations.  
2. Side of building for receiver.  
3. Floor of receiver.  
4. City of Woodburn noise control ordinance criteria.  
5. Noise level from gas station, convenience store, vacuums, and car wash.  
6. Potential noise impacts under Woodburn code.

### Southern Receivers

To the south of the site, which includes the Wood Crest Manufactured Home Park and a single family residence, noise levels ranged from 51.3 to 57.7 dBA. No noise impacts were identified. Table 4 summarizes the peak daytime noise levels at these receivers.

Receiver Name <sup>1</sup>	Bldg. Side <sup>2</sup>	Floor <sup>3</sup>	Noise Limit (dBA) <sup>4</sup>	Site Noise (dBA) <sup>5</sup>	Impact? <sup>6</sup>
S-1	Prop Line	1st Floor	65	51.3	No
S-2	Prop Line	1st Floor	65	53.5	No
S-3	Prop Line	1st Floor	65	54.7	No
S-4	Prop Line	1st Floor	65	56.0	No
S-5	Prop Line	1st Floor	65	57.1	No
S-6	Prop Line	1st Floor	65	57.7	No
S-7	Prop Line	1st Floor	65	53.6	No

1. See Figure 3 for receiver locations.
2. Side of building for receiver.
3. Floor of receiver.
4. City of Woodburn noise control ordinance criteria.
5. Noise level from gas station, convenience store, vacuums, and car wash.
6. Potential noise impacts under Woodburn code.

### Reference Noise Level Limits for Car Wash System

The purpose of the reference locations was for comparison with the noise levels provided by the manufacturer of the Whisper Blower system, provided noise level readings outside the entrance and exit of a typical car wash. Using this as the baseline requirement for a wash system, noise levels at all sites remained below the 65 dBA Woodburn criteria, with the highest noise levels at the clubhouse and office entrance. Therefore, the selected car wash vendor must supply a wash system capable of meeting these reference levels of 66.4 dBA at 30 feet from the wash system entrance and 71.3 dBA at 30 feet from the exit of the wash system and maintain sound power noise levels for all equipment in compliance with those listed in Table 1.

### Nighttime Operations without Car Wash or Vacuums

As was shown in Tables 2, 3 and 4, there are a number of receivers with noise levels exceeding the 55 dBA nighttime criteria due to car wash and vacuum operations. The following analysis assumes the car wash and self-serve vacuums would not be operational during the hours of 9:00 pm to 7:00 am the following day. This analysis period is compared to the nighttime noise control ordinance level of 55 dBA. The analysis uses the same receiver locations as used under the daytime analysis.

### Woodburn Place Phase 1

Nighttime noise levels from the gas station and convenience store at the Woodburn Place Phase 1 ranged from 23.5 dBA to 53.0 dBA with a criteria of 55 dBA. The highest noise level of 53.0 dBA was at the office and club house. Noise levels at the apartment decks ranged from 23.5 to 44.7 dBA. There are no noise impacts. Table 5 provides a summary of the peak nighttime noise levels for Phase 1 of the Woodburn Place Apartments.



