



風移聲學及環境顧問

Aeolian View Consultants

Acoustics & Environmental Engineering

**Repositioning and Long Term
Operation Plan of Ocean Park :
Noise Mitigation Audit Plan (NMAP)
for the Special Event at the Summit
(Phase 2 : Operation hour 09:00-01:00)**

**“Countdown for Nocturnland 2021”
(Temporary Outdoor Attraction Facilities)**

December 2021 (Rev. 2)

**Report Prepared for
Ocean Park Corporation**

(C:\...\21P024\21Rep-024a (R2))

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1.0 Introduction

The captioned Countdown event, to be held on 31 Dec 2021 and at a number of localized spots of the Summit inside the Ocean Park, denotes a ‘Temporary Outdoor Attraction Facilities’ and shall involve various environmental issues which are covered under the Environmental Permit (EP) (EP-249/2006/D) for the Repositioning and Long Term Operation Plan of Ocean Park. Such environmental issues include noise from the daily operations in the Ocean Park and in particular require the submission of Noise Mitigation Audit Plan (NMAP) and Noise Mitigation Audit Report (NMAP) to the Environmental Protection Department (EPD).

This report, an updated NMAP, details the change in the noise issue (Countdown event) from that as quantified in the latest approved NMAP for subsequent review / approval by the EPD. Note that all those ‘Temporary Outdoor Attraction Facilities’ and ‘Open-air Show’ under the 2 latest approved NMAPs in 2014 and 2015 will be suspended / inactive during this proposed Countdown event.

2.0 Relevant EP Requirements

2.1 Background

The EP was initially granted in July 2006 upon the approval of the associated Environmental Impact Assessment (EIA) report (Register No.: AEIAR-101/2006) and amendments to the EP were approved in October 2006, November 2010 and December 2013.

To update the opening hours of the Ocean Park and the layout plans for the Waterfront and Summit, an application for Variation of EP (VEP) was submitted to the EPD and new EP (EP-249/2006/D) was issued on 2 July 2014. Noise measurement and audit works were conducted in accordance with Conditions 2.25, 2.26, 2.27, 2.28, 2.29, 2.30 and 2.31 of the EP-249/2006/D and the NMAPs and the NMAPs, prepared sequentially in 2014 and 2015 for submission, were subsequently approved by the EPD.

2.2 Noise Related Submissions

Noise related requirements for different operations and over a number of operation time / time extensions (Phases 1, 2 and 3) in the Ocean Park are listed in various clauses, i.e. Conditions, in the EP text as summarized in Table 1 below. Essentially these comprise 3 steps in sequence, namely Noise Mitigation and Audit Plan (NMAP) submission, noise measurement and audit works and Noise Mitigation and Audit Report (NMAP) submission. The proposed Countdown event is simply a short time ‘Temporary Outdoor Attraction Facilities’ of the Special Event classification under the EP and shall run over a few hours from 20:00 hour (31 December 2021) to 01:00 hour (1 January 2022). With respect to the noise issue, the event denotes a variation from the previous approved NMAP and NMAP and accordingly under Condition 2.30 of the EP an **updated NMAP and NMAP** shall be submitted to the Environmental Protection Department (EPD) for approval prior to its proper execution.

Table 1 Extract of Noise Related Coverage under the Environmental Permit (EP)

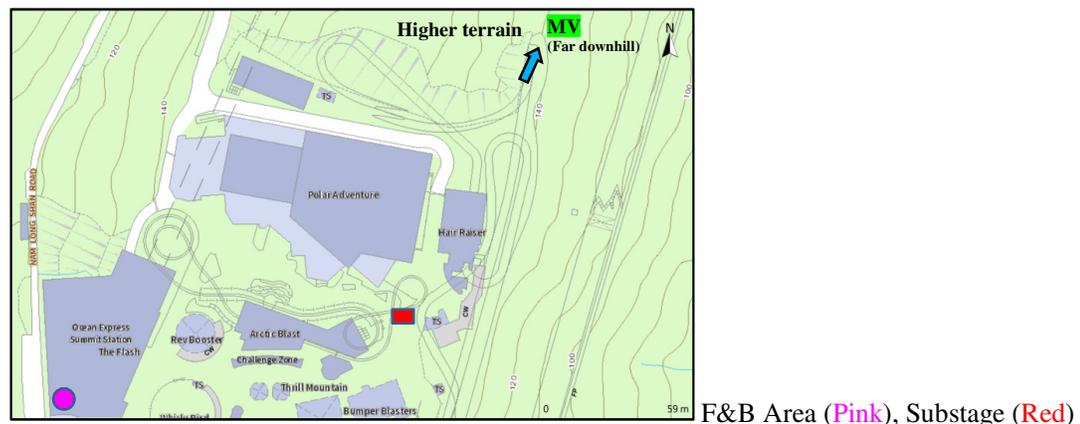
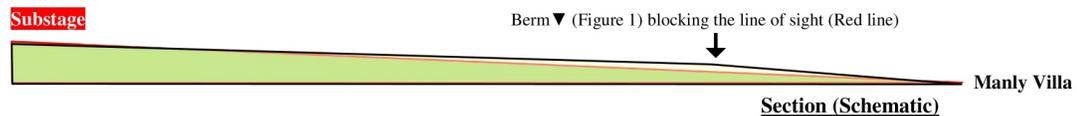
Operation Classification	Normal Operation		Special Event			Overnight Charity, Education, Conservation or Community Events
			Open-air Show	Temporary Indoor Attraction Facilities *	Sky Fair Plaza Performance	
Extension Phase	Phase 1	Phase 2	Phase 1	Phase 2	Phase 3	-
Location	All	All	Summit	Waterfront	Waterfront	All
Time Period	09:00-23:00	23:00-01:00	09:00-23:00	09:00-01:00	09:00-01:00	23:00-09:00
NMAP Submission Requirement	Condition 2.25					-
NMAP Submission Requirement	Condition 2.26					-
	Condition 2.27	Condition 2.28	Condition 2.29	Condition 2.30	Condition 2.31	Condition 2.32
Notes : 1. NMAP = Noise Mitigation Audit Plan ; NMAP = Noise Mitigation Audit Report 2. All conditions above refer to the Permit Conditions under Environmental Permit No. EP-249/2006/D 3. NMAP submission shall be preceded by the completion of noise measurement and audit works 4. NMAP & NMAP submission for the Countdown event are taken as under the classification * above						

