EXHIBIT PC-3: APPLICANT ENVIRONMENTAL NOISE IMPACT STUDY

Elevating acoustical design.

WEST LINN – KAADY CAR WASH

ENVIRONMENTAL NOISE IMPACT STUDY

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1 Executive Summary

This report is a summary of the environmental noise impact assessment for the proposed Kaady Car Wash located at 18850 Willamette Drive in West Linn, Oregon. This facility, a one-story, 3,190 square foot automatic drive-through car wash with supplemental vacuum cleaning stations, is proposed for a site previously occupied by a McDonald's drive-through restaurant.

As required by the West Linn Community Development Code (CDC), this assessment evaluates potential acoustical impacts by comparing predicted noise emissions from the proposed equipment against pertinent regulations established by the City of West Linn, Clackamas County, and the State of Oregon Department of Environmental Quality (DEQ).

The evaluation utilizes ambient sound level data obtained from the existing site as well as acoustic testing performed at three other Kaady Car Washes in the Portland area. This data was then used to create a software model that predicts noise from the proposed car wash to adjacent areas and properties.

2 Noise Code

2.1 West Linn Municipal Code (WLMC Section 5.487)

The WLMC Section 5.487 explicitly finds that low and moderate ambient noise levels are a significant City amenity and establishes standards to protect the livability, health, comfort, and welfare of its residents.

2.1.1 General Prohibition and Factors

WLMC 5.487 generally prohibits any unreasonably loud, disturbing, or raucous noise, or any noise that unreasonably annoys, disturbs, or endangers the comfort, repose, health, safety, or peace of reasonable persons of ordinary sensitivity.
Factors considered in judging whether a sound is unreasonably loud, disturbing, and unnecessary include:

1. The proximity of the sound to sleeping facilities, whether residential or commercial.
2. The land use, nature, and zoning of the area where the sound emanates and where it is received or perceived.
3. The time of day or night the sound occurs.
4. The duration of the sound.
5. Whether the sound is recurrent, intermittent, or constant.

2.1.2 Prohibited Hours

The operation of the proposed car wash, running from 8:00 AM to 8:00 PM, falls entirely within the permissible hours for general operational noise in West Linn, which prohibits unreasonably loud and raucous noise between 9:00 PM and 7:00 AM.

2.2 Clackamas County Noise Control (Chapter 6.05)

Clackamas County Code 6.05.010 declares a policy to protect the health, safety, welfare, peace, and quiet of its citizens from excessive sound. The County Code declares sound exceeding specific decibel levels at the property line to be a per se violation:

- 7:00 a.m. and 10:00 p.m.: Sound exceeding 60 dBA.
- 10:00 p.m. and 7:00 a.m. the following day: Sound exceeding 50 dBA.

However, the County Code section 6.05.060(F) specifies that sounds caused by industrial or commercial organizations or workers during their normal operations are generally exempted from the provisions of Chapter 6.05. Furthermore, industrial or commercial sound sources that are subject to noise regulation by the State of Oregon Department of Environmental Quality (DEQ) are listed separately in the definitions. Since the proposed Kaady Car Wash is a commercial operation subject to DEQ rules (OAR 340-035-0035), the State and City regulations are generally considered the primary jurisdictional noise standards.

Measurements taken to enforce Chapter 6.05 standards require a sound level meter meeting Type I or Type II meter requirements as specified in ANSI Standard 1.4-1971, with personnel trained in its use.

2.3 Oregon Administrative Rules (OAR 340-035)

Oregon Administrative Rules (OAR), Department of Environmental Quality (DEQ), Chapter 340, Division 35: Noise Control Regulations dictate overall noise guidelines, while OAR 340-035-0035: Noise Control Regulations for Industry and Commerce more specifically applies to the West Linn car wash site. The proposed car wash facility falls under the classification of a "New Industrial or Commercial Noise Source" per OAR 340-035-0015: Definitions. Because the site was previously utilized commercially (McDonald's drive-through restaurant), the appropriate reference criteria are generally found under the standards for new noise sources located on previously used sites, as defined by 340-035-0035.

Noise levels from industrial or commercial sources are measured at an appropriate measurement point on Noise Sensitive Property. Noise Sensitive Property includes real property normally used for sleeping, or normally used as schools, churches, hospitals, or public libraries. Measurement procedures must conform to the guidelines set forth in the Sound Measurement Procedures Manual (NPCS-1).

2.3.1 New Industrial and Commercial Noise Source Standards

The allowable statistical noise levels for new industrial and commercial noise sources, applicable in any one hour, are detailed below:

OAR 340-035-0035
Table 8
New Industrial and Commercial Noise Source Standards
Allowable Statistical Noise Levels in Any One Hour

DEQ State of Oregon Department of Environmental Quality

7:00 a.m. – 10:00 p.m.	10:00 p.m. – 7:00 a.m.
L_{50} – 55 dBA	L_{50} – 50 dBA
L_{10} – 60 dBA	L_{10} – 55 dBA
L_1 – 75 dBA	L_1 – 60 dBA

Note: L50 is the noise level equaled or exceeded 50% of the time, L10 is exceeded 10% of the time (or 6 minutes in any hour), and L1 is exceeded 1% of the time (or 36 seconds in any hour).

3 Environmental Noise Site Assessment

3.1 Proposed Site

The site at 18550 Willamette Dr is a General Commercial (GC) / Mixed-Use Commercial & Residential parcel situated on a topographic bench along the east side of Highway 43. The site is characterized by a relatively flat paved surface that terminates at a Concrete Masonry Unit (CMU) wall and a distinct grade break on the eastern boundary, where the terrain slopes steeply downward toward the Willamette River. The CMU wall stands approximately 6 feet tall and serves as the primary acoustic boundary on the site.

To the east and southeast lie the residential properties of Walling Way and Rose Way. These lots are terraced significantly below the commercial grade, placing the residential rooftops and backyards well below the elevation of the parking lot. Notably, the slope and residential lots are covered in dense, mature vegetation and tree canopy, which largely visually screens the CMU wall from the residents below.

. Surrounding properties and areas are zoned as follows:

- **West (across roadway):** Highway 43 and properties immediately west are zoned GC (commercial) with the properties further west up the slope being designated for Low-Medium Density Residential (R-10 or R-8.5).
- **East (shared property line with CMU wall):** The zoning shifts to Low-Medium Density Residential (R-10/R-15). This boundary is critical for noise ordinances, as it directly borders a noise-sensitive residential zone.
- **North/South:** Commercial/Office strips designated GC.

