THE GREENBUSCH GROUP, INC.

Memorandum

DATE: *June 6, 2025*

TO: *Jeff Shepherd, P.E. – Civil & Environmental Consultants, Inc.*

FROM: *Adam C. Jenkins, PE, INCE Bd. Cert., CTS-D*
Justin Morgan, INCE

RE: *Republic Services Coffin Butte Landfill – Additional Noise Mitigation*

This memorandum summarizes updated predicted sound levels from additional noise mitigation measures for the Republic Services Coffin Butte Landfill. These measures were developed to reduce predicted sound levels at nearby noise sensitive properties from proposed operations within the expansion area. We recommend the following condition of approval to address noise concerns raised in the staff report dated April 22, 2025. This condition is expected to limit increases to existing ambient conditions to not more than 6 dB at the nearest noise-sensitive receptor during the quietest operating hour.

> *Prior to the start of commercial operations in the expansion area, the Applicant shall verify by field measurement that sound levels of on-site equipment have been reduced by at least 10 dB compared to levels in Table 5.3 of the Noise Study dated September 25, 2023. Mitigation measures could include but would not be limited to upgraded engine mufflers, quieter equipment, and local noise barriers around stationary equipment. This condition shall not apply to commercial or residential haul vehicles. To verify equipment sound levels remain 10 dB below the levels shown in the Noise Study, sound levels from equipment will be measured at least once each week using a sound level meter or application installed on a mobile device. Additional measurements will be made every three years using a Type 1 sound level meter and will be overseen by a licensed engineer in the State of Oregon. These triennial measurements will be used to prepare updated noise studies.*

Noise Mitigation Implementation

The intent of including multiple mitigation options is that on-site equipment used in the expansion will be different than what was used in the study due to regular maintenance and replacement intervals. Most of the on-site equipment measured in the noise study was near the end of its maintenance cycle, providing a "worst case" emission level. Therefore, the most appropriate noise control measure for a particular piece of equipment will depend on the equipment fleet in use near the time operations in the expansion area begin. For example, a new dozer will likely be fitted with a muffler that has a higher performance level than what was in use during the Noise Study and may not require additional upgrades to achieve a 10 dB reduction.

Replacing stock engine exhaust mufflers with upgraded mufflers has been demonstrated to achieve 10 dB of noise reduction and are commonly installed on diesel engines. Aftermarket mufflers are available from several manufacturers and if necessary custom mufflers would be available from equipment manufactures or third-party vendors. In addition to mufflers, many equipment manufactures offer accessories that can help reduce sound levels from equipment, such as engine shrouds and baffles. The appropriate make and model of muffler would

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need to be identified prior to operations in the expansion area, since any muffler selections made for current equipment would likely not apply when the operations begin approximately 10 years in the future.

Downsizing mobile equipment, such as dozers, would also reduce sound levels. For example, product data from CAT shows that downsizing from a CAT D9 dozer to a D8 is 2 dB quieter and a D6 dozer is 4 dB quieter. Evolution of other technologies with lower noise emissions such as propane, diesel-hybrid, and fully electric will also influence future equipment procurement options.

Constructing noise barriers around stationary equipment or operations, such as the tippers, would provide further noise reduction. The noise reduction from noise barriers is typically 5 dB near the barrier. Barriers would be constructed to achieve a minimum surface weight of 4 pounds per foot^2. Noise barriers at the site perimeter were investigated but found to be relatively ineffective and come with a host of other site complications (visual impacts, side grading, etc.).

To verify noise emissions from on-site equipment remains 10 dB below the sound levels shown in Table 5.3 of the Noise Study issued on September 25, 2023, and to quickly identify potential issues, sound levels from on-site equipment will be measured at least once a week using a sound level meter or application installed on a mobile device. In addition to these weekly measurements, sound levels will also be measured every three years and used to prepare the updated noise studies. These triennial measurements would be made with a Type 1 sound level meter and overseen by a licensed engineer in the State of Oregon.

Verification measurements may need to be made outside of normal operating hours to reduce noise contributions from other sources. Mitigation measures found to not provide at least 10 dB of noise reduction would be replaced or additional measures would be implemented and measurements would be repeated.

Noise Mitigation Performance

Predicted sound levels with and without additional mitigation measures are compared to the median existing sound levels measured during the landfill's operating hours in Table 1. A comparison against the quietest hour measured during the landfill's operating hours is shown in Table 2. As shown in Table 1, predicted sound levels from the site are anticipated to remain below median existing sound levels without the inclusion of additional noise mitigation. Table 2 shows increases to the quietest existing sound level are predicted to be limited to 6 dB at Location 4 with the inclusion of additional noise mitigation, all other locations would be below the quietest existing sound level.

It should also be noted that while Oregon Administrative Rules (OAR) also limit increases to the existing L_{10}, these existing conditions are higher than the L_{50} metric by a greater margin than L_{10} site emissions will be above L_{50} site emissions, therefore L_{50} is the constraining metric that is most critical to addressing noise effects from the site.

Table 1. Mitigated Sound Levels Compared to Existing Conditions, dBA

Measurement Location	Median Ambient Sound Level (L_{50})		Predicted Sound Levels (L_{50})		Increase to Existing Sound Levels	
	Daytime	Nighttime	No Mitigation	Additional Mitigation	No Mitigation	Additional Mitigation
Location 1	34	34	27	23	**0**	**0**
Location 2	38	37	35	33	**0**	**0**
Location 3	54	51	39	38	**0**	**0**
Location 4	41	40	39	34	**0**	**0**

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Table 2. Mitigated Sound Levels Compared to Existing Quietest Hour, dBA

Measurement Location	Quietest Ambient Sound Level (L_{50})		Predicted Sound Levels (L_{50})		Increase to Existing Sound Levels	
	Daytime	Nighttime	No Mitigation	Additional Mitigation	No Mitigation	Additional Mitigation
Location 1	27	30	27	23	**0**	**0**
Location 2	33	34	35	33	**2**	**0**
Location 3	47	47	39	38	**0**	**0**
Location 4	28	34	39	34	**11**	**6**

To further reduce the potential noise effects at nearby properties audio files recorded during the measurements of on-site equipment and at the ambient measurement locations were reviewed to identify short term events that may not have been captured by the hourly L_{50} noise metric. The only transient events identified during this review were tonal backup alarms used by on-site equipment. Although noise from backup alarms is exempt from OAR sound limits; to address the potential effects within the community, backup alarms will be replaced with ambient sensing broadband backup alarms. Ambient sensing broadband backup alarms are typically quieter than standard alarms, adjust their volume based on the surrounding noise environment, and replace tonal alarm noises with broadband noise. During times when the surround sound levels are low, the alarms are quiet and if sound levels in the area increase the alarm also increases to maintain audibility and comply with safety standards. For example, the Street SMART bbs-tek alarm automatically adjusts to be 5-10 dB above the ambient noise level, ensuring reliable audibility while limiting overall sound level.

Sincerely,

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Vice President – Acoustical

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