3.0 Noise Measurement and Noise Mitigation

3.1 Noise Sources

The adequacy of the proposed noise mitigation measures for the Countdown event shall be properly addressed by considering the cumulative noise impact from those existing noise sources (Normal Operation) at the Summit as well as that from the Countdown event. Quantification of this cumulative noise impact shall be with respect to the noise criteria at the most critical Noise Sensitive Receiver (NSR) : ‘BC1 (Broadview Court)’ as shown in Figure 1. Geometrically another NSR ‘MV (Manly Villa)’ appears to be as critical as ‘BC1 (Broadview Court)’ in terms of the noise impact from the nearest Countdown attraction spots. However other topographical factors below and in Figure 1 shall render MV to be less critical instead.

NSR	Countdown Event (Figure 1)		Barrier Screening Effect				Fixed Plant Noise Criterion 23:00-01:00	Sensitivity to Noise from Countdown Event
	Nearest Attraction Spot	Distance to nearest Attraction Spot, m	By adjacent building establishment	By hill terrain	Line of sight	Applicable attenuation, dB(A)		
BC1	F&B Area	965	No	No	Visible from BC1 (Highest floors)	0	54	More critical
MV	Substage	951	Yes, by Hair Raiser	Yes	Completely blocked	-10	50	Less critical



A list detailing the noise sources and noise mitigation measures during the Countdown event as well as the noise criteria at BC1 are tabulated in Table 2 for easy reference.

Table 2 Noise Sources & Noise Mitigation Measures during the Countdown Event

Plant ID	Plant *	Location	Operation during Countdown Event			Noise Mitigation Measures
			31/12/2021		31/12/2021 to 1/1/2022	
			09:00-20:00	20:00-23:00	23:00-01:00	
SF01	Split-type A/C unit	Funicular Building	√	-	-	-
SF02	Split-type A/C unit	South Pole Spectacular	√	√	√	-
SF03	Split-type A/C unit	Tuxedos Restaurant	√	-	-	-
SF04	Split-type A/C unit	North Pole Encounter	√	√	√	-
SF05	AC plant	South Pole Spectacular	√	√	√	-
SF06	AC plant group	Tuxedos Restaurant	√	-	-	-
SF07	AC plant	North Pole Encounter	√	√	√	-
SF08	AC plant	Rainforest	√	√	√	-
SF09	Chiller	North Pole Encounter	√	√	√	-
SF10	Pump	North Pole Encounter	√	√	√	-
SF11	Ventilation fan	Funicular Building	√	-	-	-
SF12	PA system	Rainforest	√	√	√	-
SF13	PA system	Thrill Mountain	√	√	√	-
SF14	PA system	Polar Adventure	√	√	√	-
-	All fixed plants in Marine World & Adventure Land	Marine World & Adventure Land	√	-	-	-
N-R14	Arctic Blast	Polar Adventure	√	√	√	-
N-R17	Hair Raiser	Thrill Mountain	√	√	-	Closed (23:00 - 01:00)
N-R13	Rev Booster	Thrill Mountain	√	√	√	-
N-R12	Whirly Bird	Thrill Mountain	√	√	√	-
N-R11	The Flash	Thrill Mountain	√	√	-	Closed (23:00 - 01:00)
N-R15	Bumper Blasters	Thrill Mountain	√	√	√	-
N-R16	The Rapids	Rainforest	√	√	√	-
SF15	Machine plant	Cable Car Station	√	-	-	-
Special Event - Countdown for Nocturnland 2021		The Summit	-	√	√	Computerized volume control at the manned spot location
Fixed Plant Noise Assessment Criteria at the Most Critical NSR : BC1 (Broadview Court)			57 dB(A)		54 dB(A)	-

The Countdown event is to be held at 4 localized attraction spots of the Summit inside the Ocean Park (Figure 2). Three of them shall involve a number of floor mounted loudspeakers (some 1.5m above ground) to entertain park-goers with background music from 20:00 hour to the countdown moment at midnight. Details of the loudspeaker arrangement are as follows. Technical information of the loudspeakers is shown in Appendix I.

