

MEMO – Eric Li
March 17, 2026
Kaady Car Wash - West Linn – Environmental Water Quality Treatment
Page 2

This project is improving upon the existing storm system to bring it up to current code. A chambered detention filtration system will be buried beneath the new drive entry. This is the first filter. After getting filtered in this system, it will be diverted into the existing stormwater filtration vault that is in shared use with the adjoining shopping mall. After that filtration, it gets diverted into a stormwater retention pond, which was the system originally designed for the McDonald's facility.

This pond is a water quantity control, and it then diverts into the public sewer system on Walling Way. The pond is currently overgrown, and under this project, the pond will be cleared and restored.

It appears that the City of West Linn has made some modifications to some of the public stormwater piping along Walling Way, and a formal survey will be required to confirm inlet elevations and pipe orientations. The survey will be provided for the building permit process.

Similarly, it has been noted in the preliminary stormwater report that geotechnical and Operations and Maintenance information will be provided. Because the project scope area slope is in a nearly flat site, a Geotechnical Report is not required. See Staff Findings 9 and 146. A geotechnical report will be submitted for the building permit for structural considerations. Operations and Maintenance manuals will also be part of the Construction Document / Building Permit application and are not necessary for the Land Use Review or Conditional Use Permit.

Regarding the Water Resource Area map, the statement that "This site has no wetlands riparian areas, or environmentally sensitive areas on the site" should be corrected to note that "The area being modified for the construction of this project has no wetlands, riparian areas, or environmentally sensitive areas within the bounds of the work." The buffer WRA at the outfall for the Fern Creek culvert onto the adjacent property is 65'-0" from the outfall location. Assuming it is exactly on the property line, that would place the edge of the buffer 2" over the existing curb to exit aisle. Our project is not, and cannot, modify this exit, as it is a reciprocal exit access easement on the site, and is to remain existing as-is.

An erosion control plan for the construction of this work will be submitted to the City when the project goes in for a building permit to address construction disturbances.

SUMMARY:

This project will improve the stormwater conditions existing on the site, through the additional filtration process, and none of the work being done on the site is within the designated sensitive Water Resource Area. All process water within the car wash are separate from the exterior stormwater, and is either reclaimed or sent to the sanitary sewer system. Kaady Car Wash's practices have been submitted to and approved to the State DEQ, and have been certified as a sustainable business practice. Environmentally, this is a net improvement to the water quality on this site.



Eric Li, Senior Associate
TVA Architects

News

Kaady Car Washes first to be certified safe for the environment by independent pollution prevention agency.

April 19, 2011

A team of experts from the Oregon Department of Environmental Quality, the Clean Water Services Management Utility for the Tualatin River Watershed, the City of Portland Environmental Services and the Lake Oswego Office of Water Quality have certified all 12 Kaady Car Washes in Oregon as EcoLogical Businesses.

Acting on behalf of the Pollution Prevention Resource Center, the team visited each individual Kaady location before granting the certification, which is the first given to any car wash operation since the "EcoBiz" program was launched.

Debra Taevs, PPRC Deputy Director, called Kaady "ahead of the curve" in adopting environmentally conscious practices, and described the company as "setting the pace" for ecology in the car wash business. "We were very impressed with the environmental standards they already had in place", Taevs said, "as well as with their 'can-do' attitude".

Signs displaying the certification are now posted at all Kaady Car Washes, said Owner Charles Kaady, who describes the honor as a validation of the environmental standards he has been implementing since starting the business 35 years ago.

"Whether we're talking about safely discharging overflow into the water treatment system, using environmentally friendly shampoos, or conserving water and electricity", said Kaady, "every day is 'Earth Day' at all our locations... and has been from the beginning."





Expires 03/31/2025

Kaady Car Wash

7400 SW Barbur Blvd, Portland, OR

Marney M. Jett

3/11/2019

Marney Jett

Clean Water Services

Date



Expires 03/31/2025

Kaady Car Wash

714 N State St, Lake Oswego, OR

Marnay M. Jett

3/11/2019

Marnay Jett

Clean Water Services

Date



Expires 03/31/2025

Kaady Car Wash

17701 SW Lower Boones Ferry Rd, Lake Oswego, OR

Marney M. Jett

3/11/2019

Marney Jett

Clean Water Services

Date



Expires 03/31/2025

Kaady Car Wash

6950 SW Nyberg Rd, Tualatin, OR

Marney M. Jett

3/11/2019

Marney Jett

Clean Water Services

Date

Wyss, Darren

From: Eric Li <ericl@tvaarchitects.com>
Sent: Wednesday, March 18, 2026 11:28 AM
To: Wendie Kellington; Wyss, Darren; Chuck Kaady
Subject: FW: Kaady Car Wash - Landscape Width Adjustment
Attachments: A0.01 Site Plan - CUP Supplemental.pdf

CAUTION: External Email – Confirm legitimacy before clicking, opening attachments, or following instructions.

After consulting with Darren, and reviewing the staff report, I've added some small trees to the site plan, since Darren gave me the Don't worry about the .dwg file, as it is an AutoCAD file provided to Froelich for their integration to their files. This drawing is ready to be part of the record.

Narrative:

The parking island between the vacuum stations and the property line/mall parking lot has been widened from 3.9' to 5'-0" width, compliant with the Municipal Parking Code. The walkway adjacent to the car wash has been reduced from 5'-0" in width to 4'-0", and the north parking stalls have been reduced from 20'-0" in depth to 19'-8" to accommodate this change.

Staff finding 102 states that "When a parking, loading, or service area or driveway is contiguous with an adjoining lot or parcels, there shall be an intervening five-foot-wide landscape strip. The landscaped area shall contain:

- Trees spaced as appropriate to the species not to exceed 30 feet apart on center, on the average. (7 X Little Leaf Linden @ 24'-0" o.c.)
- Shrubs, not to reach a height greater than 3'-0" (Pacific Yew)
- Vegetative ground cover, to cover 100 percent of the exposed ground within two growing season. No bark mulch shall be allowed except under the canopy of low-level shrubs. (Variegated Japanese Sedge)

Eric Li | TVA Architects | cell: 971.678.7578

From: Wendie Kellington <wk@klgpc.com>
Sent: Tuesday, March 17, 2026 5:13 PM
To: Eric Li <ericl@tvaarchitects.com>
Cc: Chuck Kaady <ckaady@kaady.com>
Subject: FW: Kaady Car Wash - Landscape Width Adjustment

Is this now a part of the record? Please confirm. Also will you please send me the narrative that goes with it to review. The dwg file I cannot open. Thanks.

From: Eric Li <ericl@tvaarchitects.com>
Sent: Sunday, March 15, 2026 4:04 PM
To: Wyss, Darren <dwyss@westlinnoregon.gov>; Wendie Kellington <wk@klgpc.com>; Chuck Kaady

<ckaady@kaady.com>; Evan Eykelbosch (eeeykelbosch@froelich-engineers.com) <eeeykelbosch@froelich-engineers.com>

Subject: Kaady Car Wash - Landscape Width Adjustment

Darren,

Rather than trying to get a discretionary approval or appeal for the width of the parking island, we have modified the island to increase from 3'-9" to 5'-0" in width. The allowable sidewalk width in West Linn is 4'-0", so we narrowed the sidewalk adjacent to the building from 5'-0" to 4'-0". The minimum depth of parking stalls is 18'-0", so we reduced the north parking stall depth on the north side from 20'-0" to 19'-8" which got us the outright permissible dimension for the parking island.

See the attached revised A0.01 Site Plan.

Evan,

I've included an updated AutoCAD background for your use relative to the adjusted lot dimensioning.

