Mowbray Community Centre

Plant Noise Impact Assessment

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	14/10/2026	Original Issue	[redacted] Susan Witterick BSc MIOA	[redacted] Ben Tomlin BSc MIOA

1 INTRODUCTION

1.1 dBx Acoustics Ltd has been appointed by NATTA Building Company to assess noise emissions from the building services plant proposed for the new Mowbray Community Centre, which forms part of the Mowbray mixed-use development on land north of Horsham, West Sussex.

1.2 Reserved matters approval for the Community Centre was granted by Horsham District Council (HDC) under application DC/22/2355 on 8th March 2023. Condition 4 of the approval requires that, prior to first operation of the building, a scheme for the control of plant noise is submitted to and approved in writing by the local planning authority, and sets a limit on the cumulative rating level of plant noise at the nearest noise sensitive receptor.

1.3 This report presents an assessment of the proposed ventilation plant in accordance with BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound', and is intended to support the discharge of Condition 4.

1.4 dBx previously prepared the Planning Noise Impact Assessment for the Community Centre (report *23019-R01A-SW*, dated 15th February 2023) which was submitted with the reserved matters application. That report proposed the wording and the 35dB limit subsequently adopted by HDC in Condition 4, and is referred to where relevant below.

1.5 A glossary of acoustic terminology is presented in Appendix B.

2 PLANNING CONDITION AND ASSESSMENT CRITERIA

Condition 4 of DC/22/2355

2.1 Condition 4 of the reserved matters approval reads:

> *Pre-Occupation Condition: Prior to first operation of the Community Centre hereby approved, a scheme for the control of noise of any plant shall be submitted to and approved in writing by the local planning authority. The equipment shall be maintained so that the cumulative rating level of noise from the proposed plant and equipment, determined using BS4142:2014, shall not exceed 35dB at 1m from the façade of the nearest noise sensitive receptor.*
>
> *Reason: To safeguard the amenities of neighbouring properties in accordance with Policy 33 of the Horsham District Planning Framework (2015).*

2.2 The condition therefore sets an absolute limit of 35dB$L_{Ar,Tr}$ for the cumulative rating level (determined in accordance with BS 4142:2014) of all plant, assessed at 1 m from the façade of the nearest noise sensitive receptor.

BS 4142:2014+A1:2019

2.3 BS 4142:2014+A1:2019 describes methods for rating and assessing sound of an industrial or commercial nature, including sound from fixed installations such as mechanical ventilation plant, at residential receptors. The specific sound level (the equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over the reference time interval) is determined by measurement or by calculation.

2.4 A rating level, $L_{Ar,Tr}$, is then obtained by adding corrections to the specific sound level for any acoustic features that make the sound more noticeable: tonality (+2 to +6dB), impulsivity (+3 to +9dB), intermittency (+3dB) and other readily distinctive characteristics (+3dB). The reference time intervals are 1 hour during the day (07:00-23:00) and 15 minutes at night (23:00-07:00).

2.5 The impact of the specific sound is assessed by comparing the rating level with the background sound level, taking account of the context in which the sound occurs. A difference of around +10dB or more is likely to indicate a significant adverse impact, a difference of around +5dB is likely to indicate an adverse impact, and where the rating level does not exceed the background sound level this is an indication of a low impact, depending on the context.

2.6 In this case the planning condition fixes the limit as an absolute level, so the assessment turns on the predicted rating level rather than on a measured background sound level. The BS 4142 context is nonetheless considered in Section 7.

3 PROPOSED PLANT

Design Information

3.1 This assessment is based on the mechanical services design information provided by NATTA on 8th October 2026, prepared by The Design Collective (TDC), as listed in Table 1.