<b>Table 5. Woodburn Place Phase 1 Nighttime Noise Modeling Summary</b>					
<b>Receiver Name<sup>1</sup></b>	<b>Bldg. Side<sup>2</sup></b>	<b>Floor<sup>3</sup></b>	<b>Noise Limit (dBA)<sup>4</sup></b>	<b>Site Noise (dBA)<sup>5</sup></b>	<b>Impact?<sup>6</sup></b>
E-1 a	South	1st Floor	55.0	43.0	No
E-1 b	South	2nd Floor	55.0	43.9	No
E-1 c	South	3rd Floor	55.0	44.7	No
E-2 a	South	1st Floor	55.0	41.0	No
E-2 b	South	2nd Floor	55.0	42.2	No
E-2 c	South	3rd Floor	55.0	42.9	No
E-3 a	South	1st Floor	55.0	34.5	No
E-3 b	South	2nd Floor	55.0	38.5	No
E-3 c	South	3rd Floor	55.0	39.6	No
E-4	Entrance	Ground	55.0	43.8	No
E-5	Entrance	Ground	55.0	45.4	No
E-6 a	East	1st Floor	55.0	23.5	No
E-6 b	East	2nd Floor	55.0	24.9	No
E-6 c	East	3rd Floor	55.0	28.9	No
E-7 a	West	1st Floor	55.0	40.7	No
E-7 b	West	2nd Floor	55.0	40.0	No
E-7 c	West	3rd Floor	55.0	40.4	No
E-8 a	West	1st Floor	55.0	38.2	No
E-8 b	West	2nd Floor	55.0	40.7	No
E-9	Pool	Ground	55.0	46.8	No
E-10	Office	Ground	55.0	53.0	No
E-11	Outdoor	Ground	55.0	34.8	No
E-12 (M-1)	Outdoor	Ground	55.0	37.9	No
<ol style="list-style-type: none"> <li>1. See Figure 3 for receiver locations.</li> <li>2. Side of building for receiver.</li> <li>3. Floor of receiver.</li> <li>4. City of Woodburn noise control ordinance criteria.</li> <li>5. Noise level from gas station and convenience store, without vacuums or car wash.</li> <li>6. Potential noise impacts under Woodburn code.</li> </ol>					

## Woodburn Place Phase 2

Nighttime noise levels at the Woodburn Place Phase 2 Apartments ranged from 34.4 to 47.7 dBA, and no exceedance of the city of Woodburn 65 dBA criteria was identified. Noise levels at the entrances near the parking lot were the highest, ranging from 43.9 to 47.8 dBA, while noise levels at the decks ranged from 34.4 to 41.6 dBA. Table 6 provides a summary of the peak nighttime model noise levels at the Woodburn Place Phase 2 Apartments.

<b>Receiver Name<sup>1</sup></b>	<b>Bldg. Side<sup>2</sup></b>	<b>Floor<sup>3</sup></b>	<b>Noise Limit (dBA)<sup>4</sup></b>	<b>Site Noise (dBA)<sup>5</sup></b>	<b>Impact?<sup>6</sup></b>
W-1	Entrance	Ground	55.0	43.9	No
W-2	Entrance	Ground	55.0	45.3	No
W-3	Entrance	Ground	55.0	46.9	No
W-4	Entrance	Ground	55.0	47.3	No
W-5	Entrance	Ground	55.0	47.8	No
W-6 a	West	1st Floor	55.0	35.1	No
W-6 b	West	2nd Floor	55.0	34.6	No
W-6 c	West	3rd Floor	55.0	34.9	No
W-7 a	East	1st Floor	55.0	35.0	No
W-7 b	East	2nd Floor	55.0	34.4	No
W-7 c	East	3rd Floor	55.0	34.8	No
W-8 a	East	1st Floor	55.0	41.4	No
W-8 b	East	2nd Floor	55.0	41.6	No
W-8 c	East	3rd Floor	55.0	41.0	No
W-9 a	West	1st Floor	55.0	34.6	No
W-9 b	West	2nd Floor	55.0	35.0	No
W-9 c	West	3rd Floor	55.0	35.6	No

1. See Figure 3 for receiver locations.  
2. Side of building for receiver.  
3. Floor of receiver.  
4. City of Woodburn noise control ordinance criteria.  
5. Noise level from gas station and convenience store, without vacuums or car wash.  
6. Potential noise impacts under Woodburn code.

### Southern Receivers

To the south of the site, which includes the Wood Crest Manufactured Home Park and a single family residence, noise levels ranged from 42.3 to 49.3 dBA. No noise impacts were identified. Table 7 summarizes the peak nighttime noise levels at these receivers.