Eric Li

Senior Associate

TVA Architects

1750 SW Yamhill St., Suite 150

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Wyss, Darren

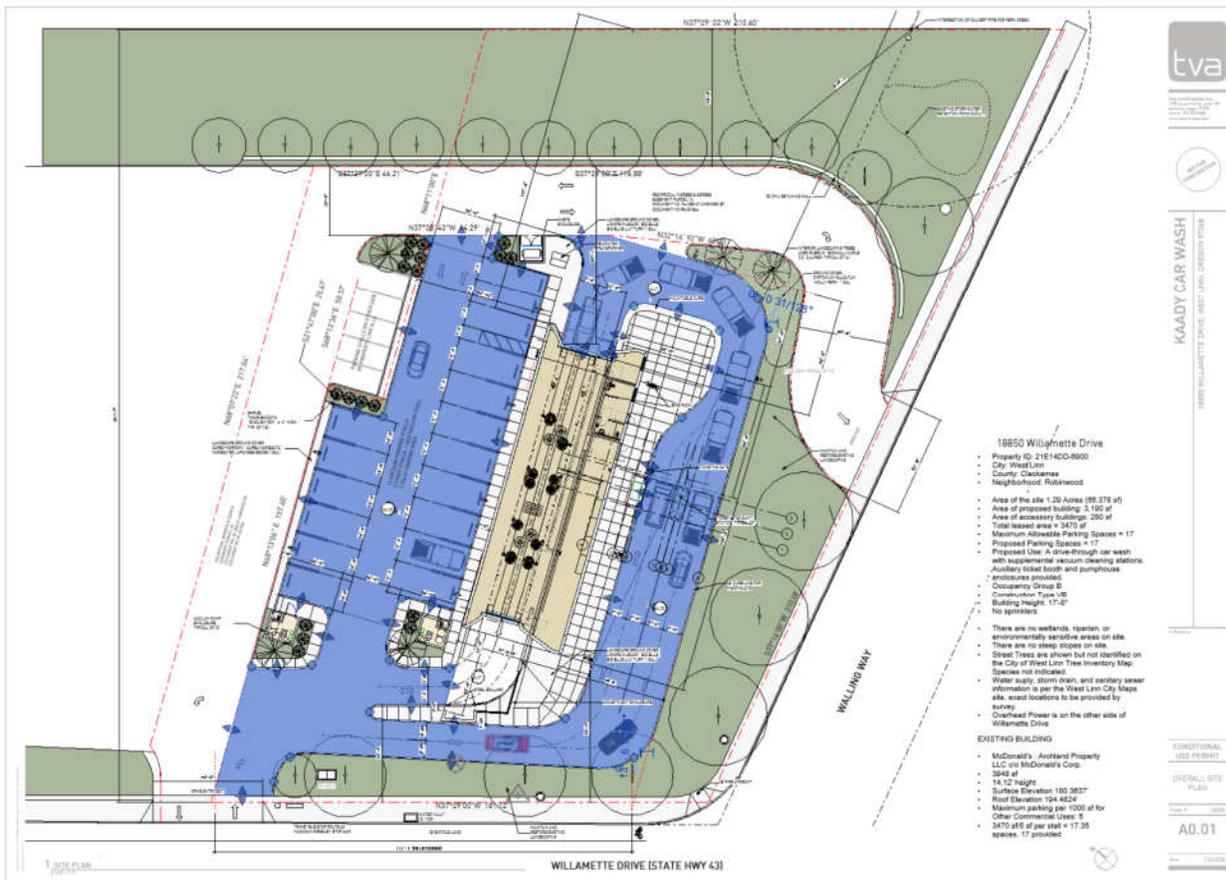
From: Eric Li <eril@tvaarchitects.com>
Sent: Friday, March 13, 2026 7:16 PM
To: Wyss, Darren; Evan Eykelbosch (eykelbosch@froelich-engineers.com); Chuck Kaady
Subject: Kaady Car Wash - Landscape Percentages

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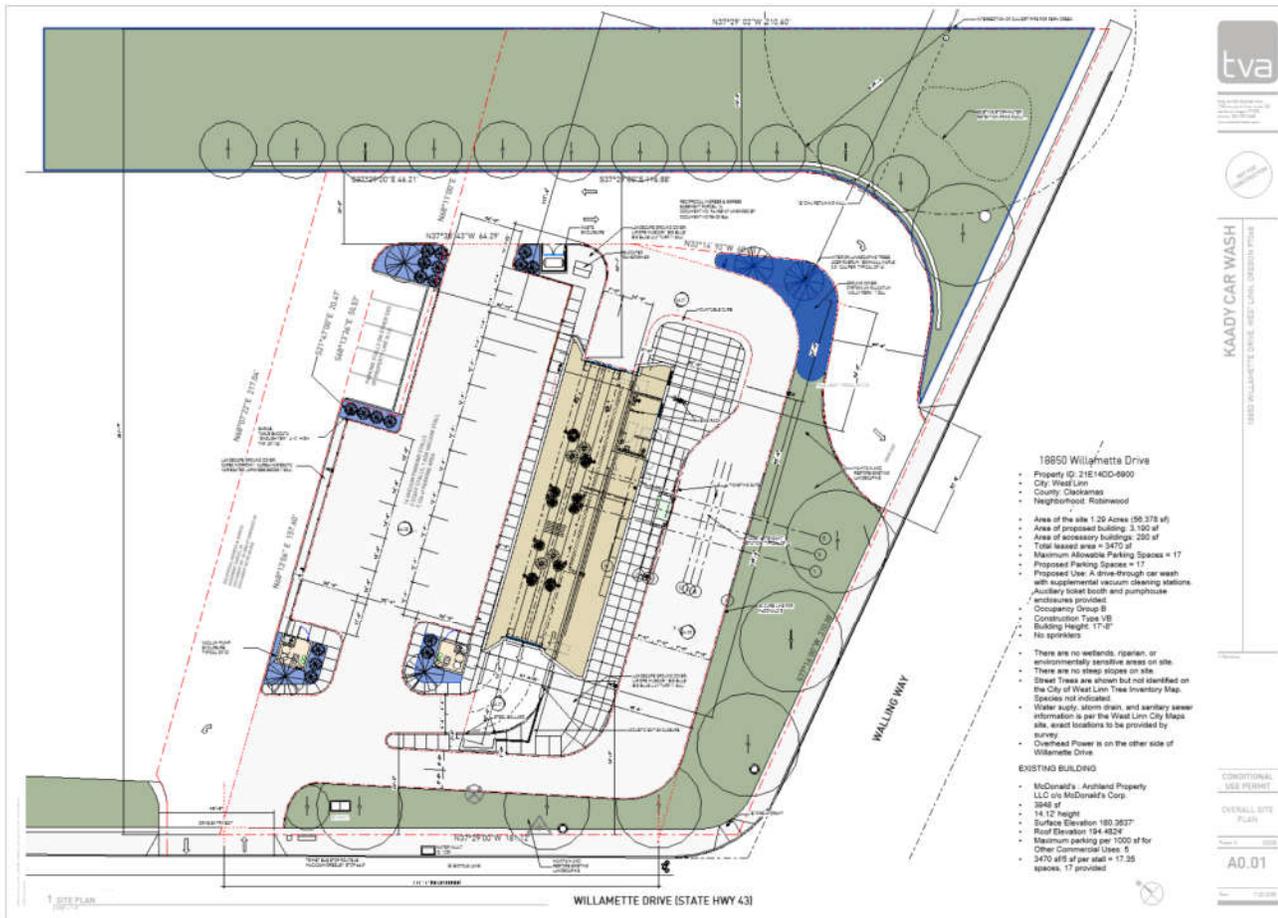
Darren,

I calculated the planting areas, and found that we are in compliance with the code.

Per the zoning code we need to be 5sf of planting per 100 feet of vehicular use area. The vehicular use area is shown here in blue. 16,915 sf



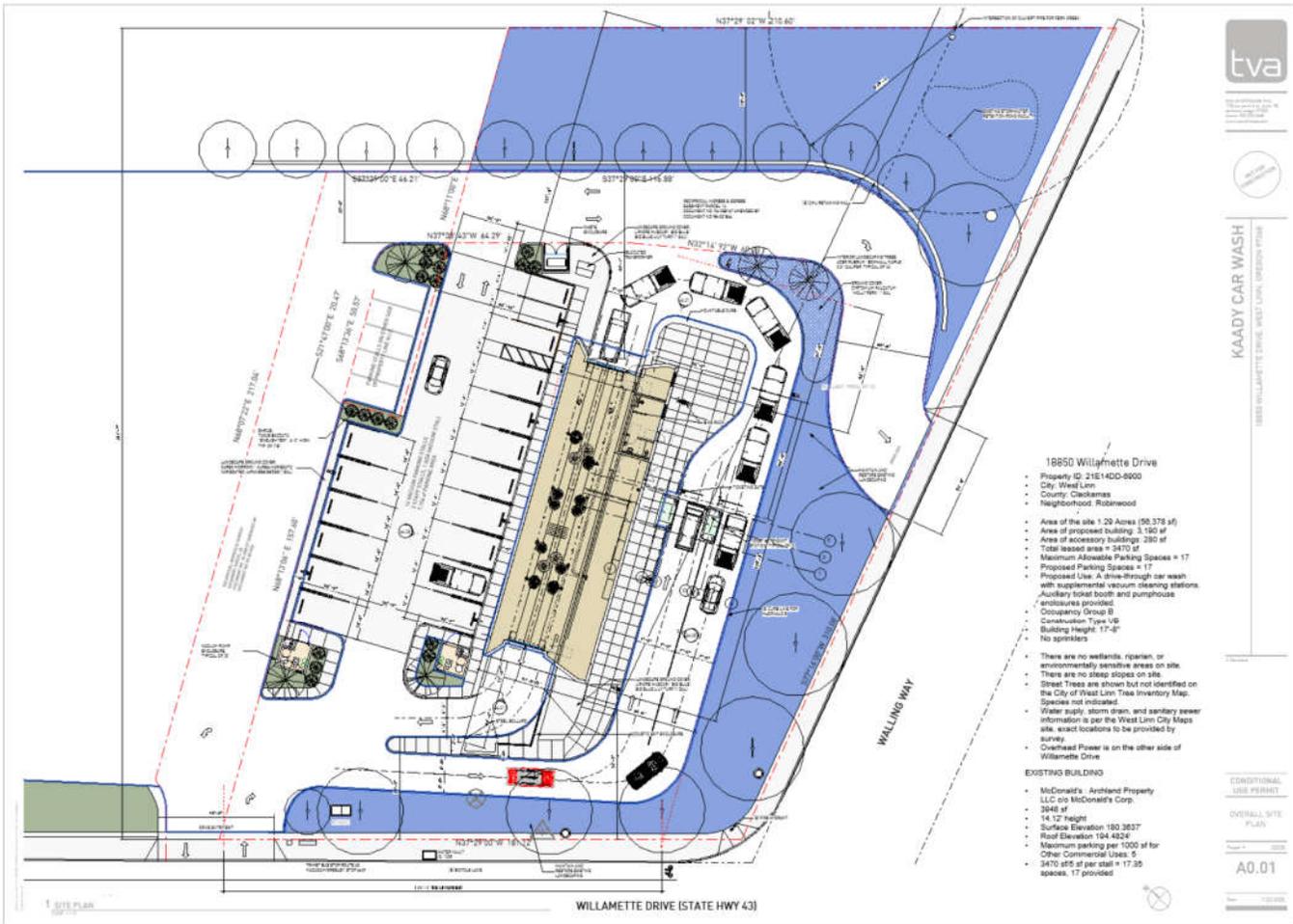
The interior planting areas are shown in this diagram, also in blue: 2500 sf



2500/16195 = 15.4% coverage. Compliant.