Table 1: Design Information

Document	Reference	Revision / date
Mechanical Specification Part D - Equipment Schedules	TDC26050 MES.01-MES.11	P3, 21/07/2026 (Preliminary)
Mechanical Services Layout (Sheets 1 and 2)	TDC26050-ALL-00-M-4200 / 4210	C1, 10/09/2026
Mechanical Layout (Sheets 1 and 2)	TDC26050-ALL-00-M-4110 / 4120	C1, 10/09/2026
Plantroom Layouts	TDC26050-ALL-00-M-4000	C1, 10/09/2026
Mitsubishi Electric Lossnay LGH-RVXT3-E Product Information Sheet	Mitsubishi Electric	September 2024
Zehnder Centair CMEV.4eHT Product Data Sheet	Centair_CMEV.4eHT_Technical_Specification_2023_V1	2023
Sketch Site Layout, RM3 Village Centre	OSP Architecture 22177 / SK03D	November 2022

Ventilation Plant

3.2 The ventilation strategy comprises four mechanical ventilation with heat recovery (MVHR) units serving the changing rooms, kitchen and reception areas, and four continuous mechanical extract ventilation (MEV) units serving the WC and shower areas. All units are located internally within the building, and all intake and discharge terminals are located at roof level.

3.3 The MVHR units are Mitsubishi Electric Lossnay LGH-RVXT3-E ceiling-void units with four commissionable fan speeds. The mechanical schedule indicates continuous operation at the design duty, with fan speed switching to boost on detection of CO2 concentrations above 1,500 ppm. The MEV units are Zehnder Centair CMEV.4eHT variable-speed extract units, scheduled to operate continuously with duties stated at speed setting 3.

3.4 Heating is provided by gas boilers in the gas cupboard and underfloor heating served from the plantroom. The boiler flue terminates at high level. No external condensing units, chillers or other externally mounted plant are shown on the design information. The scheduled plant is summarised in Table 2.

Table 2: Scheduled Ventilation Plant (TDC26050 MES.05 and MES.06, Rev P3)

Unit	Serves	Manufacturer / model	Design duty	Operation
MVHR-01	Female Changing	Mitsubishi Electric LGH-200RVXT3-E	284 l/s @ 50 Pa	Continuous; boost on CO2
MVHR-02	Male Changing	Mitsubishi Electric LGH-200RVXT3-E	284 l/s @ 50 Pa	Continuous; boost on CO2
MVHR-03	Kitchen	Mitsubishi Electric LGH-160RVXT3-E	400 l/s @ 130 Pa	Continuous; boost on CO2
MVHR-04	Reception	Mitsubishi Electric LGH-160RVXT3-E	340 l/s @ 107 Pa	Continuous; boost on CO2
MEV-01	WC Lobby 1	Zehnder Centair CMEV.4eHT	26 l/s @ 100 Pa	Continuous, speed 3
MEV-02	Female Changing	Zehnder Centair CMEV.4eHT	38 l/s @ 75 Pa	Continuous, speed 3
MEV-03	Male Changing	Zehnder Centair CMEV.4eHT	53 l/s @ 40 Pa	Continuous, speed 3
MEV-04	Accessible WC	Zehnder Centair CMEV.4eHT	32 l/s @ 90 Pa	Continuous, speed 3

Sound Power Levels

3.5 Sound power levels for the plant have been taken from the manufacturers' published data. Mitsubishi Electric publish octave band sound power levels (63Hz to 4kHz, tested to ISO 3744:2010) for casing breakout and for the in-duct levels at the supply/exhaust air outlets and at the return/outside air connections, at each of the four default fan speeds.

3.6 Zehnder publish octave band sound power levels (125Hz to 8kHz, tested to BS EN 13141-6:2004) for casing breakout and for the in-duct extract level at each speed setting.

3.7 As the units are located internally, only the in-duct sound power levels at the intake and discharge connections contribute to noise at external receptors. Casing breakout is contained within the building and has not been considered further. The A-weighted sound power levels used in this assessment are presented in Table 3, with the octave band data from which they are derived in Appendix A.