<b>Receiver Name<sup>1</sup></b>	<b>Bldg. Side<sup>2</sup></b>	<b>Floor<sup>3</sup></b>	<b>Noise Limit (dBA)<sup>4</sup></b>	<b>Site Noise (dBA)<sup>5</sup></b>	<b>Impact?<sup>6</sup></b>
S-1	Prop Line	1st Floor	55.0	42.3	No
S-2	Prop Line	1st Floor	55.0	44.7	No
S-3	Prop Line	1st Floor	55.0	46.3	No
S-4	Prop Line	1st Floor	55.0	48.6	No
S-5	Prop Line	1st Floor	55.0	48.3	No
S-6	Prop Line	1st Floor	55.0	49.3	No
S-7	Prop Line	1st Floor	55.0	44.0	No

1. See Figure 3 for receiver locations.  
2. Side of building for receiver.  
3. Floor of receiver.  
4. City of Woodburn noise control ordinance criteria.  
5. Noise level from gas station and convenience store, without vacuums or car wash.  
6. Potential noise impacts under Woodburn code.

## Construction Noise Impact Analysis

Construction activities associated with the proposed project improvements would be similar to other construction projects of small commercial developments, and also similar to the noise produced during construction of the two new apartment complexes. However, the duration of construction for the gas station, convenience store, and car wash will be substantially less. Project construction will result in an increase in short term noise levels. Short term major construction activities are expected to include the following:

- Site grading, storage tanks, and base preparation
- Construction of building foundation and paving parking areas
- Constructing the building superstructure
- Access intersection improvements, sidewalks, gas delivery equipment, car wash equipment installation, light poles, and signs
- Final finishes, pavement painting, displays installation, product delivery and final preparation for occupation.

Noise levels for these activities can be expected to range from 70 to 95 dBA at sites 50 feet from the activities. Typical equipment for project construction would include haul trucks, loaders, loaders, dump trucks, concrete trucks, pump trucks, flatbed trucks, pump trucks and other supporting equipment. Project construction would be required to meet the City of Woodburn noise control ordinance and is exempt between the hours of 7:00 am and 9:00 pm daily. Construction outside these hours would require a noise variance from the city of Woodburn.

## Operational Noise Mitigation

The primary operational noise mitigation is the restriction of the car wash and self-serve vacuum operations between the hours of 9:00 pm to 7:00 am the following day due to the more stringent noise criteria during these hours. There would be no other operational noise mitigation if the design of the facility results in the use of car wash systems, car wash blowers, self-serve vacuums and other ancillary

equipment that meet the noise level requirements outlined in Table 1. Furthermore, the selected vendor must supply a system that is capable of meeting the reference levels of 66.4 dBA at 30 feet from the wash system entrance and 71.3 dBA at 30 feet from the exit of the wash system. Site operations with these limitations are not predicted to exceed the Woodburn noise code.

## **Construction Noise Mitigation**

Construction activities associated with the proposed project improvements are expected to result in noise levels that range from 70 to 95 dBA at sites 50 feet from the activities. These noise levels, although temporary in nature, could be annoying. In the City of Woodburn, construction activities are exempt from the noise ordinance between the hours of 7:00 am and 9:00 pm daily.

The following construction noise abatement measures are recommended to reduce noise levels during construction:

- Require all equipment to have sound-control devices no less effective than those provided on the original equipment. No equipment shall have un-muffled exhaust.
- Require all equipment to comply with pertinent equipment noise standards of the U.S. Environmental Protection Agency.



## Cumulative Noise Levels

It is important to note that the predicted noise levels provided in Tables 2, 3 and 4 are only for noise related to the operations of the gas station, convenience store, car wash, vacuums, and associated equipment. Also, the noise levels in Tables 5, 6 and 7 are only for noise related to the operations of the gas station and convenience store, without any noise from car wash or vacuums. The main noise source for many residences located near Molalla Road is traffic noise from Molalla Road. To provide a more comprehensive view of the noise levels in the area, traffic data from project traffic engineers with the new apartments completed was used in SoundPlan to model traffic peak hour noise levels using the same methods as the FHWA.

The following two figures were prepared to aid in the understanding of the contribution of noise from the operation of the gas station, convenience store, and car wash to the existing traffic noise from Molalla Road. Figure 4 is a plot of traffic noise levels using the color scale shown in the figure. This figure represents only noise from highway traffic without any noise emissions from the gas station, car wash, vacuums, or other project related noise sources. The figure shows how traffic noise is the dominant noise source in the areas nearest to the highway.