Figure 1 below shows the general layout of the existing site, while Figure 3 shows the zoning.

Figure 1: Existing Site and Neighboring Area Layout

Site boundaries

Ambient sound monitoring location

Figure 2: Zoning Boundaries and Types

Mixed-Use Commercial / Residential (GC)

Low-Medium Density Residential

From a noise impact standpoint, the CMU wall with the existing topography provides the primary noise reduction from the site to the residential neighbors. The construction of the wall uses high-mass (CMU) and is continuous which blocks the direct line-of-sight between noise sources on the lot and from the west (such as automobile traffic on Highway 43) and the lower-elevation residences. This creates an acoustical shadow immediately behind the wall, preventing direct sound transmission, so that the primary sound energy is diffracted over the barrier based on the source – path – receiver geometry.

While the dense vegetation provides a visual buffer, its acoustic impact is much more limited in comparison to the CMU wall. The effectiveness of vegetation as a barrier is based on the year-round thickness and the overall depth of the foliage the sound energy travels through. In general, it takes more than 100 feet of thick vegetation to reduce sound energy by 15% (~3 dB). The sound reduction of the existing vegetation was not considered in this acoustical impact study due to the limited thickness.

3.2 Ambient Noise Assessment

An environmental noise monitor was deployed on the site of the proposed future car wash tunnel entrance on Monday, November 3, 2025, during daytime business hours (8:00 am - 3:25 pm) above the eastern CMU wall dividing the existing site parking lot from residential properties. The approximate location is shown in Figure 2. Measurements were used to calibrate the ambient traffic noise in the environmental computer noise impact model. The hourly average sound level ranged from 56 to 62 dBA; the primary noise sources were vehicle traffic on Willamette Drive to the west / southwest and Walling Way to the south / southeast. The loudest hourly increment (62 dBA) occurred from 1:00 pm to 2:00 pm.

Additional ambient sound readings were also taken that morning on Walling Way to better understand existing conditions in the residential area to the east of the site. The measurements were taken from the site's south parking lot exit onto Walling and east to the intersection with Rose Way. The sound levels ranged from 57 to 44 dBA as distance from Willamette Drive (the primary noise generator) increased.

Project site looking north

Noise Monitoring location near ladder

Handheld measurements of Highway 43

4 Environmental Noise Impact

4.1 Noise Emission from Proposed Equipment

Our 3D computer model of the sound emission and analysis used sound data from measurements at existing Kaady Car Washes and Sonny's Car Washes in Phoenix, Arizona. The measured sound data is shown in the table below.

Measured Equipment and Sources	Sound Pressure Level, Leq (dBA)
Centrifugal Blowers *Source: Kaady, W Burnside St, Portland*	79 dBA @ 36-feet from tunnel exit
Wash Systems (no blowers) *Source: Kaady, W Burnside St, Portland*	68 dBA @ 27-feet from tunnel entrance
Centrifugal Vacuum Producer *Source: Kaady, SE 70th Ave, Tualatin*	68 dBA @ 5-feet from equipment room louver
Vacuum Hoses & Debris Traps *Source: Sonny's Car Wash, Phoenix*	75 dBA @ 2-ft
Cars and Trucks idling in line *Source: Sonny's Car Wash, Phoenix*	< 55 dBA @ 30-feet

Pictures from testing of comparable Kaady Car Wash systems to integrate into 3D topographical noise impact computer model.

End of Tunnel at Tualatin

Blower equipment at Tualatin

Vacuum Collector Doghouse

Vacuum Collector at Hillsboro

Tunnel at Hillsboro

4.2 Computer Noise Impact Model and Prediction

Noise from the car wash was modeled using the DataKustik CadnaA noise prediction software and predicted to all adjacent property lines. The predicted car wash noise levels are compared to the predicted daytime average ambient noise levels due to traffic at each of these receiver locations; calibrated from on-site environmental noise monitoring. The modeled noise sources include the entrance and exit of the car wash with blowers inside the tunnel, (2) vacuum producer units, and vacuums at each parking stall.