3.8 For MVHR-01, MVHR-02 and MVHR-04 the design duties coincide with the manufacturer's 50% and 75% speed data points. The design duty of MVHR-03 (400 l/s) falls between the 75% (333 l/s) and 100% (444 l/s) data points, and the sound power levels have been interpolated linearly in each octave band between these two points, equivalent to approximately 90% fan speed. For the MEV units the manufacturer's data for speed setting 3 has been used, consistent with the mechanical schedule.

Table 3: A-Weighted In-Duct Sound Power Levels Used in the Assessment, dBL_{wA}

Unit	Basis	Intake (return / outside air)	Discharge (supply / exhaust air)
MVHR-01	Design duty, 50% speed point	42	55
MVHR-02	Design duty, 50% speed point	42	55
MVHR-03	Design duty, interpolated ~90% speed	53	68
MVHR-04	Design duty, 75% speed point	47	62
MEV-01 to MEV-04	Speed setting 3	-	41

4 NOISE SENSITIVE RECEPTORS

4.1 The Community Centre sits within the RM3 village centre of the Mowbray development, with new residential development on all sides.

4.2 As identified in dBx report *23019-R01A-SW*, the nearest noise sensitive receptors are the apartments at Plots 73-89 to the east of the Community Centre and the houses at Plots 3-12 to the north-west, all of which are new dwellings within the development.

4.3 The assessment has been carried out at the nearest residential façade to the roof-level plant terminals, which is the apartment block to the east of the Community Centre at a distance of approximately 33 m from the MVHR terminals and 34-37 m from the MEV terminals, measured from the OSP Architecture sketch site layout *22177/SK03D*.

4.4 The limit in Condition 4 applies at this location, and all other dwellings are further from the plant.

5 CALCULATION METHODOLOGY

5.1 The specific sound level at 1m from the nearest residential façade has been calculated for each intake and discharge terminal from the sound power levels in Table 3, as follows:

- Distance attenuation from each terminal to the receptor has been calculated assuming spherical spreading from a point source (20 log r + 11 dB).
- All terminals are located at roof level and do not have direct line of sight to the receptor façade. A screening correction of -10dB has been applied in all cases.
- No allowance has been made for attenuation from ductwork, bends, terminal louvres or grilles between the unit and the terminal, nor for the directivity of the terminals. The assessment is therefore conservative in this respect.
- No allowance has been made for air absorption or ground effects, which are negligible over the distances involved.

5.2 The specific sound level is the logarithmic sum of the contributions from all 12 terminals. All plant operates continuously although it is assumed that plant will operate during the daytime period only (07:00h-23:00h).

6 RESULTS

6.1 The calculated contribution of each terminal to the specific sound level at 1m from the nearest residential façade is presented in Table 4, for the plant operating at the scheduled design duties.

Table 4: Calculated Plant Noise Levels at 1 m from NSR – Design Duty

Unit	Terminal	L_{wA}, dB	Distance, m	Distance attenuation, dB	Screening, dB	Reflections, dB	Lp, $dBL_{Aeq,T}$
MVHR-01	Intake	42	33	-41	-10	+3	-6
MVHR-01	Discharge	55	33	-41	-10	+3	7
MVHR-02	Intake	42	33	-41	-10	+3	-6
MVHR-02	Discharge	55	33	-41	-10	+3	7
MVHR-03	Intake	53	33	-41	-10	+3	5
MVHR-03	Discharge	68	33	-41	-10	+3	20
MVHR-04	Intake	47	33	-41	-10	+3	-1
MVHR-04	Discharge	62	33	-41	-10	+3	14
MEV-01	Discharge	41	34	-42	-10	+3	-8
MEV-02	Discharge	41	35	-42	-10	+3	-8
MEV-03	Discharge	41	36	-42	-10	+3	-8
MEV-04	Discharge	41	37	-42	-10	+3	-8
Cumulative	**All plant**						**21**

6.2 The cumulative specific sound level at 1m from the nearest residential façade is $21dBL_{Aeq,T}$, dominated by the discharge from MVHR-03 (kitchen).