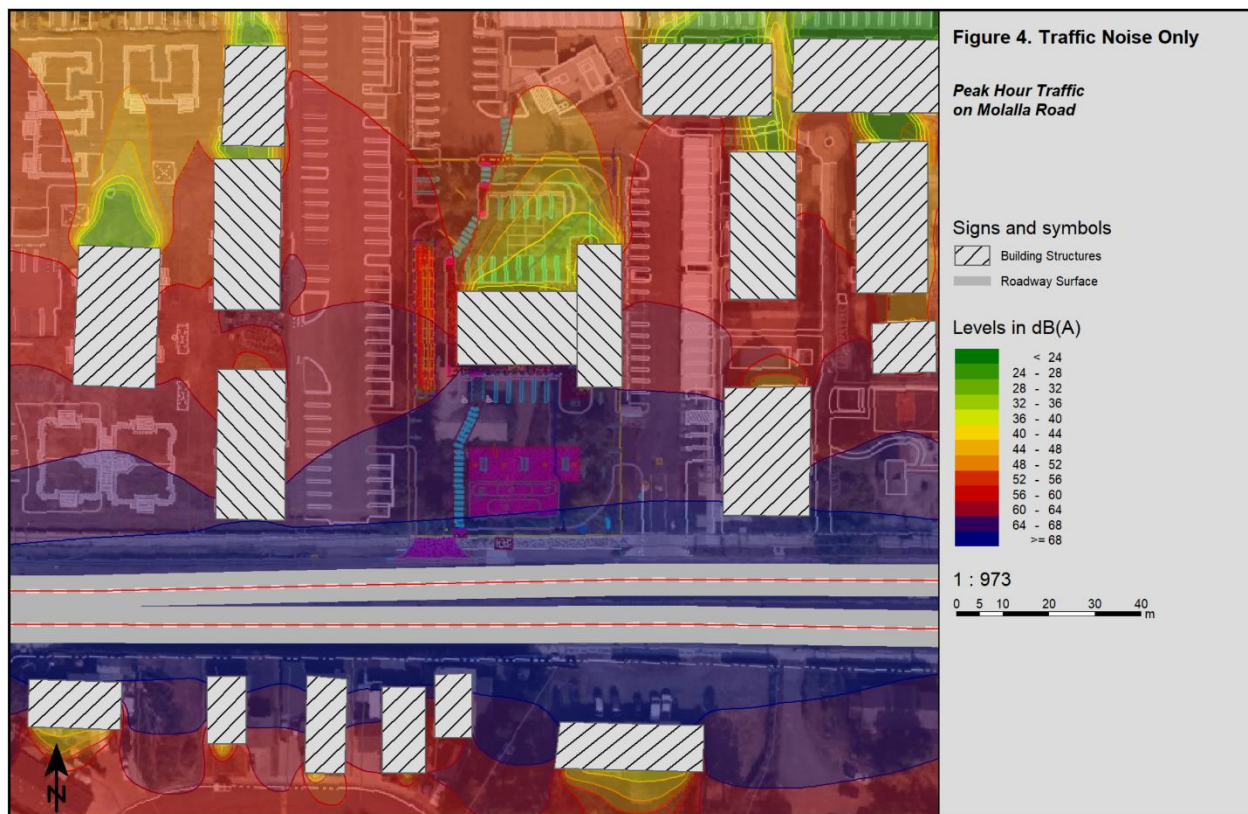
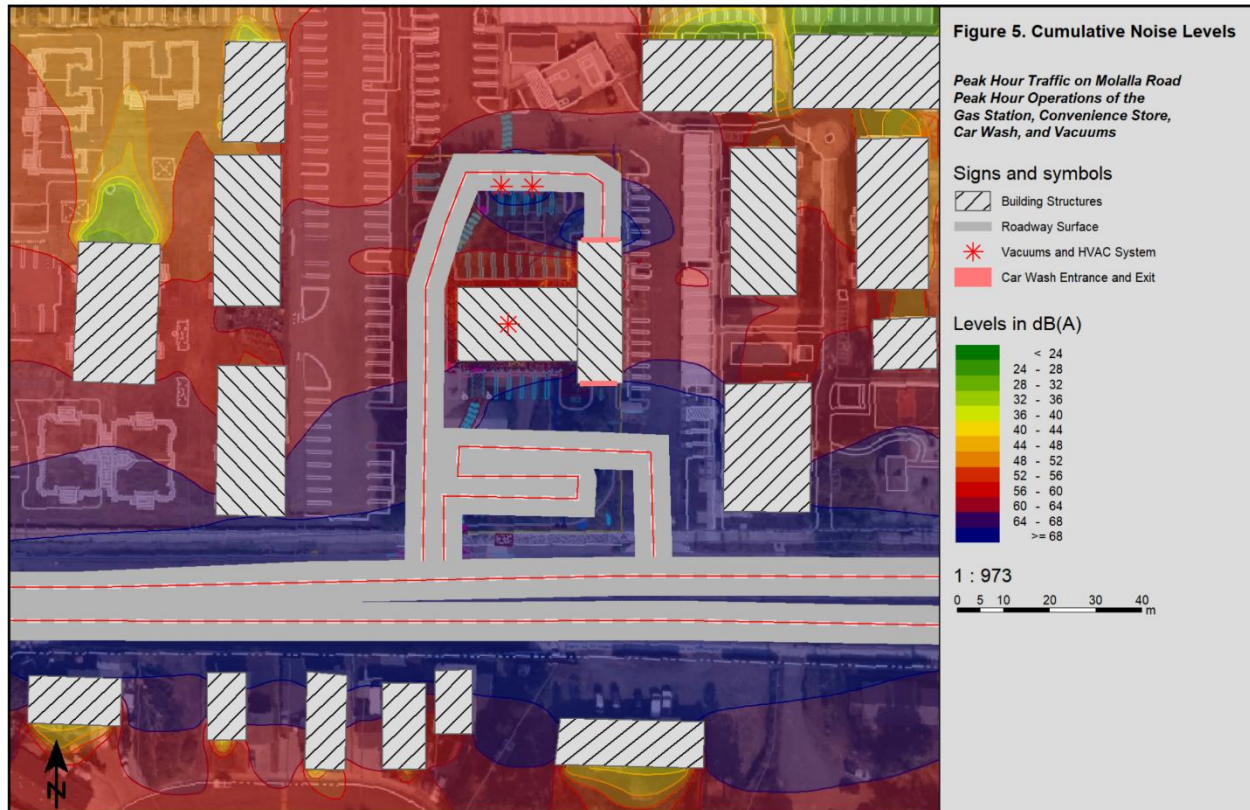