Table 3 Loudspeaker Arrangement

Noise Source			No. of Loudspeakers at Attraction Spot :			
Loudspeaker Model *	Dimensions, mm (H x W x D)	Countdown		F&B Area	Silent Corner	
		Main Stage	Substage			
A	Main Speaker - JBL VTX-V20	280 x 911 x 402	6	-	-	0
B	Sidefill Speaker - JBL VTX-F15	640 x 457 x 328	2	3	4	0
Total :			8	3	4	0
Notes : * To be floor mounted or some 1.5m above ground & with onsite volume control for background music playing						

3.2 Noise Measurement Methodology

Field noise measurement (mock-up test) is to be conducted prior to the event for incorporation into the subsequent NMAP submission. With all the noise sources being loudspeakers (floor mounted and portable type), single point source measurement for the loudspeaker group at each attraction spot (except Silent Area) shall be adopted. The proposed measurement positions at each attraction spot are as shown in Figure 3. The measurement shall cover both the background noise (1 single time, each over 1 min) and loudspeaker source (3 times, each over 5 min, simulated sound track feeding all the speakers at the attraction spot) at the selected single position to capture the noise samples in terms of A-weighted equivalent continuous noise level (L_{eq}). Results from the loudspeaker source measurement shall then be corrected by the background noise levels if necessary so as to determine the noise compliance status with the derived Sound Pressure Level (SPL) limit at the measurement position or the Sound Power Level (SWL) limit for the loudspeaker group as determined in Appendix III. Follow-up repeated measurements may be conducted with loudspeaker volume adjustment in case non-compliance is identified.

[Remarks : Simulated sound track for the loudspeaker source shall include e.g. background music, park-goers’ noise such as chatting &/or screaming]

Table 4 Noise Measurement Details & Noise Mitigation Measures

Attraction Spot Location	Noise Measurement				Commissioning Noise Limit, dBA		Noise Mitigation Measures
	Noise Source *	Noise Parameter	Measurement Position **	No. of Measurements	SWL	SPL (at 10m position)	
Main Stage	6 speakers	L_{eq} (5 min) in dB(A)	R1	3	114	83	Computerized volume control at the manned spot location
	2 speakers		R2		109	78	
Substage	2 speakers		R3		109	78	
	1 speaker		R4		106	75	
F&B Area	3 speakers		R5		111	80	
	1 speaker		R6		106	75	
Silent Corner	-	-	-	-	-	-	-

Notes :

1. SPL = Sound Pressure Level ; SWL = Sound Power Level
2. * Input from simulated sound track [e.g. background music and noise from visitors (or pink noise)]
3. ** Free field position
4. The Commissioning Noise Limits are taken as those more stringent (23:00-01:00) as in Appendix III

3.3 Instrumentation

The noise measurement shall be undertaken using 1 precision integrating sound level meter and 1 sound level calibrator. The sound level meter shall conform to the Class 1 accuracy requirements under the International Electrotechnical Commission standards IEC 61672-1 (2002) and IEC 61260 (1995). Both the meter and calibrator shall, at the time of measurement, have been calibrated by a recognized laboratory in accordance with relevant IEC laboratory calibration requirements and with calibration certificates valid within 1 year from the calibration dates. Appendix II gives the calibration certificates of the proposed instrumentation.

Table 5 Measurement Equipment

Measurement Equipment	Brand Name & Model No.	Serial No.	Calibration Expiry
Precision integrating sound level meter	NTi-XL2-TA	A2A-08670-E0	04/06/2022
Sound level calibrator	Svantek SV 30A	7441	08/02/2022

Field calibration check for the sound level meter using the sound level calibrator shall be conducted immediately before and after each series of measurements to ensure that the change in calibration level is within 0.5 dB. Otherwise the series of measurements shall be retaken onsite. ‘Fast response’ time weighting setting on the sound level meter shall be selected for all the noise measurements. The measurements shall be supervised onsite and endorsed by a qualified professional with at least 7 years of field noise measurement experience as well as being a corporate member of the Hong Kong Institute of Acoustics (HKIOA) or equivalent.

3.4 Noise Mitigation Measures

With all the loudspeakers being handy type and relatively low power rating aimed at serving the localized spot park-goers, noise mitigation measures shall basically be via the computerized volume control at each manned attraction spot location.