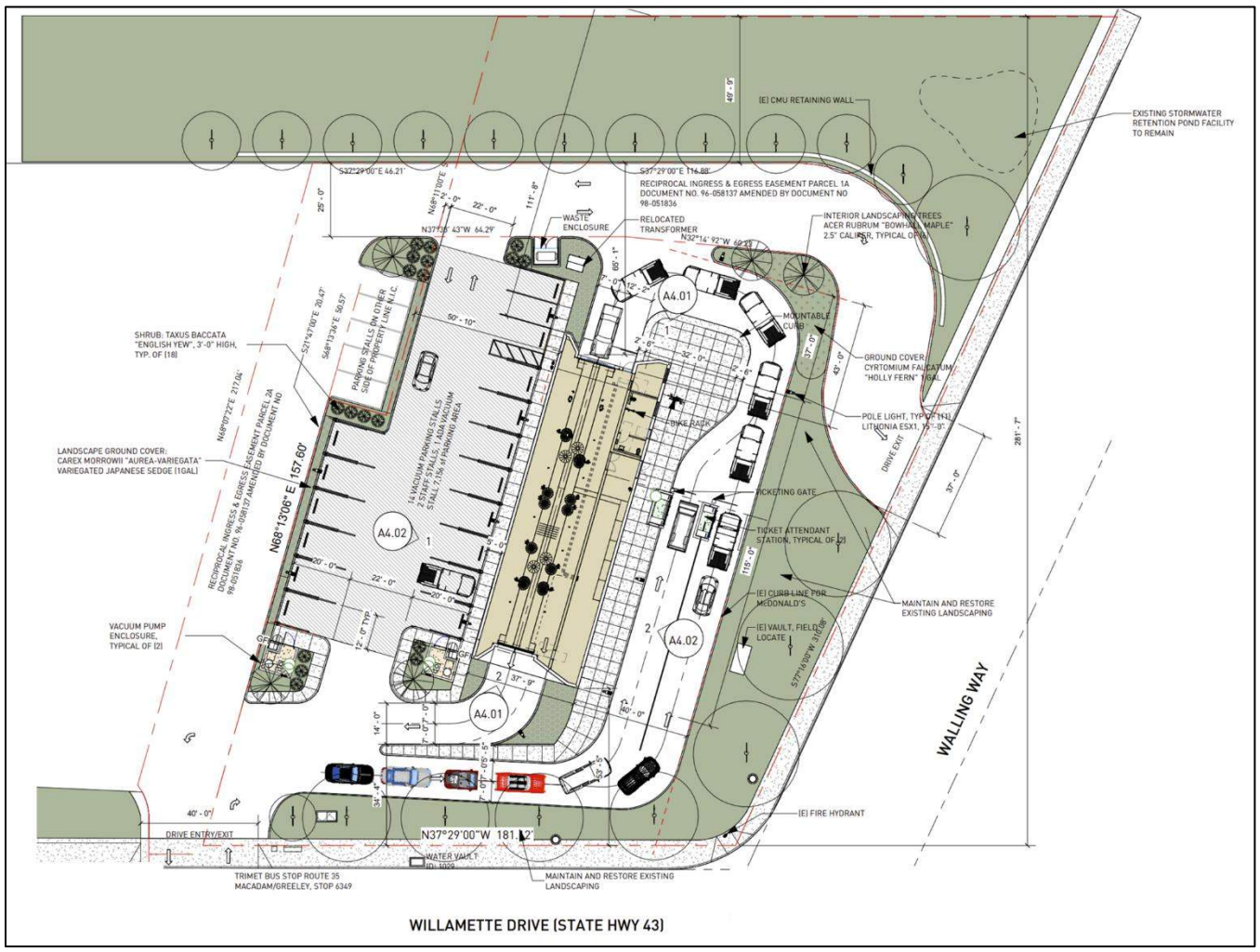

Figure 3: Proposed Car Wash Site Plan

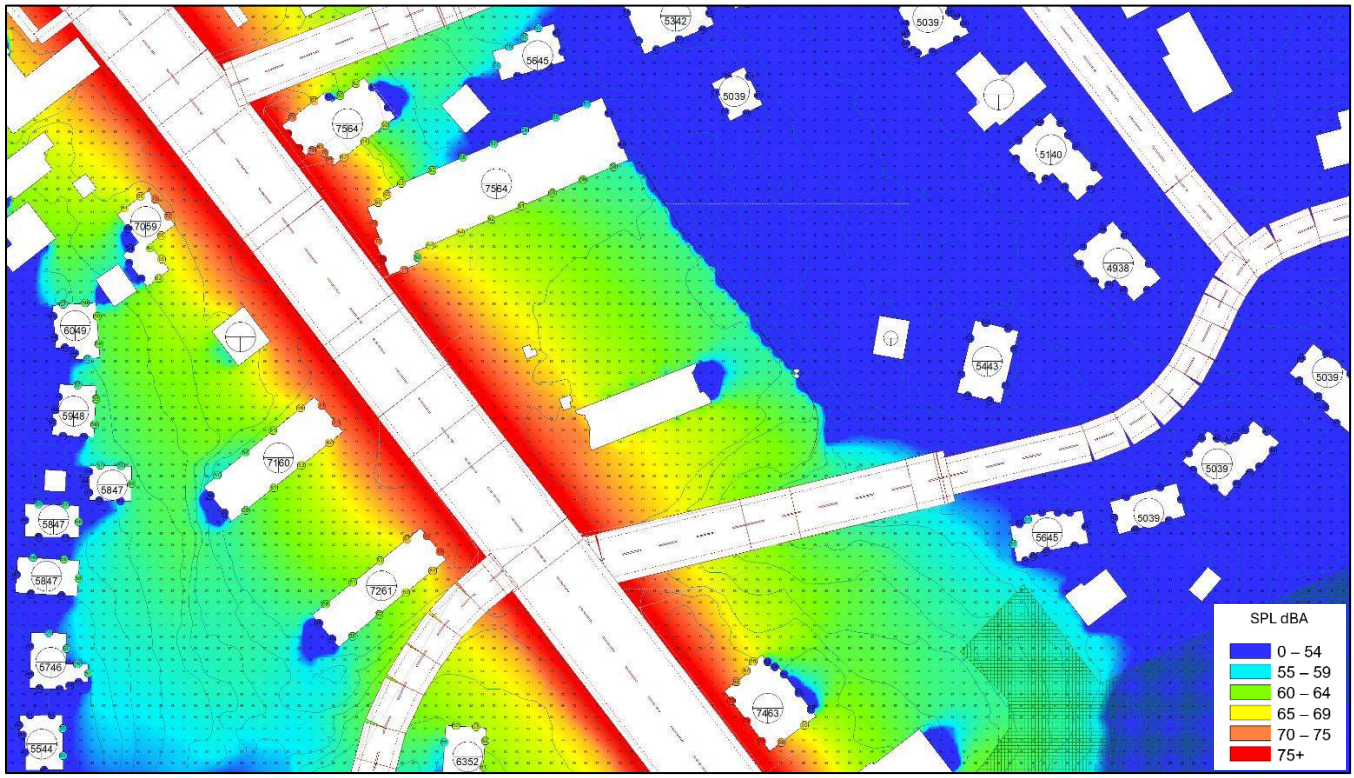

Figure 4: Traffic Noise Impact at Proposed Car Wash Site (Car Wash OFF)

Figure 4 shows predicted traffic noise impact at the site location. The traffic noise was modeled using traffic data from the Oregon Traffic Monitoring System and calibrated with the daytime sound level measurements taken on the east boundary of the site. Traffic noise was modeled for Willamette Drive / Highway 43, but not for the residential street Walling Way. The predicted noise is color mapped to coded (**red** depicts sound levels greater than 75 dBA, **blue** depicts sound levels less than 54 dBA). Noise is predicted to be around 70 dBA at the exit to the car wash site from traffic from Willamette Drive / Highway 43 before operating the car wash equipment.