For the perimeter landscaping, you informed me that we needed 20% landscaping compared to the overall site.

Our perimeter landscaping is 19,064 sf. Our project site is 56,378 sf. 19,065/56,378 is 33.8%. Compliant, and then some.



For the

I used the areas

Eric Li

Senior Associate

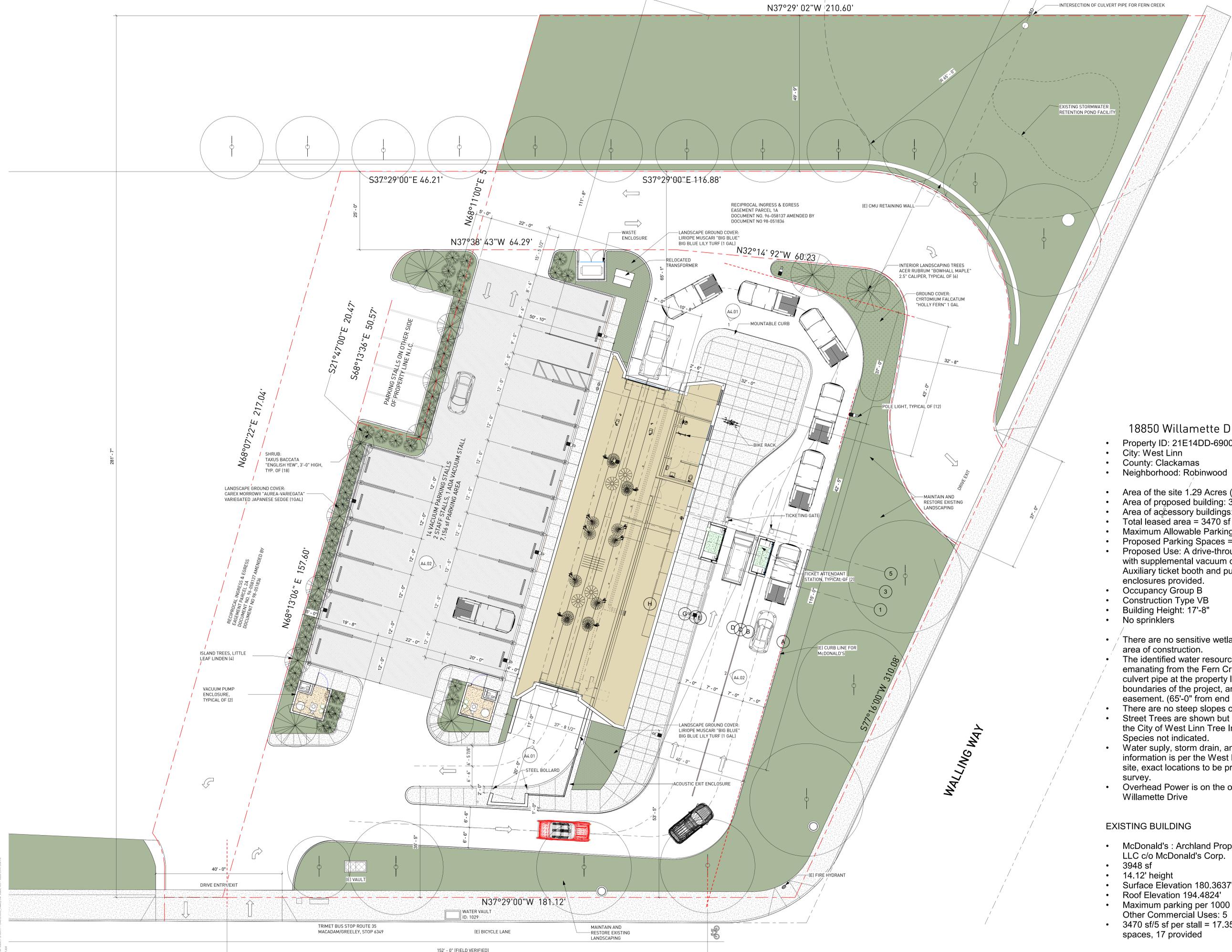
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18850 Willamette Drive

- Property ID: 21E14DD-6900
- City: West Linn
- County: Clackamas
- Neighborhood: Robinwood
- Area of the site 1.29 Acres (56,378 sf)
- Area of proposed building: 3,190 sf
- Area of accessory buildings: 280 sf
- Total leased area = 3470 sf
- Maximum Allowable Parking Spaces = 17
- Proposed Parking Spaces = 17
- Proposed Use: A drive-through car wash with supplemental vacuum cleaning stations. Auxiliary ticket booth and pumphouse enclosures provided.
- Occupancy Group B
- Construction Type VB
- Building Height: 17'-8"
- No sprinklers
- There are no sensitive wetlands within the area of construction.
- The identified water resource area emanating from the Fern Creek underground culvert pipe at the property line is outside the boundaries of the project, and the reciprocal easement. (65'-0" from end of pipe.)
- There are no steep slopes on site.
- Street Trees are shown but not identified on the City of West Linn Tree Inventory Map. Species not indicated.
- Water supply, storm drain, and sanitary sewer information is per the West Linn City Maps site, exact locations to be provided by survey.
- Overhead Power is on the other side of Willamette Drive

EXISTING BUILDING

- McDonald's : Archland Property LLC c/o McDonald's Corp.
- 3948 sf
- 14.12' height
- Surface Elevation 180.3637'
- Roof Elevation 194.4824'
- Maximum parking per 1000 sf for Other Commercial Uses: 5
- 3470 sf/5 sf per stall = 17.35 spaces, 17 provided

Δ Revisions

CONDITIONAL USE PERMIT

OVERALL SITE PLAN

Project # 22005

A0.01

Date: 7.23.2025



WEST LINN – KAADY CAR WASH

ENVIRONMENTAL NOISE IMPACT STUDY

Submitted to:

Kaady Car Washes
2545 SW Spring Garden St
Portland, OR 97219

TVA Architects

1750 SW Yamhill St Suite 150
Portland, OR 97205

Prepared by:

Tenor Engineering Group
811 1st Ave, Suite 466
Seattle, WA 98104

March 17, 2026



**KAADY
CAR WASHES**

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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) 5.487, 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. This study also evaluates predicted noise emissions under the administrative rules of 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.

As a result of the evaluation, it is determined that:

1. Predicted noise from the proposed facility will meet the West Linn noise ordinance to all sensitive receptors.
2. Predicted noise from the proposed facility will meet the OAR DEQ daytime and nighttime L50 noise limit to all residential receivers, though the business will only operate during daytime hours.
3. Predicted noise impact will make the business operations barely or not perceptible to any residential neighbor.
4. Predicted noise impact to the nearest businesses (to the north) will not be perceptible through the storefront windows and doors, and slightly perceptible above traffic noise at the sidewalk outside the businesses the furthest east from Highway 43.

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)

The Clackamas County noise regulations apply to the unincorporated areas of Clackamas County. The proposed facility will be established within incorporated City of West Linn. Therefore, the Clackamas County noise regulations do not apply. Regardless, it is noted that

County Code section 6.05.060(F) specifies that sounds caused by industrial or commercial organizations or workers during their normal operations are exempted from the provisions of Chapter 6.05. Therefore, the Clackamas County code would not apply in any event because all sound produced by the proposed facility will be caused by a commercial organization during normal operations.