4.0 Event Noise Monitoring Exercise

Field noise monitoring at the 3 attraction spot locations shall be undertaken on the event day (31 Dec 2021). Similar noise measurement arrangement to that for the field noise measurement exercise (mock-up test) as detailed in Sections 3.2 and 3.3 above shall apply. However the noise monitoring exercise shall be conducted once only at each of the 3 attraction spots and the earliest monitoring time shall be 21:30 hour to coincide with the anticipated increasing crowd of the incoming park-goers. Immediate feedback for loudspeaker volume adjustment shall be directed to the audio crew onsite in case the monitoring results are in excess of the derived Sound Pressure Level (SPL) limits at the measurement positions or the Sound Power Level (SWL) limits for the respective loudspeaker groups. Upon volume adjustment of the loudspeaker group (if required), the noise monitoring shall be repeated for that loudspeaker group to verify noise compliance again. An ‘Event Noise Monitoring Report’ shall be prepared afterwards to the Ocean Park for record and for any follow-up review by the EPD if requested.

Table 6 Noise Monitoring Details (Event Day)

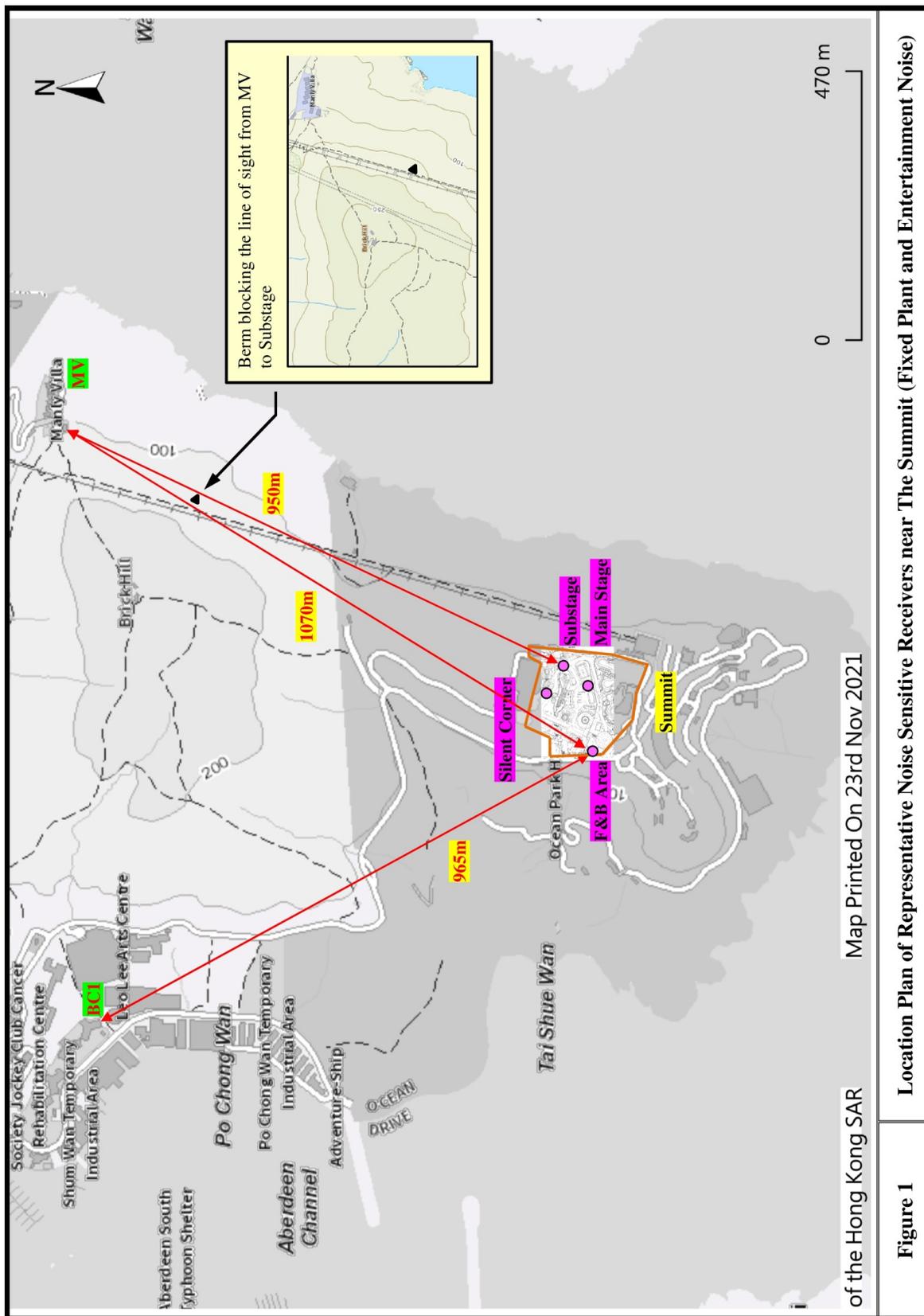
Attraction Spot Location	Event Noise Monitoring *				Commissioning Noise Limit, dBA)	
	Noise Source *	Noise Parameter	Monitoring Position **	No. of Measurements	SWL	SPL (at 10m position)
Main Stage	6 speakers	L _{eq} (5 min) in dB(A)	R1	1	114	83
	2 speakers		R2		109	78
Substage	2 speakers		R3		109	78
	1 speaker		R4		106	75
F&B Area	3 speakers		R5		111	80
	1 speaker		R6		106	75
Silent Corner	-	-	-	-	-	-
Notes : 1. SPL = Sound Pressure Level ; SWL = Sound Power Level 2. * To be conducted at 21:30 hour, 31 Dec 2021 (Event day) 3. ** Free field position						