Figure 5 is a similar plot that also includes noise from the peak daytime operation of the new gas station, convenience store, car wash and vacuums. The main differences between the two graphics are the noise from the car wash entrance and vacuums resulting in an increase in noise at some of the apartment units just north and east of the new facility. The noise levels in Figure 5 represent the worst case noise

levels in the area by combining all noise sources, peak hour traffic on Molalla Road, peak daytime operations at the gas station, convenience store, car wash and vacuums, simultaneously.



## Conclusion and Summary

Overall, the projected noise levels using the recommended equipment noise levels and proposed noise mitigation are predicted to remain below the City of Woodburn daytime and nighttime noise control ordinance. During peak daytime hours, all residential units have predicted noise levels of 59.7 dBA or less, well below the criteria of 65 dBA for daytime use. The only location predicted to have noise levels above 60 dBA is the entrance to the clubhouse and office, where noise levels are predicted to reach 64.1 dBA during heavy usage of the car wash.

During peak nighttime hours, all residential units have predicted noise levels of 49.3 dBA or less, below the criteria of 55 dBA for nighttime use. The only location predicted to have noise levels above 50 dBA is the entrance to the clubhouse and office, where noise levels are predicted to reach 53.0 dBA during peak nighttime hours.

Therefore, restricting operation of the car wash and self-serve vacuums to between the hours of 7:00 am and 9:00 pm and using equipment with equal or lower noise levels than specified, there are no predicted exceedances of the City of Woodburn noise control code, and no further noise mitigation would be required.