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	
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) zoned 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 zoned 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 zoned 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

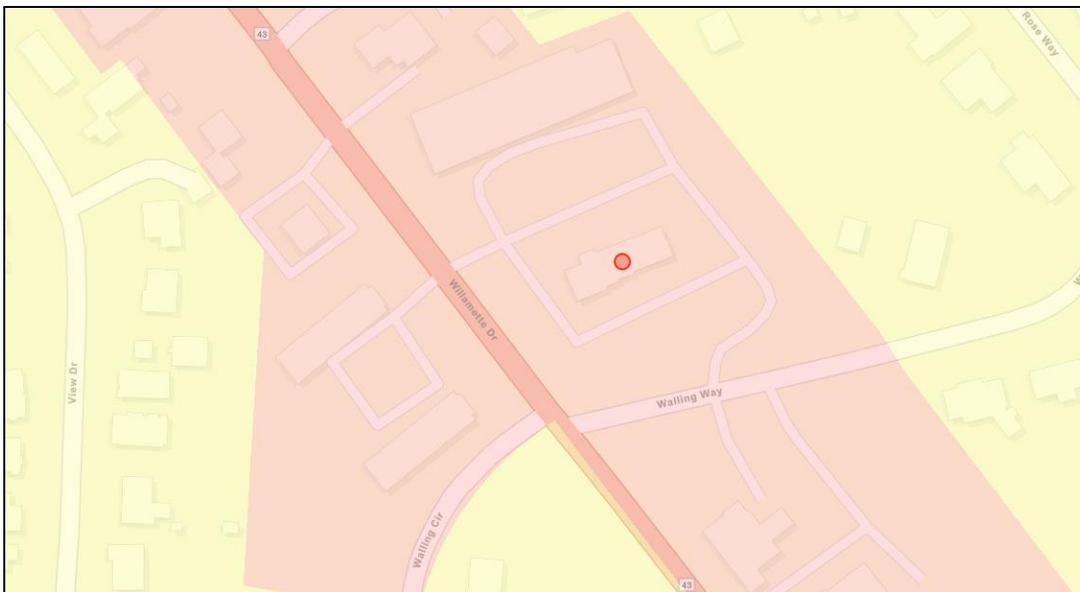


Figure 2: Zoning Boundaries and Types



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 <i>Source: Kaady, W Burnside St, Portland</i>	79 dBA @ 36-feet from tunnel exit
Wash Systems (no blowers) <i>Source: Kaady, W Burnside St, Portland</i>	68 dBA @ 27-feet from tunnel entrance
Centrifugal Vacuum Producer <i>Source: Kaady, Hillsboro</i>	68 dBA @ 5-feet from equipment room louver
Vacuum Hoses <i>Source: Sonny's Car Wash, Phoenix</i>	75 dBA @ 2-ft
Cars and Trucks idling in line <i>Source: Sonny's Car Wash, Phoenix</i>	< 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.

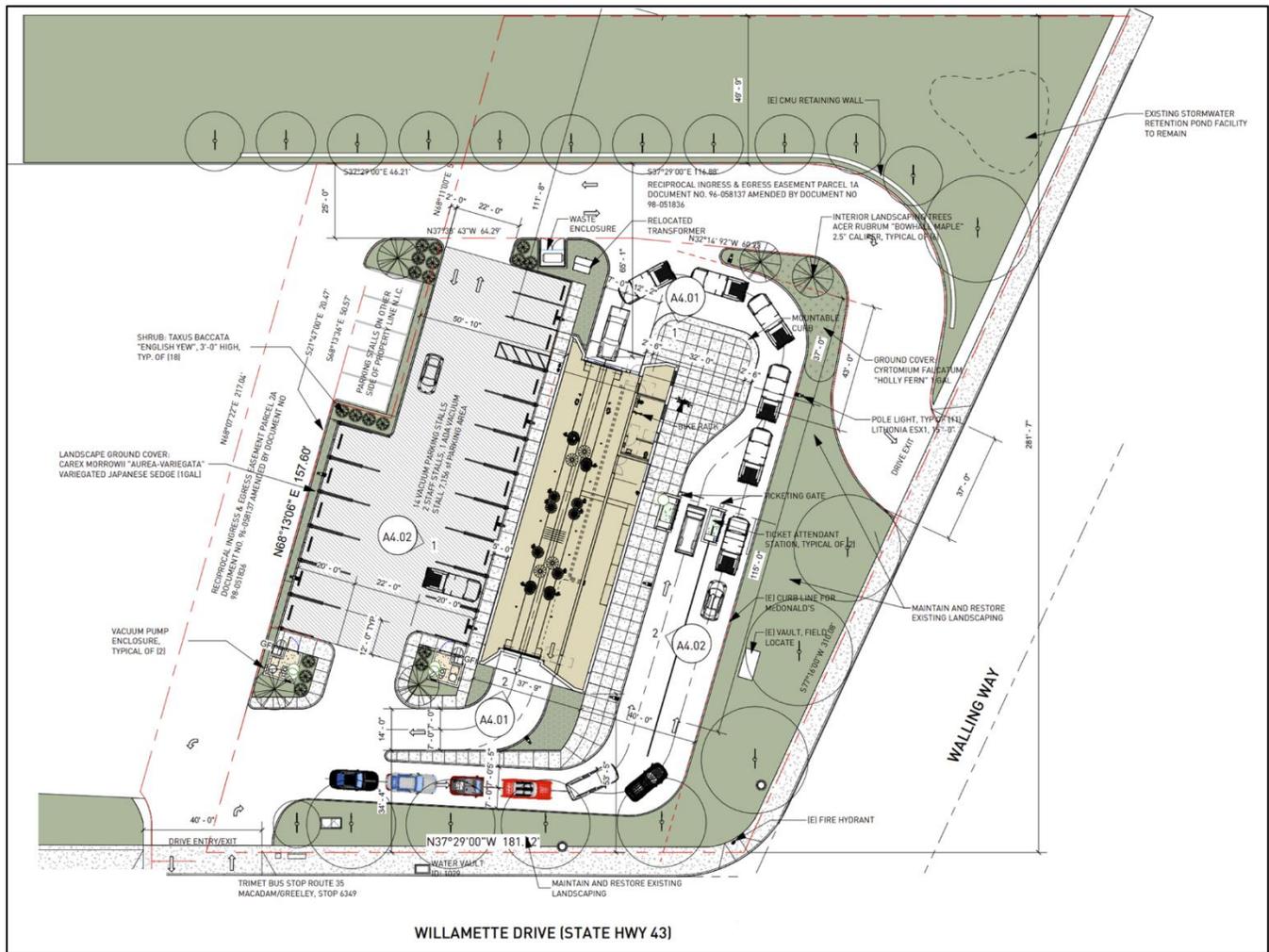


Figure 3: Proposed Car Wash Site Plan

4.3 Initial Design (Without Mitigation)

The following shows the predicted noise impact of the preliminary car wash design without noise mitigation measures.

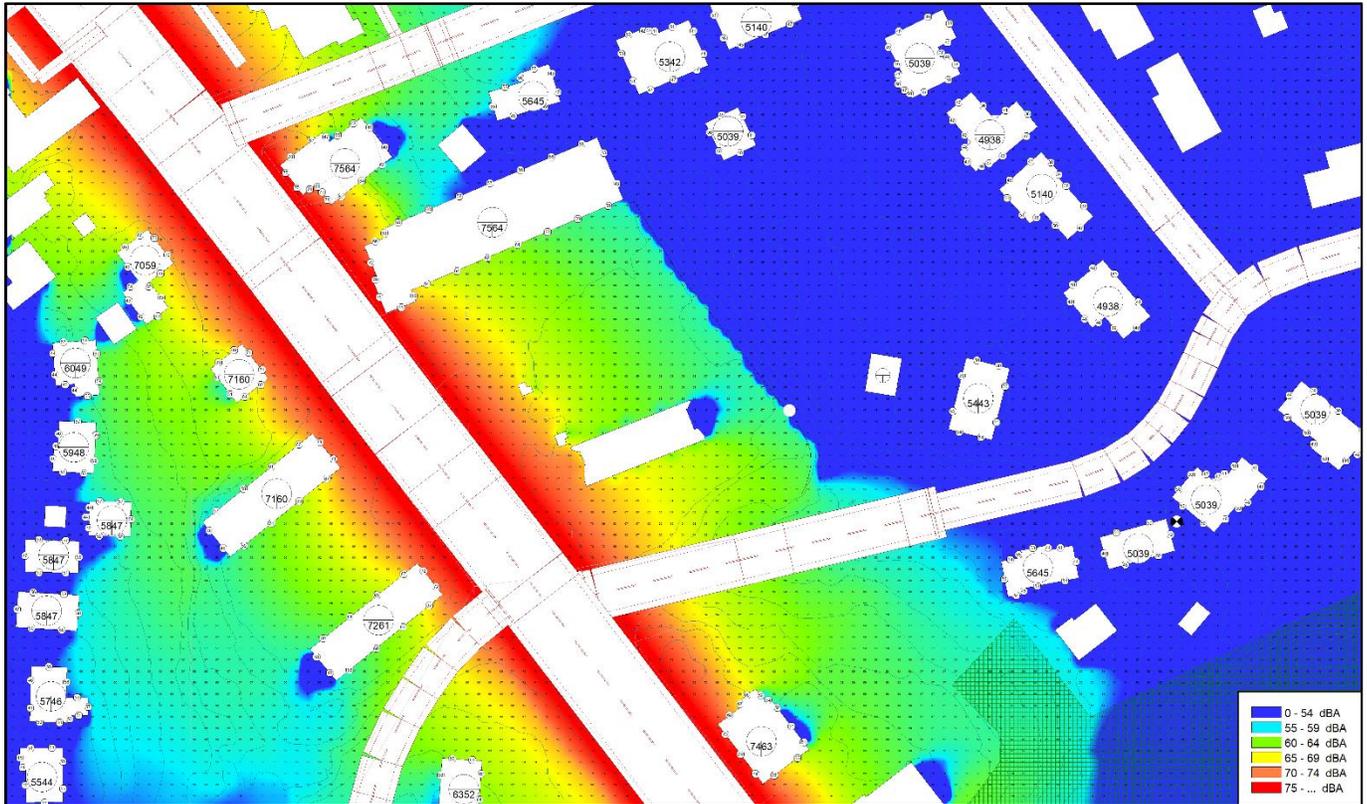


Figure 4: Background Traffic Noise Impact at Proposed Car Wash Site (Car Wash OFF)

Figure 4 shows existing 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, due to a lack of available traffic data and observations of less than a few vehicles during the on-site assessment. Traffic noise is most commonly associated with major roadways and arterials.