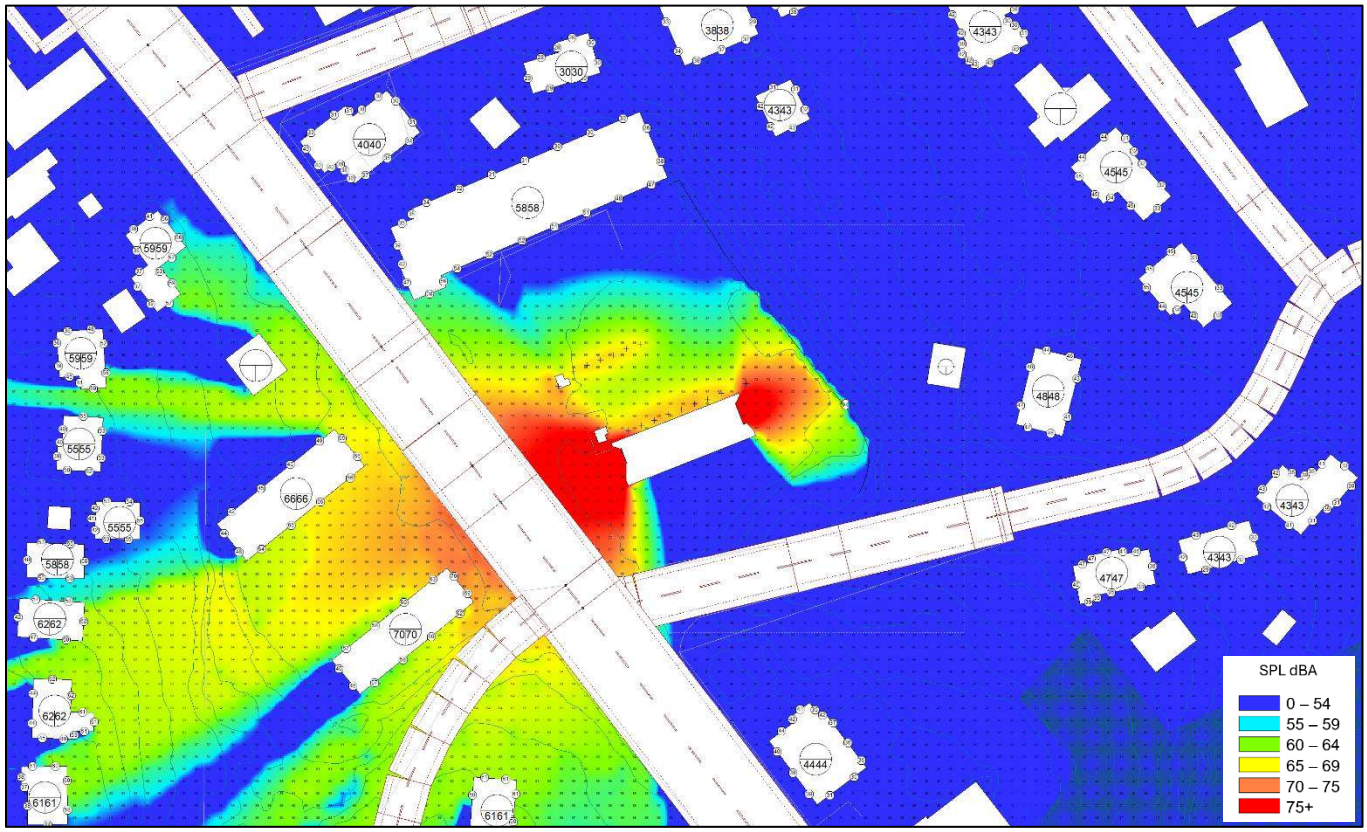

Figure 5: Predicted Noise Impact from Car Wash Activities (not including traffic noise)

Figure 5 shows the predicted sound impact from the car wash system (including blowers) and enclosed vacuum collectors, excluding traffic noise. This noise impact model assumes sound levels coming from the tunnel are comparable to those measured at the existing Kaady Car Wash locations used as reference and include the continuous operation of two (2) vacuum producers and fifteen (15) vacuum hoses running simultaneously.

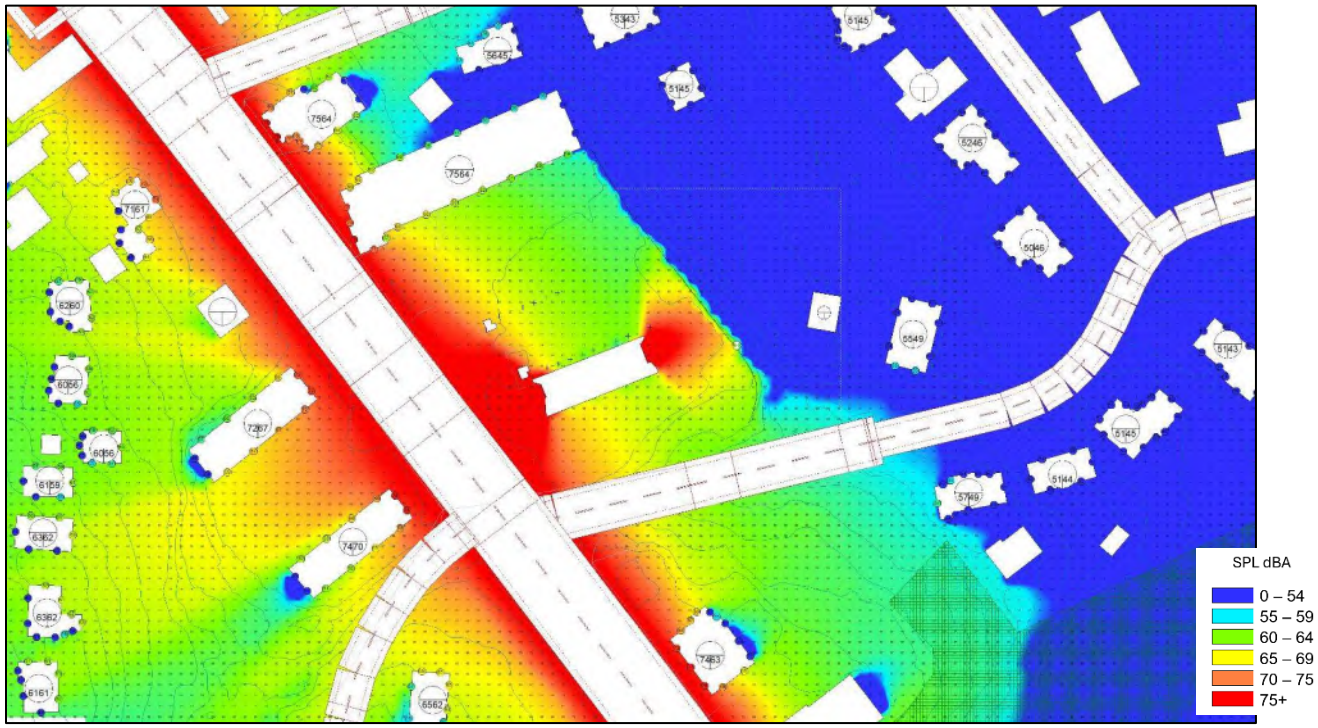

Figure 6: Predicted Noise Impact from Car Wash Activities, Including Traffic Noise

Figure 6 shows the combined predicted noise impact of car wash activities and traffic noise. This noise impact model sums the car wash operations with daytime traffic noise.