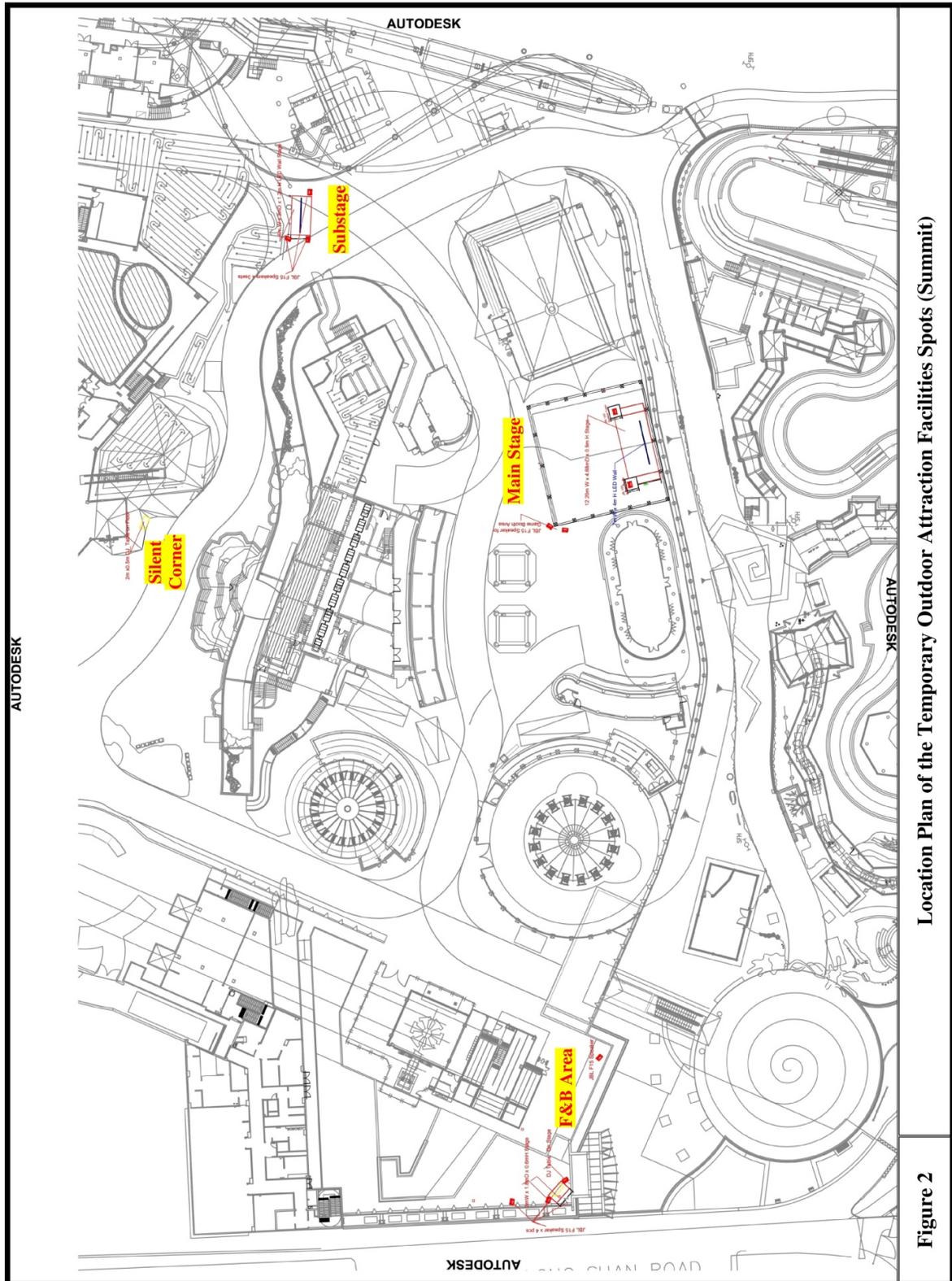
5.0 Noise Audit

Noise from the Countdown event shall also comply with the inaudibility requirement at the neighbouring Noise Sensitive Receivers (NSRs) after 23:00 hour as stipulated under the EPD’s guidelines [1]. Site visit beyond 23:00 hour on the event day shall be conducted at / close to the most critical NSR (Broadview Court, Shum Wan Road) to verify the inaudibility compliance status. In case audible noise is perceived and persists, immediate feedback to the audio crew at the attraction spots shall be exercised to lower the source volume / stop the source for inaudibility confirmation.