Rating Level

6.3 The specific sound is broadband fan noise from ducted ventilation units operating continuously at a fixed speed. It is not impulsive and not intermittent, and no prominent tonal components are expected at the receptor given the attenuation of the ductwork and the distance involved.

6.4 No acoustic feature corrections are therefore considered applicable, and the rating level is taken as equal to the specific sound level, $21dBL_{Ar,Tr}$.

6.5 It is noted that even if the maximum combined feature corrections for tonality and intermittency that might conceivably apply to plant of this type (+6 dB) were added, the rating level would be $27dBL_{Ar,Tr}$, still 8dB below the limit set in Condition 4.

Sensitivity - Boost Operation

6.6 The MVHR units switch to boost (100% fan speed) when CO2 concentrations exceed 1,500 ppm, and the MEV units may be commissioned at a higher speed setting.

6.7 As a sensitivity check, the calculation has been repeated with all four MVHR units at 100% speed and all four MEV units at their maximum setting, operating simultaneously. The in-duct sound power levels for this scenario are presented in Appendix A.

6.8 Under this scenario the cumulative specific sound level at 1 m from the nearest residential façade is 32dB$L_{Aeq,T}$.

6.9 All units operating at maximum speed at the same time is not a realistic operating condition, and boost operation of the MVHR units would only occur during periods of high occupancy within the building's permitted hours of use (up to 23:00h).

6.10 The predicted rating level nevertheless still does not exceed the 35dB$L_{Ar,Tr}$ limit of Condition 4.

7 ASSESSMENT

Compliance with Condition 4

7.1 The cumulative rating level of noise from the proposed plant at 1m from the façade of the nearest noise sensitive receptor is predicted to be 21dB$L_{Ar,Tr}$ with the plant operating at its design duties.

7.2 This is 14dB below the 35dB limit set by Condition 4 of DC/22/2355. The criterion is met with a substantial margin, and no additional mitigation is required.

Context

7.3 BS 4142:2014+A1:2019 requires that the significance of the impact is assessed in context. The following points are relevant:

- The predicted rating level of 21dB$L_{Ar,Tr}$ is 14dB below the conservative background sound level of 35dB$L_{A90,T}$ assumed in deriving the planning condition, and around 20dB below the background sound levels measured across the wider site in 2016. A rating level this far below the background sound level is an indication of a low impact.
- A level of 21dB$L_{Aeq,T}$ outside a bedroom window would result in a level of around 6dB$L_{Aeq,T}$ within the room with the window open for ventilation, well below the internal criteria of BS8233:2014 and the WHO Guidelines for Community Noise, and inaudible in practice.
- The residential receptors are new dwellings being delivered as part of the same development as the Community Centre, and the plant noise forms part of the acoustic environment into which the dwellings are introduced rather than a change to an established environment.
- The plant is of a type (ducted ventilation) that does not generate impulsive or markedly tonal sound at the receptor, and operates at a constant level without on-off cycling.

7.4 Taking the absolute level and the context together, the impact of the proposed plant on the nearest residential receptors is assessed as low, and no adverse impact is expected.

Uncertainty

7.5 BS 4142 requires the uncertainty of the assessment to be considered. The principal sources of uncertainty in this case are the manufacturers' sound power data (which is laboratory measured to recognised standards, with the Mitsubishi Electric octave band data taken from published charts to a precision of 1 dB), the interpolation of the MVHR-03 duty point, and the screening allowance.

7.6 The calculation is conservative in that no allowance has been made for the attenuation of the ductwork and terminals or for terminal directivity, which would reduce the predicted noise levels.

7.7 The combined uncertainty is unlikely to exceed ±3 dB, which is small in relation to the peredicted rating level of 14dB below the planning limit.