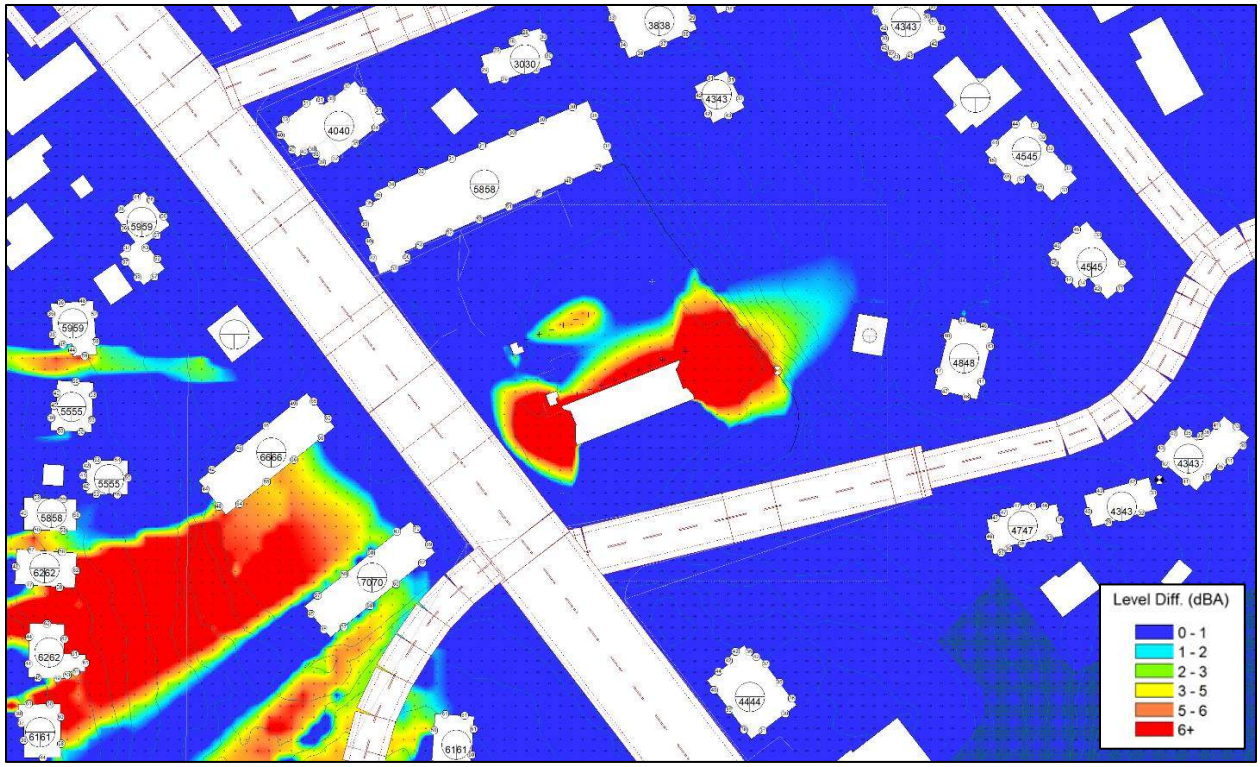

Figure 7: Predicted Noise Level Difference with addition of Car Wash to existing Traffic noise

Figure 7 shows the predicted overall change in noise with the addition of the car wash to the existing traffic noise. The yellow, orange, and red colors on the map represent decibel level increases of 3 to more than 6 dB, which might be perceptible to these property owners and users when the car wash systems are operating at 100%.

The following sections summarize the predicted noise impact to the surrounding noise-sensitive communities.

4.2.1 North, Northwest, South, and Southeast - General Commercial Zones

The noise impact model predicts that the sound level at the nearest commercial properties around the proposed car wash will be equal to or less than traffic noise based on the traffic volumes and the planned orientation of the car wash tunnel. As noted in Figure 5, the noise impact to the nearest commercial buildings is not predicted to exceed 60 dBA and Figure 7 notes that the noise impact is not predicted to increase the noise level above existing traffic noise.

4.2.2 East / Northeast Residential Zone

The noise impact model predicts that the sound level at the nearest residential properties to the east, northeast, and southeast are predicted to be less than 55 dBA, as shown in Figure 5, which meets the OAR 340-035-0035 limit of 55 dBA (L_{50}) to noise-sensitive properties. Figure 7 shows that the blowers might increase the noise by 3 dBA or less in the rear yard of 3315 Walling Way; this means the blower noise might be barely audible above traffic noise, but should not be a significant impact. Pre-construction ambient levels in this area were modeled in the 48–52 dBA range. The inclusion of the car wash brings the cumulative levels to approximately 50–54 dBA within the backyard; this meets the OAR noise code limit without additional remediation.

4.2.3 West / Southwest Commercial and Residential Zones

The noise impact model predicts that the sound level at the nearest commercial properties will not exceed traffic noise.

The noise impact model predicts that the sound level at the nearest residential properties to the west up the hill could exceed 60 dBA and the ambient sound level by up to 5 dBA. The predicted noise impact from the car wash blowers is estimated to be 60–63 dBA, which exceeds the Clackamas County daytime limit and OAR L_{10} (10% of an hour) limit of 60 dBA. This is an estimated 20% to 25% increase in sound over traffic, and may be perceived as a noticeable impact when windows are open or within east-facing outdoor spaces.