6.0 References

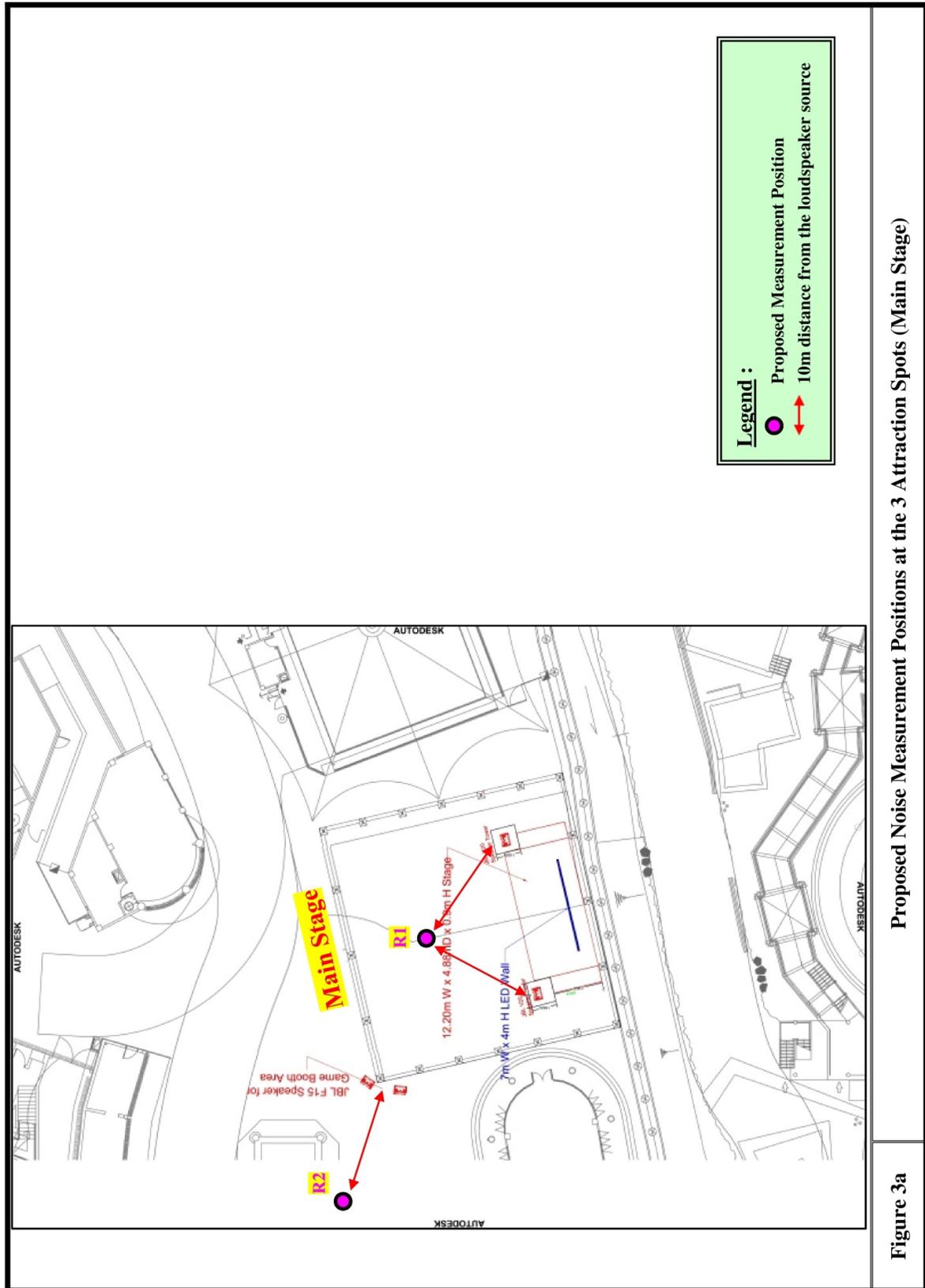
1. Noise Control Guidelines for Music, Singing & Instrument Performing Activities, Environmental Protection Department, April 2021.