The predicted noise is color mapped to coded (red depicts sound levels greater than 75 dBA, blue depicts sound levels less than 54 dBA). Buildings may have a circle two numbers inside. The left number is the loudest predicted daytime hourly noise level at any point on the building’s facade. The right number is the loudest predicted hourly nighttime noise level at any point on the building’s facade.

Existing background noise is predicted to be around 70 dBA at the proposed exit to the car wash site from traffic from Willamette Drive / Highway 43 before operating any car wash equipment.

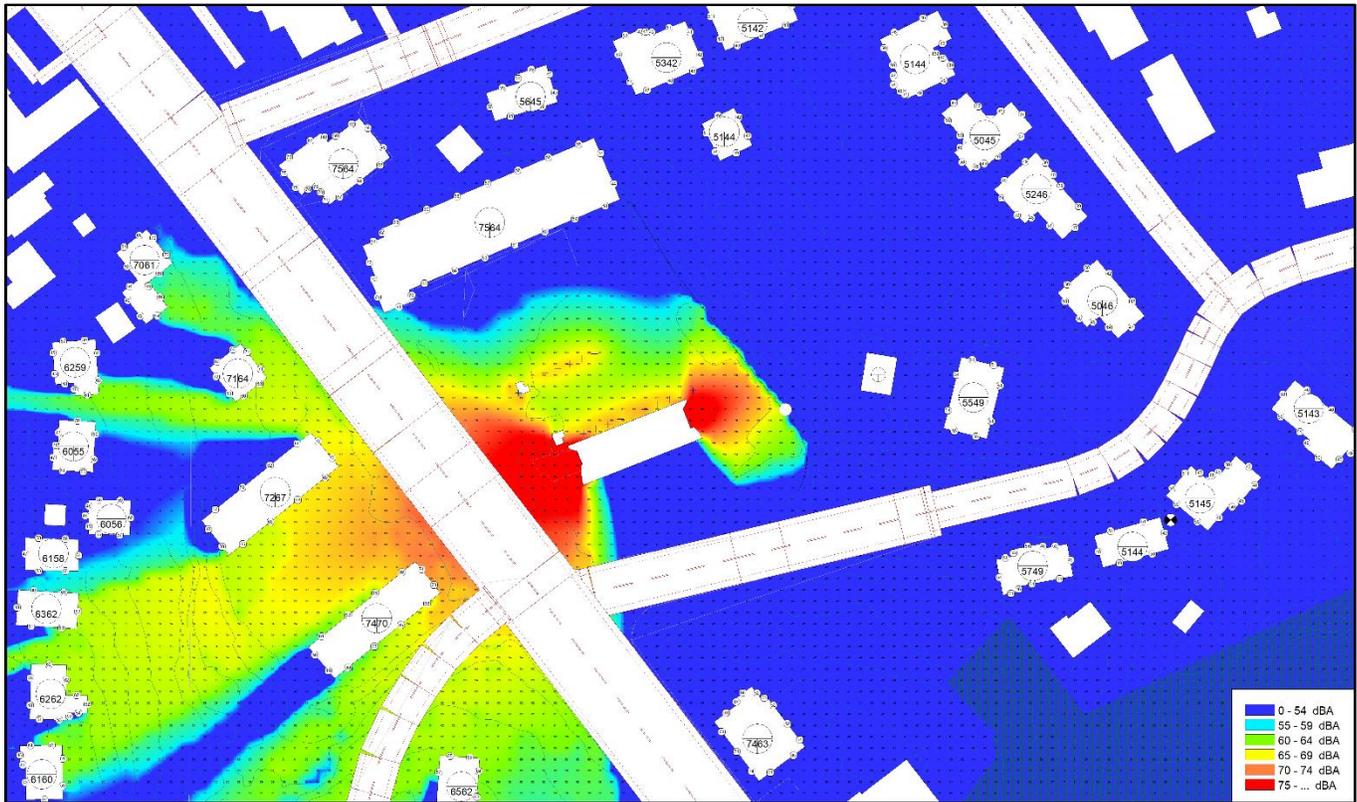


Figure 5: Predicted Noise Impact from Car Wash Activities Without Mitigation (not including traffic noise)

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.

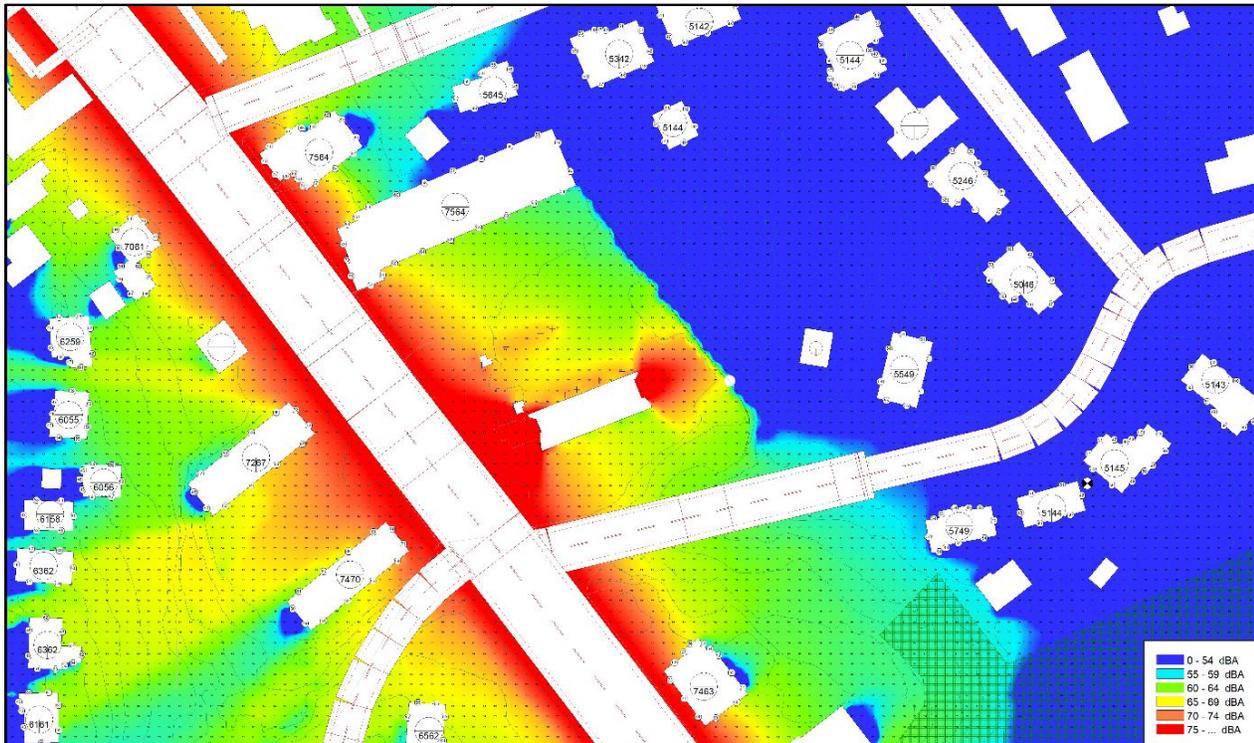


Figure 6: Predicted Noise Impact from Car Wash Activities Without Mitigation, Including Traffic Noise

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.