A primary driver to the west compared to the east is the topography and lack of visible and acoustical screens; the terrain elevation increases to the west (note topographic lines toward the lower left of the figures), the residential properties have a direct line of sight into the car wash tunnel exit. The geometry associated with this topography is such that a barrier at the exit of the car wash would not provide enough noise reduction, and the existing foliage provides effective noise reduction. The shape of the buildings on the west side of Willamette Drive does not provide any noise reduction to these residences.

5 Noise Control Options

The following noise control options have been engineered to reduce the noise impact to meet the Clackamas County Code 60 dBA (during daytime hours 7:00am to 10:00pm) and Oregon Administrative Rules statistical noise levels for new commercial noise sources.

5.1 Redesigned Tunnel Exit

To address the noise impact to the residences to the west up the hill, an enclosed turn to the west end of the car wash tunnel was engineered. The following is the proposed coordinated design by TVA Architects.

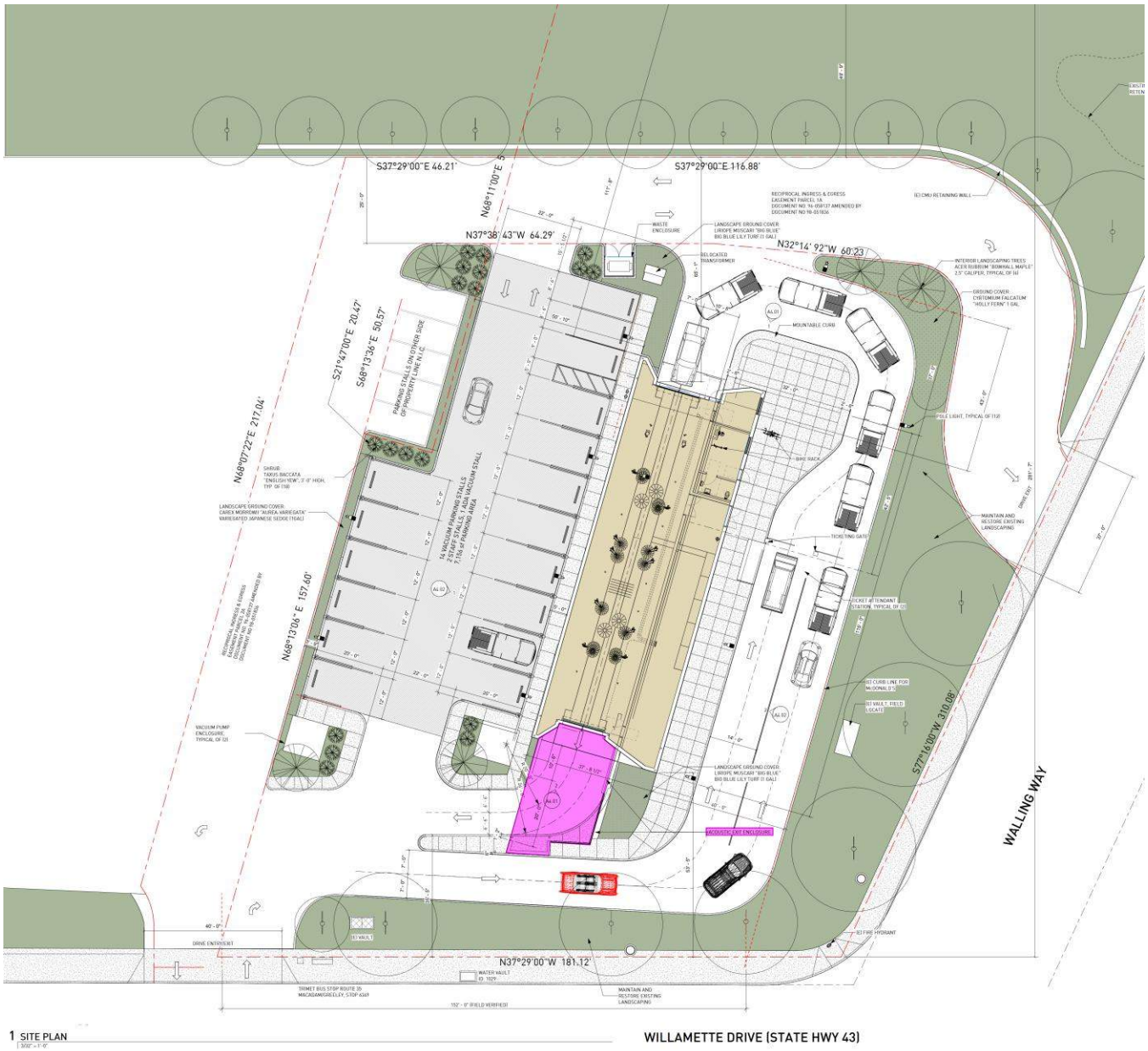

Figure 8: Updated Site Plan

Figure 9: Exterior Elevation Drawings (TVA Architects)