Attachment A

Equipment Specifications

## THE QUIET DRYING SYSTEM



### LIMITED LIFETIME FAN WARRANTY-NO MAINTENANCE

- ◆ Quiet noise efficient/axial fans
- ◆ 10HP motors or 15HP motors
- ◆ 65 dBa @ 65'
- ◆ Approximately 9600 CFM per motor
- ◆ Adaptable to all Wash types & requirements
- ◆ 304 Surgical grade SS brushed standard
- ◆ Nozzles your choice of available colors

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CHOICE OF NOZZLE TYPE AND COLOR



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SOUND LEVEL READINGS FOR 3 MOTOR WHISPER PACKAGE

The following readings were taken from a masonry car wash building using A-weighted decibels. The car wash building measures 70' 5" end to end. Measurements were taken with overhead doors fully opened. Sound levels may vary with conditions.

<u>Distance</u>	<u>Sound Level A-weighted slow response (dBA)</u>
Exit	87
5'	84
10'	80
20'	75
30'	71
65'	65

<u>Distance</u>	<u>Sound Level A-weighted slow response (dBA)</u>
Entrance	80
5'	76
10'	72
20'	68
30'	65
47'	61





Turn to the experts

## Product Data

# WeatherMaster® Single Packaged Rooftop Heat Pump Units

3 to 10 Nominal Tons



# WeatherMaster®



50HCQ 04, 05, 06, 07, 08, 09, 12  
with Puron® (R-410) Refrigerant




**MINIMUM - MAXIMUM AIRFLOWS (CFM) COOLING AND ELECTRIC HEAT**

UNIT	COOLING			ELECTRIC HEATERS		
	Minimum CFM	Minimum CFM 2-Speed Fan Motor (at High Speed)	Minimum CFM 2-Speed Fan Motor (at Low Speed)	Maximum CFM	Minimum CFM	Maximum CFM
50HCQA04	900	N/A	N/A	1500	900	1500
50HCQA05	1200	N/A	N/A	2000	1200	2000
50HCQA06	1500	N/A	N/A	2500	1500	2500
50HCQA07	1800	N/A	N/A	3000	1800	3000
50HCQD07	1800	1800	1200	3000	1800	3000
50HCQD08	2250	2250	1500	3750	2250*	3750
50HCQD09	2550	2873	1915	4250	2252*	4250
50HCQD12	3000	3380	2253	5000	3000*	5000

\* Minimum electric heat CFM exceptions:

UNIT	UNIT VOLTAGE	HEATER kW	UNIT CONFIGURATION	REQUIRED MINIMUM CFM
50HCQD08 50HCQD09	575	17.0	Horizontal or Vertical	2800
		34.0		2350
50HCQD12	230	50.0	Vertical	3550
		50.0	Horizontal	3420
		43.5	Horizontal or Vertical	3040
	575	50.0	Vertical	3150
		33.5	Vertical	3520
		33.5	Horizontal	3420
		26.5	Vertical	3610

**SOUND PERFORMANCE**

50HCQ UNIT	OUTDOOR SOUND (dB) AT 60 Hz								
	A-Weighted	63	125	250	500	1000	2000	4000	8000
A04	76	51.8	69.0	64.6	67.8	70.7	63.8	60.9	59.0
A05	79	56.1	69.6	68.7	72.5	72.8	68.9	65.0	61.2
A06	79	57.7	66.6	68.7	72.9	74.5	71.1	67.6	62.6
A07	81	86.7	82.7	79.1	78.4	75.4	71.2	67.8	62.9
D07	81	86.7	82.7	79.1	78.4	75.4	71.2	67.8	62.9
D08	83	87.3	81.6	79.7	80.6	79.0	73.5	69.2	66.1
D09	87	61.7	74.7	77.4	82.6	84.9	81.9	78.8	75.9
D12	83	61.0	67.3	75.1	77.7	78.1	75.5	71.2	66.7

**LEGEND**

dB —Decibel

**NOTES:**

1. Outdoor sound data is measure in accordance with AHRI standard 270.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of "average" human ear. A-weighted measurements for Carrier units are taken in accordance with AHRI standard 270.