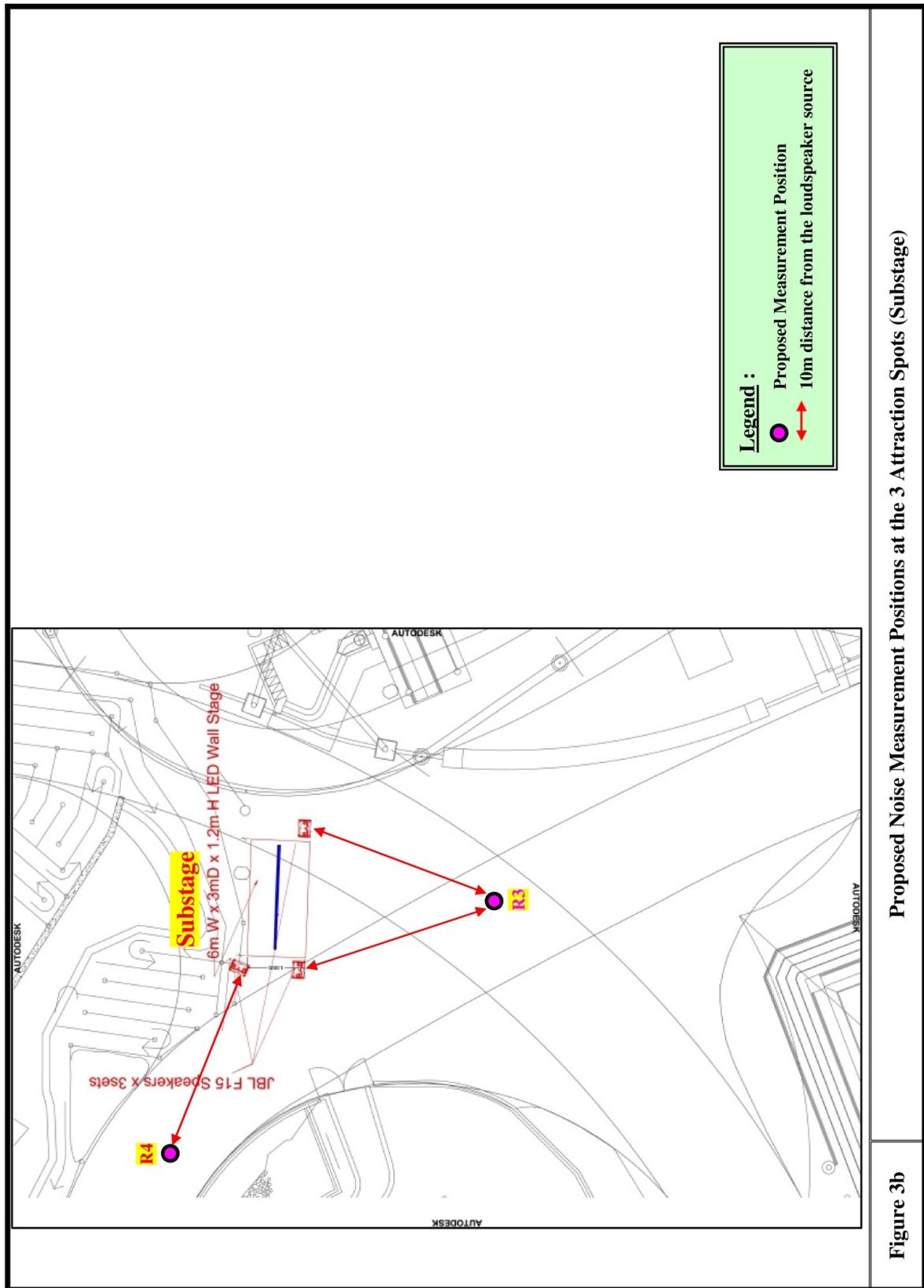




Location Plan of the Temporary Outdoor Attraction Facilities Spots (Summit)