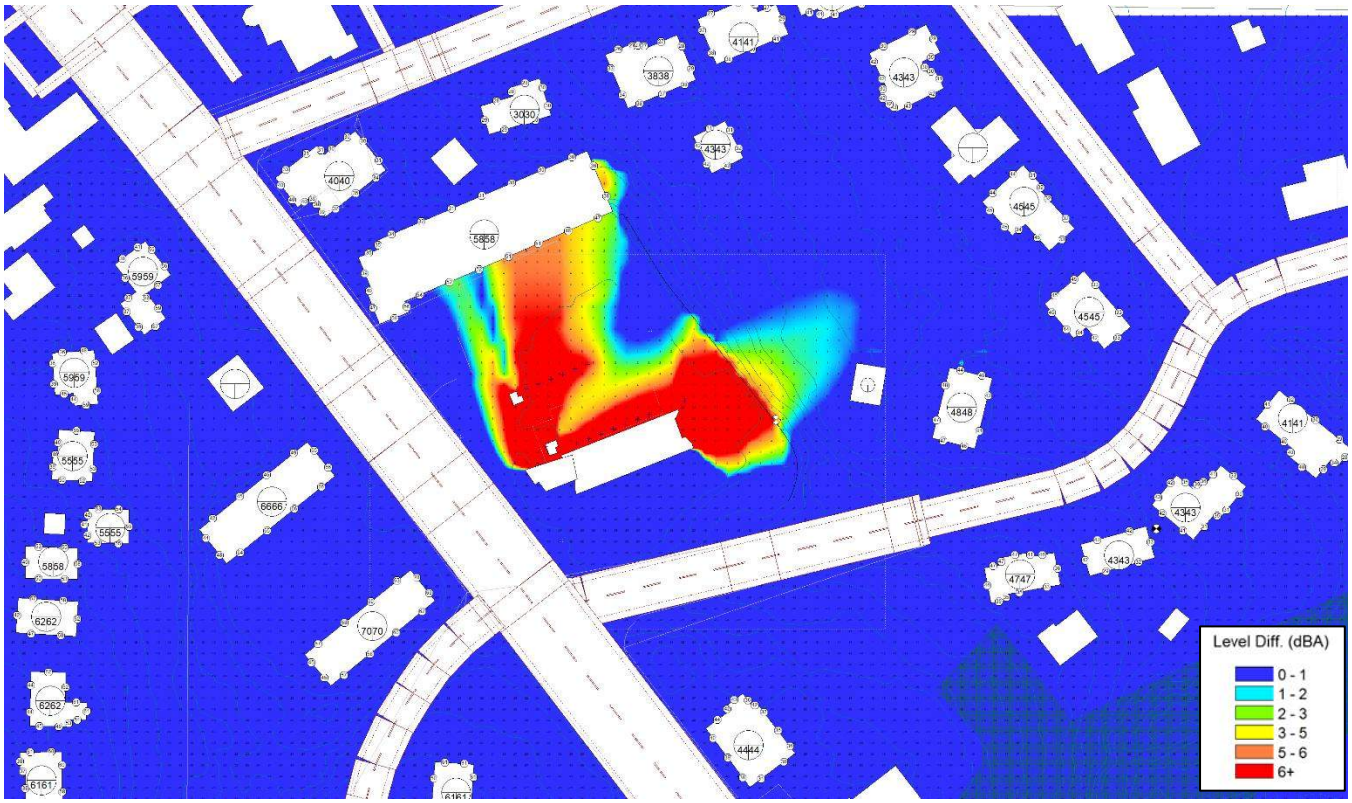

Figure 10: Predicted Noise Level Increase with Tunnel Exit Modification

Figure 10, shows that the extension reduces the noise to be equal to or less than traffic noise to the western residences.

5.2 Alternative Tunnel Blowers

This option was modeled, but is not planned.

No Noise Impact at West Residences (1 dBA or less of increase above traffic noise without altering the tunnel design)

1) Install a blower system inside the tunnel that does not exceed a total sound pressure level of 69 dBA at 30-feet.
    a. Suggested System: International Drying Corporation Stealth Predator Dryer System (80 HP), 69 dBA at 30-feet

Meets Clackamas County Code (60 dBA) and Oregon Administrative Rules (55 dBA)

2) Install a blower system inside the tunnel that does not exceed a total sound pressure level of 75 dBA at 30-feet or silencer package that reduces the noise by 6 dBA for the current basis of design system.
    a. Suggested System: International Drying Corporation Stealth Predator Dryer System (120 HP), 72 dBA at 30-feet

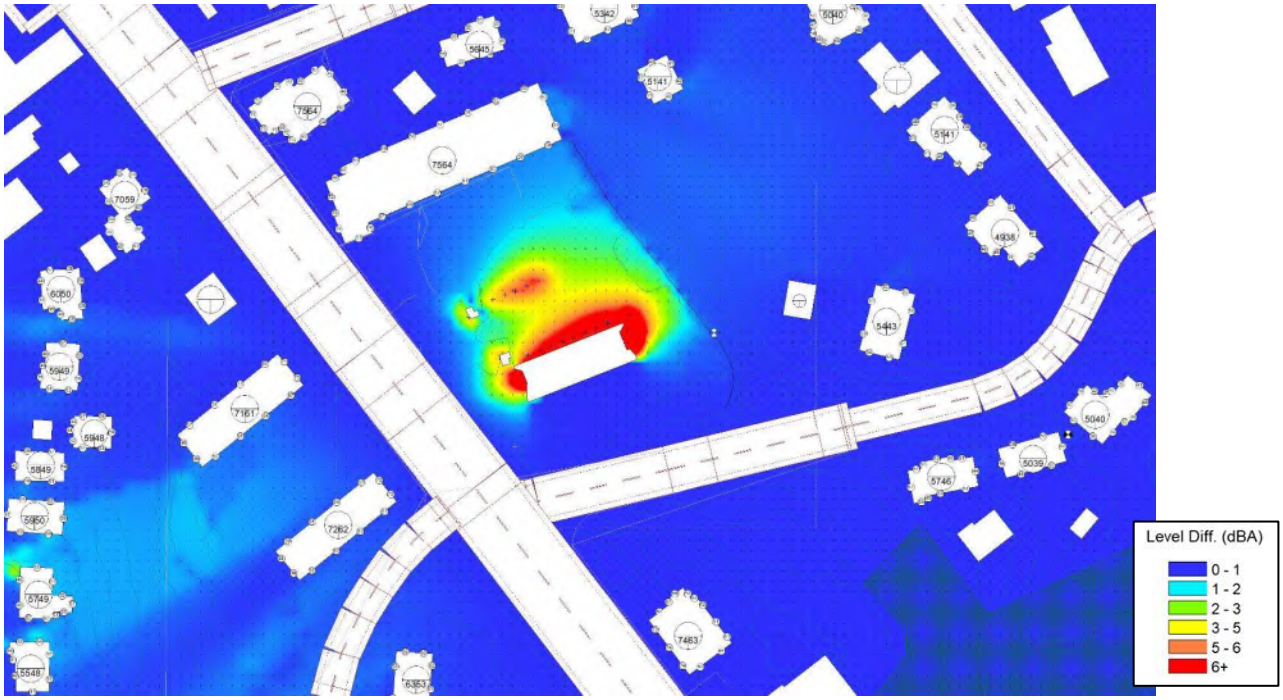

Figure 11: Predicted Noise Level Increase from International Dryer Corp Stealth Predator 80HP Dryer