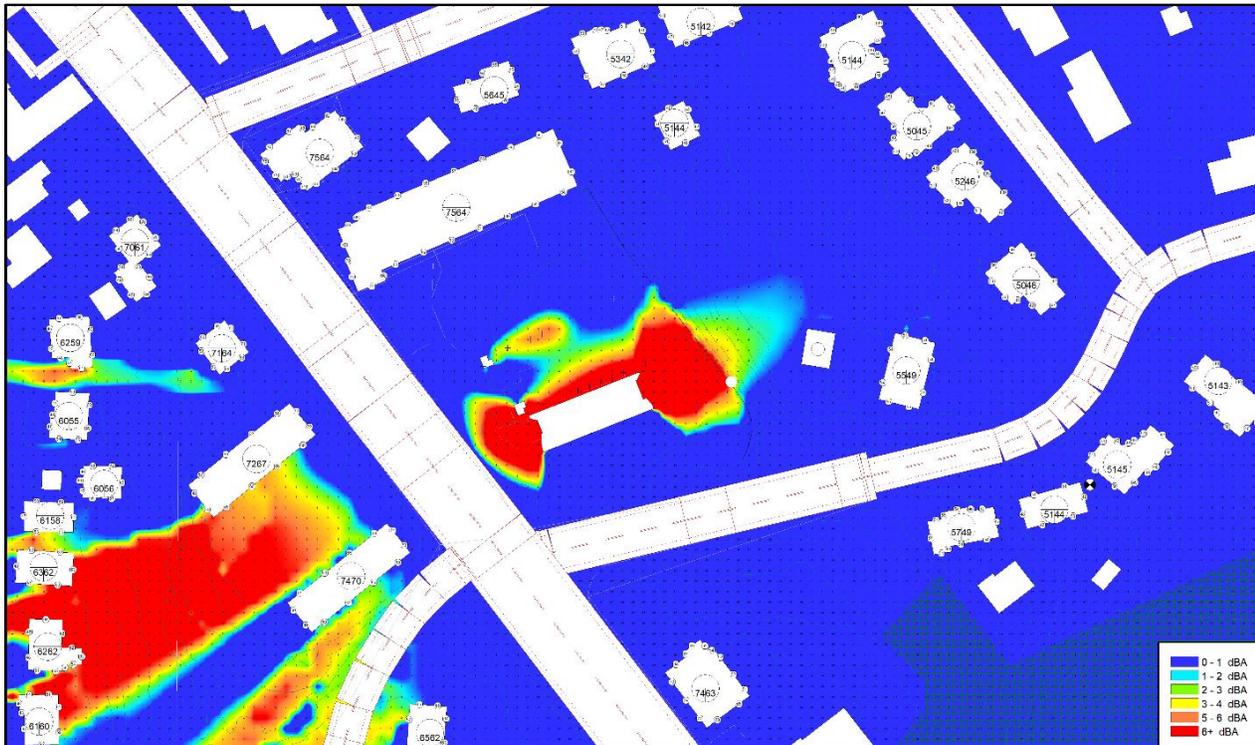


Figure 7: Predicted Noise Level Difference with Addition of Car Wash Without Mitigation to Existing Traffic Noise

Figure 7 shows the predicted overall change in noise with the addition of the car wash to the existing traffic noise before additional mitigation. 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% without noise controls.

4.4 Noise Control Plan

The following noise control plan has been engineered to further reduce the noise impact shown on the above figures to meet the Oregon Administrative Rules L50 statistical noise levels for new commercial noise sources.

4.4.1 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.

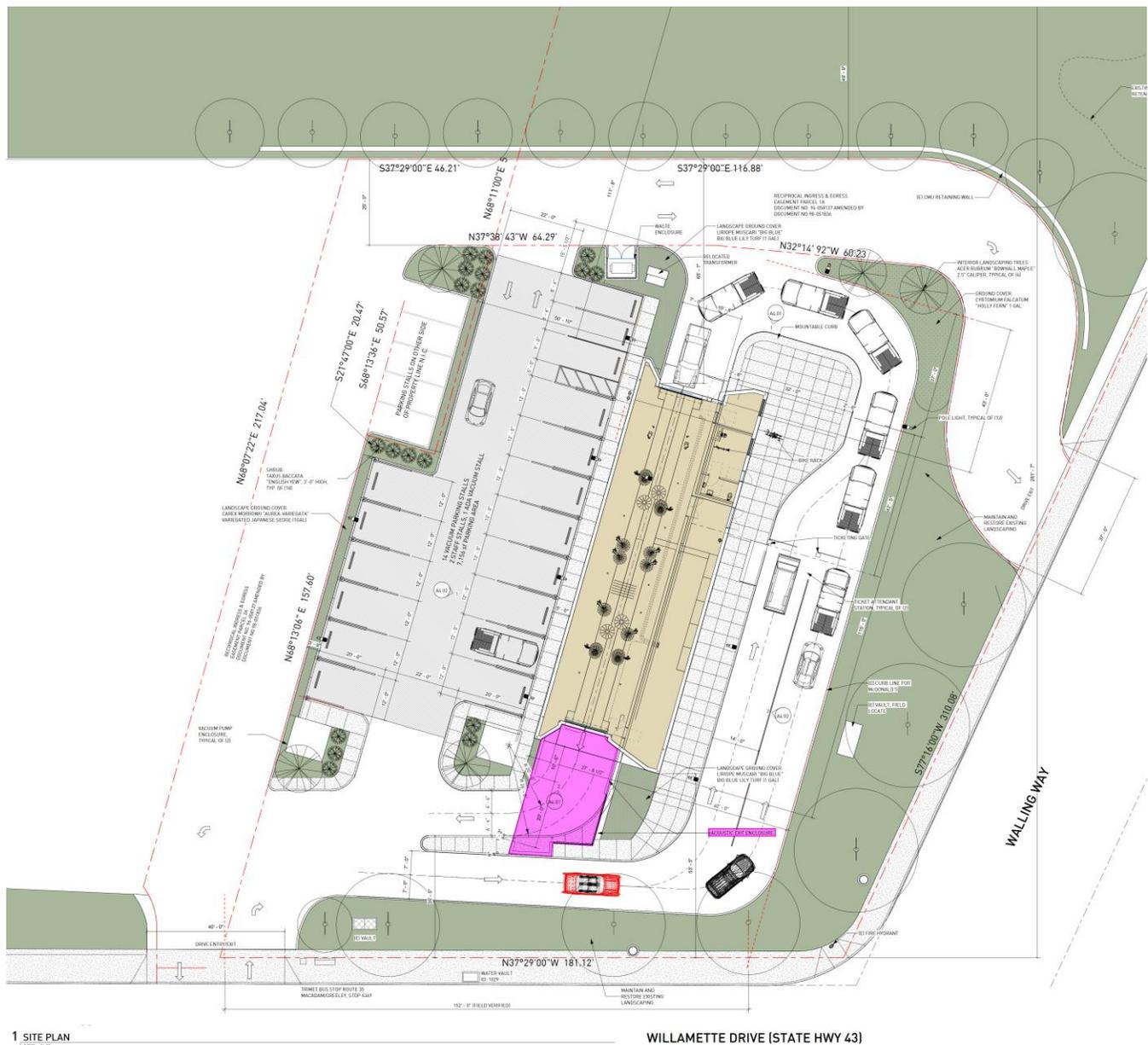


Figure 8: Updated Site Plan

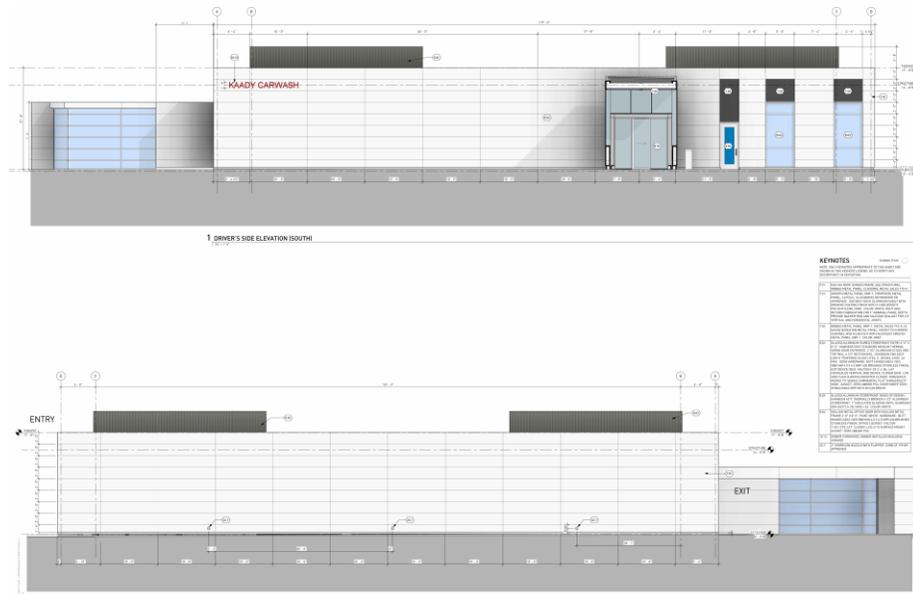


Figure 9: Exterior Elevation Drawings (TVA Architects)

Figure 10 shows the predicted noise impact from the tunnel exit modification to the surrounding properties without traffic noise. Noise from the tunnel exit modification is predicted to be less than 55 dBA at the western residences, less than 60 dBA at the commercial properties across the street, and up to 65 dBA at the sidewalk outside the nearest north commercial storefronts.