7.8 The conclusions of the assessment are therefore robust.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 A BS 4142:2014+A1:2019 assessment has been carried out of noise from the ventilation plant proposed for the Mowbray Community Centre, comprising four Mitsubishi Electric Lossnay MVHR units and four Zehnder Centair MEV units, all located internally with intake and discharge terminals at roof level.

8.2 The cumulative rating level at 1m from the façade of the nearest noise sensitive receptor is predicted to be 21dB$L_{Ar,Tr}$ at the scheduled design duties, 14dB below the 35dB limit required by Condition 4 of reserved matters approval DC/22/2355.

8.3 Even with all units operating at maximum speed simultaneously, the predicted rating level of 32dB$L_{Ar,Tr}$ remains within the limit.

8.4 On the basis of this assessment, the proposed plant complies with Condition 4 of DC/22/2355, and the condition can be discharged.

APPENDIX A - MANUFACTURERS' SOUND POWER DATA

Octave band sound power levels for the Mitsubishi Electric Lossnay units are taken from the LGH-RVXT3-E Product Information Sheet (September 2024), in which they are published as charts of sound power level against octave band centre frequency for each fan speed, tested to ISO 3744:2010. The values below have been read from the published charts to the nearest 1 dB. Only the in-duct levels relevant to the external assessment are reproduced.

Table 5: Mitsubishi Electric LGH-200RVXT3-E (MVHR-01, MVHR-02) in-duct sound power levels, dB re 1 pW

Model	Path	Speed	63	125	250	500	1k	2k	4k	dBA
LGH-200RVXT3-E	Intake (RA/OA)	50%	49	48	45	41	35	29	23	42
LGH-200RVXT3-E	Intake (RA/OA)	100%	67	66	62	56	54	47	38	59
LGH-200RVXT3-E	Discharge (SA/EA)	50%	56	57	53	52	51	47	40	55
LGH-200RVXT3-E	Discharge (SA/EA)	100%	72	75	71	68	72	69	66	76

Table 6: Mitsubishi Electric LGH-160RVXT3-E (MVHR-03, MVHR-04) in-duct sound power levels, dB re 1 pW

Model	Path	Speed	63	125	250	500	1k	2k	4k	dBA
LGH-160RVXT3-E	Intake (RA/OA)	75%	54	54	50	46	41	34	27	47
LGH-160RVXT3-E	Intake (RA/OA)	~90% (interp.)	60	61	55	51	48	40	31	53
LGH-160RVXT3-E	Intake (RA/OA)	100%	64	65	59	54	52	44	34	57
LGH-160RVXT3-E	Discharge (SA/EA)	75%	61	63	59	57	58	54	49	62
LGH-160RVXT3-E	Discharge (SA/EA)	~90% (interp.)	66	69	64	62	65	61	57	68
LGH-160RVXT3-E	Discharge (SA/EA)	100%	70	73	68	65	69	65	62	72

Octave band in-duct extract sound power levels for the Zehnder Centair CMEV.4eHT are taken from the Zehnder product data sheet (Centair_CMEV.4eHT_Technical_Specification_2023_V1), tested to BS EN 13141-6:2004.

Table 7: Zehnder Centair CMEV.4eHT (MEV-01 to MEV-04) in-duct extract sound power levels, dB re 1 pW

Setting	125	250	500	1k	2k	4k	8k	dBA
3 (factory boost)	44.3	43.2	41.5	29.4	23.8	19.7	25.1	41
MAX	50.2	56.0	50.8	47.4	40.4	35.7	29.4	53