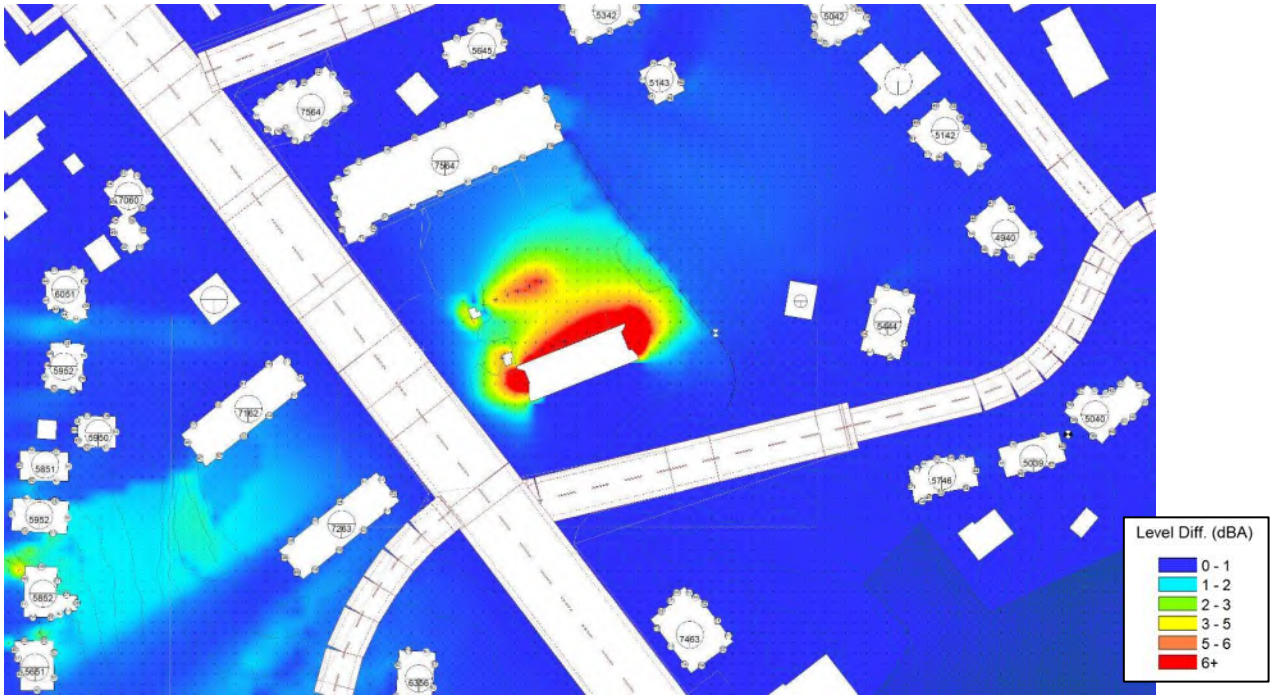

Figure 12: Predicted Noise Level Difference from International Dryer Corp Stealth Predator 120HP Dryer system

Figure 13 shows the predicted noise impact with International Dryer Corporation's Stealth Predator 120HP dryer system. The proposed system meets the noise code at all adjacent properties and is predicted to not exceed 54 dBA at the western residential property lines.

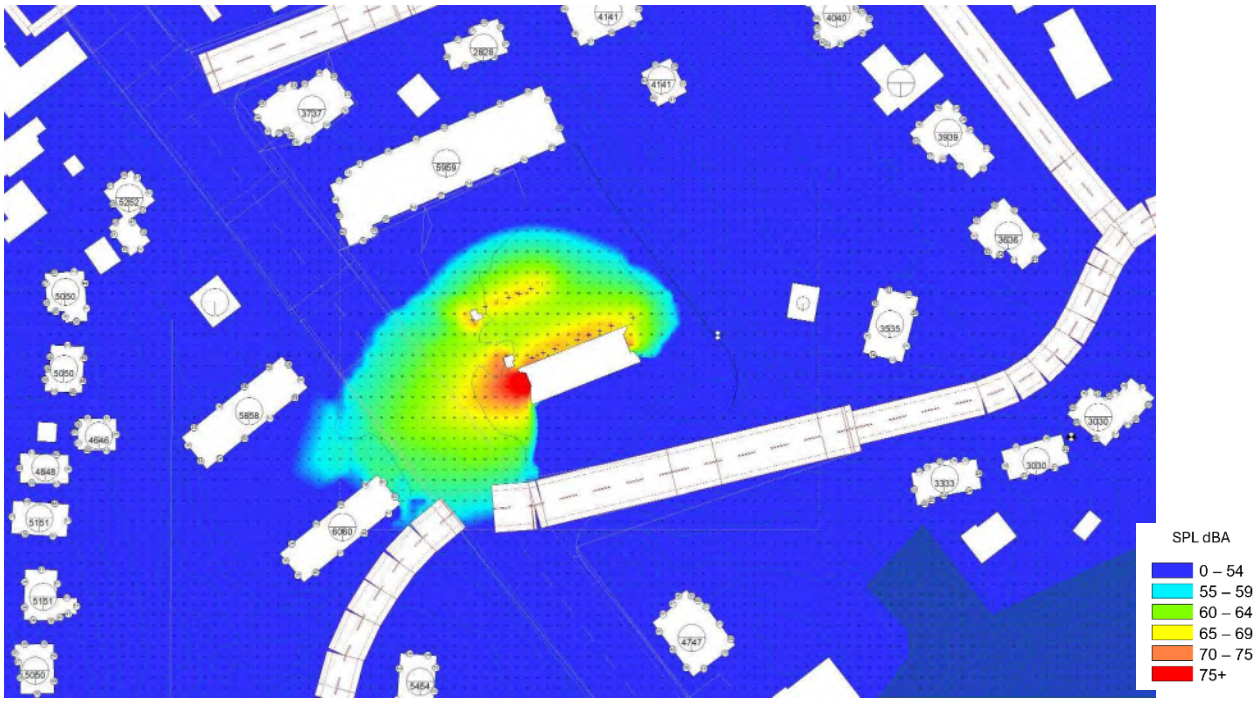

Figure 13: Predicted Noise Impact with International Dryer Corp Stealth Predator 120HP Dryer system

With the level of background noise associated with traffic from Willamette Drive / Highway 43 it is not feasible to measure the independent contributing sound from the car wash without stopping traffic. This means the measured sound level at the nearest property lines will always be a combination of traffic noise and the car wash activity noise (e.g., 52 dBA, traffic + 53 dBA, car wash = 56 dBA measured).

Please contact us with any questions or additional coordination.

All the best,

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