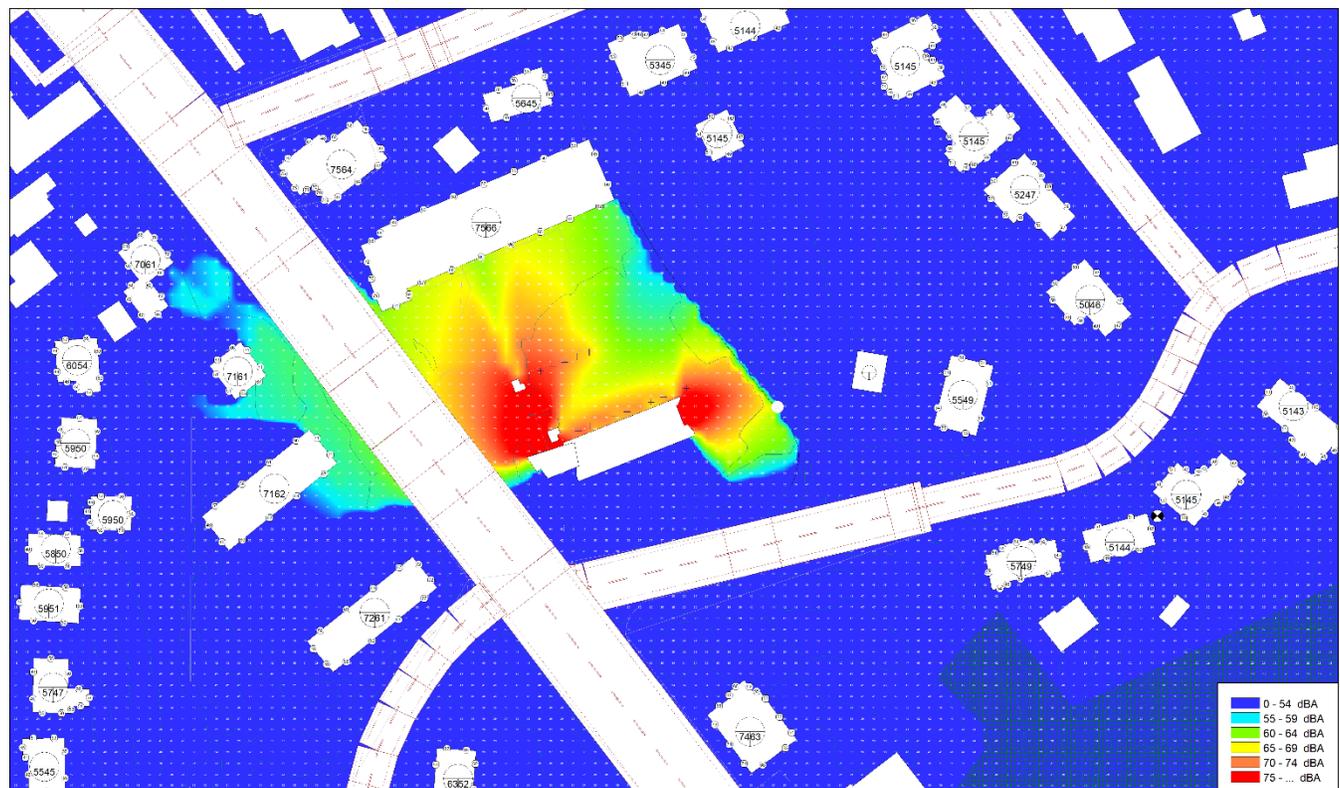


Figure 10: Predicted Noise Level Impact with Tunnel Exit Modification

4.4.1.3 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 are predicted to be less than 55 dBA, which meets the OAR 340-035-0035 limit of 55 dBA (L_{50}) to noise-sensitive properties, and are predicted to be equal to or less than existing traffic noise.

The noise control plan was required to reduce the noise impact to the west due to the lack of visible and acoustic screens; the terrain elevation increases to the west (note topographic lines toward the lower left of the figures). The modeling did not include any noise reduction factors from the existing foliage and the modeling showed that the shape of the commercial buildings on the west side of Willamette Drive did not provide effective noise reduction to these residences.

4.4.2 Alternative Tunnel Blowers

This option was modeled for comparison, but is not planned for the site

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

Figure 12 shows the predicted noise impact with International Dryer Corporation's Stealth Predator 120 HP 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.

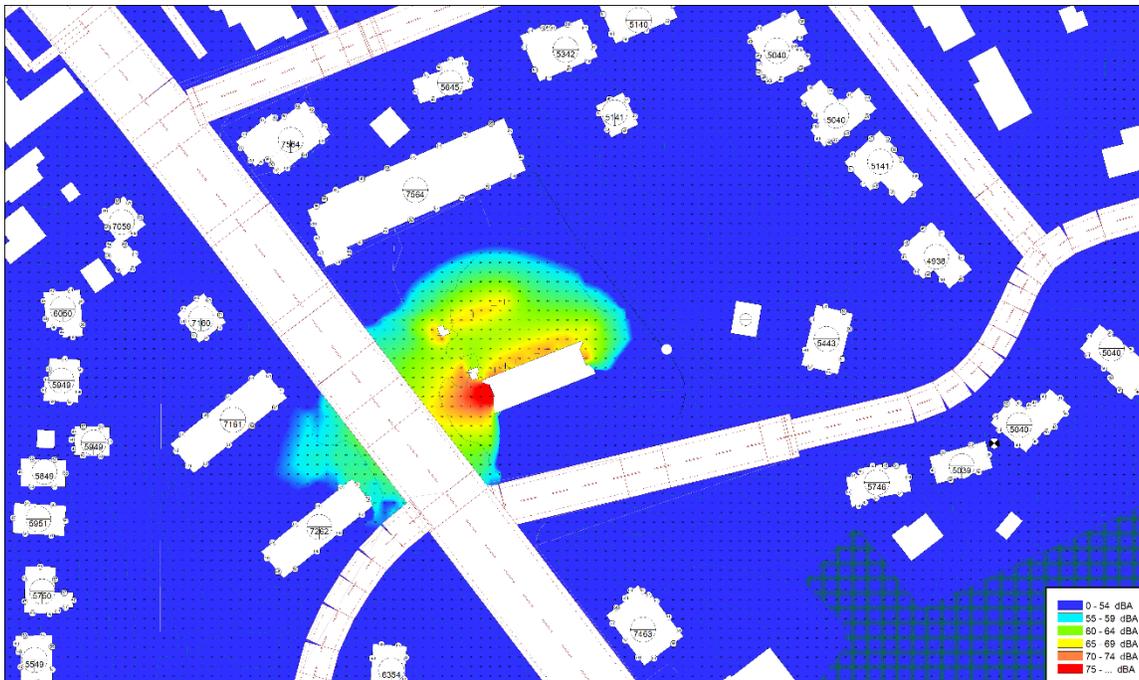


Figure 12: Predicted Noise Impact with International Dryer Corp Stealth Predator Dryer system

5 Conclusion

The proposed noise control plan with the modified tunnel will meet the noise ordinance and not be a noise impact in comparison to Willamette Drive / Highway 43 at this site.

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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RENEWAL DATE: 12/31/2026

Appendix A. Descriptors

To better understand the relevant acoustics, here is a brief overview of sound and vibration properties, descriptors, and terms.

Both Interior and exterior noise, or sound, is often measured as an A-weighted sound level in units of decibels, symbolized as dBA. The A-weighting is a specific weighting filter in a sound level meter that corresponds approximately to the sensitivity of human hearing at the various frequencies for quiet levels near the human threshold of hearing. The terms “noise” and “sound” are more descriptions of perceived quality and are the same fundamental quantity.

Sound levels vary significantly, depending on location and activities. People normally experience sound levels between about 30 and 90 dBA, depending on their activity. For example, a nearby noisy vehicle, loud stereo, or power tool may produce 90 dBA; normal conversation is about 55 to 65 dBA; and a bedroom or quiet office is about 30 to 40 dBA when no one is talking or playing music.