APPENDIX B – GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (Lp) the reference quantity is 2x10-5 N/m2. The sound pressure level existing when microphone measured pressure is 2x10-5 N/m2 is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A-weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
L_{Fmax}	The instantaneous maximum sound pressure level which occurred during the measurement. F indicates that the fast time-weighting is used.
L_{AFmax}	The instantaneous maximum A weighted sound pressure level which occurred during the measurement. F indicates that the fast time-weighting is used.
$L_{Ar,Tr}$	The rating level: the equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
Reverberation Time, T	The time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. The descriptor *T,* often includes other nomenclature to describe the type of reverberation time measurement or if the reverberation time is an average taken for specific frequencies. For example, a T_{mf} is the mid-frequency reverberation time.
Absorption Coefficient, α	The fraction of reverberant sound energy absorbed by a material. It is expressed as a value between 1.0 which equates to perfect absorption and 0 which equates to zero absorption.
Acoustic Class, A - E	Classification of sound absorbers into Sound Absorption Classes A-E, according to BS EN ISO 11654, including frequencies 200-5000 Hz
NRC	A single-number rating system used to compare the sound-absorbing characteristics of building materials. A measurement of the acoustical absorption performance of a material, calculated by averaging its Sound Absorption Coefficients at 250, 500, 1000 and 2000 Hz
STI	**Speech Transmission Index**, Metric ranging between 0 and 1 representing the transmission quality of speech with respect to intelligibility by a speech transmission channel
R	**Sound Reduction Index,** the laboratory measured sound insulation properties of a material or building element in octave or third octave bands.
R_w	**Weighted Sound Reduction Index**, a single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.
D_w	**Weighted Level Difference**, the weighted level difference between a pair of rooms, stated as a single figure.

D_{nT}	**Standardised Level Difference,** a frequency-dependent measurement of airborne sound insulation, calculated using the following formula: $D_{nT} = L_1 – L_2 + 10\log(T/T0)$ dB Where: L_1 is the energy-averaged sound pressure level due to the pink noise source measured in the source room using a sweep technique. L_2 is the energy-averaged sound pressure level measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T_{30} measured in seconds). T_0 is the reference reverberation time (= 0.5s for dwellings).
$D_{nT,w}$	**Weighted Standardised Level Difference,** a single-figure value of airborne sound insulation performance, derived according to procedures in BS EN ISO 717-1, based on the D_{nT} values at different frequencies (100-3150 Hz third octave bands).
$D_{n,F,w}$	**Weighted, Normalised Flanking Level Difference,** the normalised, weighted difference in sound level between a pair of rooms via a flanking element, such as mullion or ceiling detail. The level difference in octave bands is first normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
D_{ne}	**Normalised Element Level Difference**. The normalised difference in sound level between a pair of rooms via a small element such as a trickle ventilator. The level difference in octave bands is normalized to a reference amount of absorption.
$D_{n,e,w}$	**Weighted, Normalised Element Level Difference**. The normalised, weighted difference in sound level between a pair of rooms via a small element such as a trickle ventilator, stated as a single figure. The level difference in octave bands is normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
C_{tr}	**Spectrum Adaptation Term** , a correction term applied to the sound insulation single-number values (R_w, D_w, and $D_{nT,w}$) in accordance with BS EN ISO 717-1. Applying the C_{tr} penalises a construction's performance if its low frequency performance is poor in relation its performance at higher frequencies.
Impact Sound	The noise generated by an impact on a structure. This is normally used to describe the noise created by people walking or moving furniture on a floor structure.
L_{nT}	**Standardised Impact Sound Pressure Level,** a frequency dependent measurement of impact sound insulation, calculated using the following formula: $L_{nT} = L_1 + 10\log(T/T0)$ dB Where: L1 is the mean sound pressure level due to the tapping machine measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T30 measured in seconds). T_o is the reference reverberation time (0.5s for dwellings)
$L'_{nT,w}$	**Weighted Standardised Impact Sound Pressure Level,** a single-figure value (@ 500 Hz) of impact sound insulation, performance, derived according to BS EN ISO 717-2, based on the L_{nT} values at different frequencies (100Hz- 3150 Hz third octave bands).
Insertion Loss, IL	The reduction of noise level due to the presence of a noise control device such as an attenuator, excluding any regeneration noise created by its presence.
NR	The **Noise Rating level**. This is a single figure value derived by plotting a noise spectrum against a set of curves. The curve under which the spectrum fits is the resulting NR level.

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