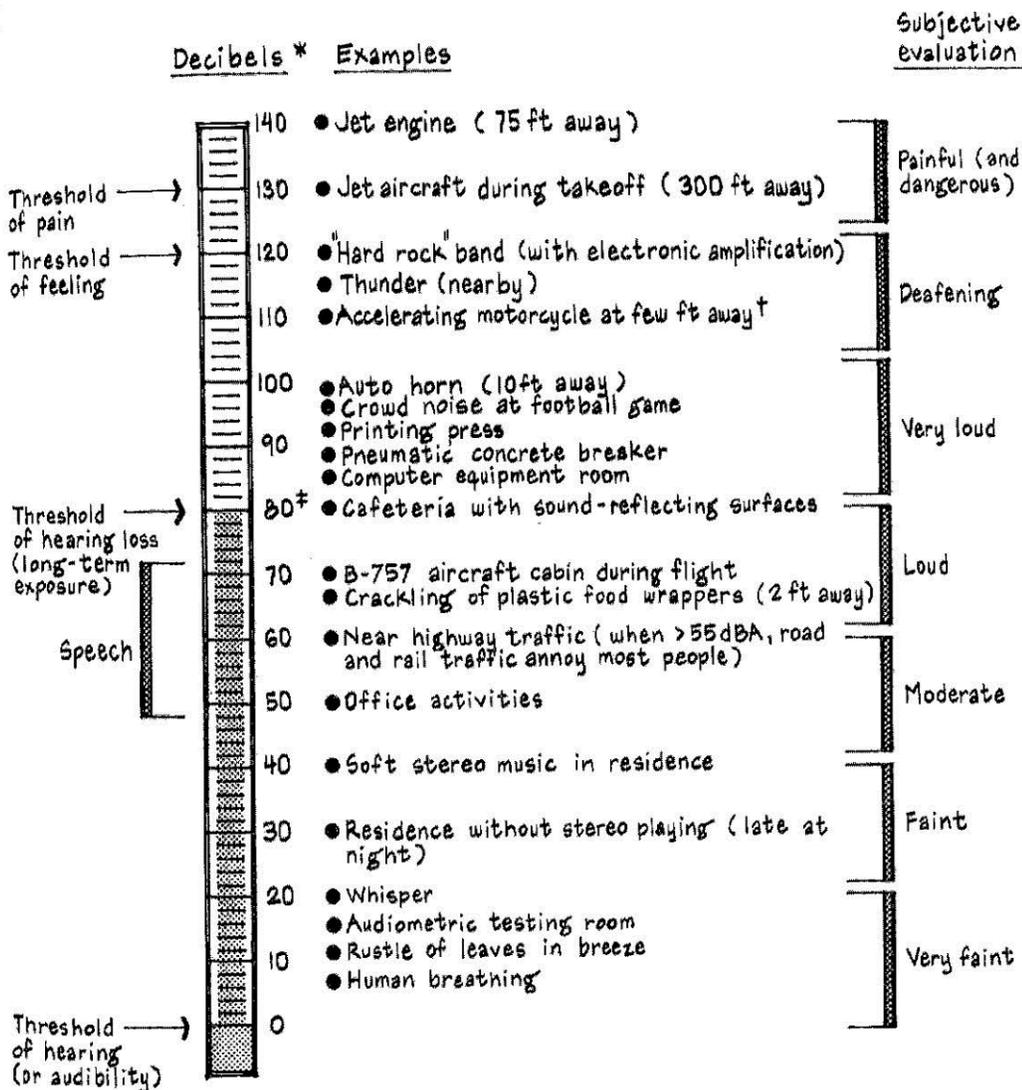


Figure 13: Architectural Acoustics, Egan © 1988

Sound – is vibration in an elastic medium, and the one more commonly measured and perceived is through air. That is defined by both amplitude (pressure change) and frequency (hertz / cycles per second). The term noise often refers to the perception of sound described as disruptive, a nuisance, or potentially harmful to health and well-being.

Decibel (dB) – Logarithmic quantity of sound amplitude proportional to human perception of sound energy. This is the human scale of pressure changes associated with sound and the unit of measurement for sound and noise. The normal human threshold is 20 micro-Pascals, which is equivalent to 0 dB.

A-Weighting (dBA) – is the summed sound level that weighs for the sensitivity of the human ear as a function of frequency for relatively quiet levels of sound. In effect, the A-weighting is based on the 40-phon Fletcher–Munson curves which represented an early determination of the equal-loudness contour for human hearing.

C-Weighting (dBC) – is the summed sound level that weighs for the sensitivity of human hearing for loud sound levels. This weighting follows the inverted shape of the equal-loudness contour passing through 100 dB at 1 kHz. It effectively describes the contribution of low-frequency noise with a single summed value.

Z-Weighting / Unweighted (dBZ) – is the non-weighted summed sound level and is usually used for sound level reporting for one-third and single octave bands.

Sound Pressure Level, L_p – specifies the perceived sound at a receiver or measurement location that is dependent on distance and environmental conditions. This is what a person hears or microphone measures in a location in space, referenced to 20 micro-Pascals.

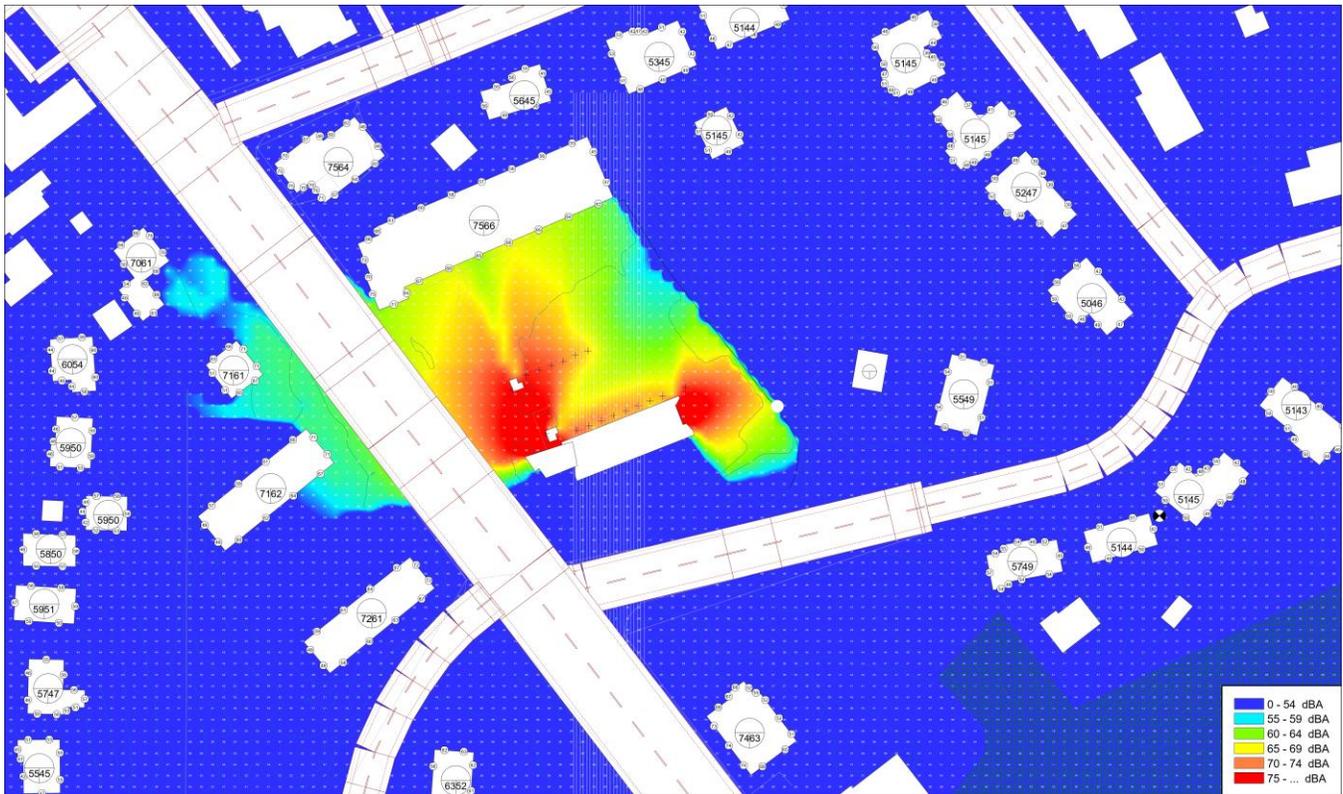
Sound Power Level, L_w – specifies the sound emission from a source independent of distance and environmental conditions. It is the potential acoustic energy of a source that is calculated and measured based on sound emission and emitting area, referenced to one picowatt.

Average Noise Level (L_{eq}) – is the time-average sound level documented in decibels that is noted with the measured time interval.

Maximum Sound Level (L_{max}) – is the highest sound level measured during a single noise event and is documented with the time response (Slow – 1 second, Fast – 0.125 second, Impulse – 0.035 second). L_{min} is the quietest sound level measured during a single time interval of measurement.

Sound waves, similar to light waves, will expand hemispherically from a point source above the ground, losing 6 dB per doubling of distance—referred to as the inverse square law. Other effects that are considered in the acoustical computer modeling software include ground absorption, air absorption, barrier effects (diffraction, reflection, and diffusion). The amount of these affects are based on the geometry from the source to the listener and the type of materials (i.e., sound reflective vs. sound absorptive).

APPENDIX B. Model Output Explanation



The CadnaA environmental noise emission model estimates the noise impact to the adjacent properties using international calculation standards. The colors represent the predicted noise level range in the areas around the building emitting the noise; areas in **royal blue** are below the daytime OAR DEQ limit of 55 dBA. The small circles around the envelope of each building show the predicted noise level from the noise sources being assessed (for the example above, only the car wash) to this location on the building façade. The larger circles in the center of each building use a European environmental noise standard to show the predicted loudest position on the envelope from all noise emission sources in the model; the bottom left is the daytime noise level based on traffic volumes and daytime noise sources, and the bottom right is the nighttime noise level based on traffic volumes.