Figure 2





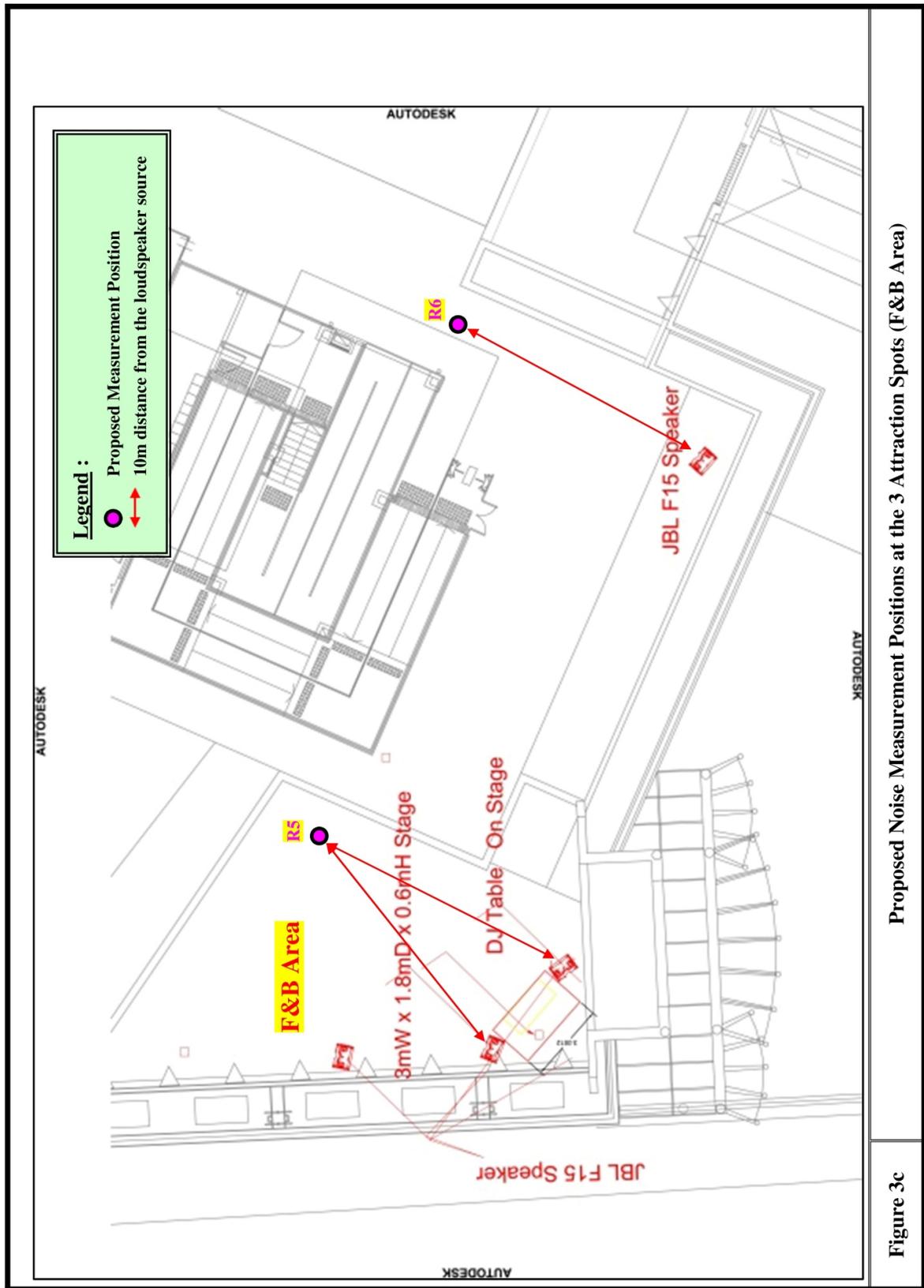


Figure 3c

Appendix I

Technical Information of the Loudspeakers

SPECSHEET

VTX V20

High Performance Dual 10” Line Array Element



Key Features:

- D2415K D2 Dual Diaphragm Dual Voice Coil Compression Driver
- Integral mid/high waveguide provides precise vertical wavefront coupling and optimal 105 degree horizontal coverage
- Variable curvature line source array (0-12.5 degrees) with enhanced long throw resolution
- Versatile, highly-ergonomic Angle Stop Mechanism (ASM) suspension system allowing tension or compression suspension
- Switchable Quad- or Bi-Amplified 3-Way system operation
- BSS® Audio OmniDriveHD V5 Processing for use with Crown Audio iTechHD or VRack and control via JBL HiQnet Performance Manager™
- Optimized for deployment with the dual-15” VTX S25 cardioid-arrayable subwoofer either separately or suspended in the same array
- In addition to stand-alone applications, V5 presets perfectly integrate VTX V20 and S25 as supporting elements of a VTX V25-II or VTX F Series system



Description:

The VTX V20 is a compact, high-output line array element designed to deliver high fidelity sound reinforcement in a wide variety of applications. Patented D2 Dual Diaphragm Dual Voice Coil and Differential Drive® LF transducer technologies employed in VTX V25-II and the JBL M2 Master Reference Monitor along with BSS® Audio OmniDrive HD V5 processing provide uncompromised sound quality, while VTX V20’s flexible suspension system ensures efficient transport, fast setup and precise configuration.

Specifications:

System	
Frequency Range (-10 dB):	60 Hz - 20 kHz (short throw mode, free field)
Coverage Pattern (-6dB)	105 degrees nominal (315 Hz - 16 kHz)
Horizontal:	Varies with array size and configuration (0-12.5 degree inter-enclosure angles)
Vertical:	degree inter-enclosure angles)
System Input Power Rating ¹ :	
Active	LF: 2 x 600 W Continuous, 2 x 2400 W Peak (AES / 2 hour)
	MF: 550 W Continuous, 2200 W Peak (AES / 2 hour)
	HF: 315 W Continuous, 1260 W Peak (AES / 2 hour)
2W Passive	LF: 1180 W Continuous, 4720 W Peak (AES / 2 hour)
	MF/HF: 550 W Continuous, 2200 W Peak (AES / 2 hour)
Bandpass Sensitivity:	
Active	LF: 93 dB, 1W / 1m (2.0 Vrms at 3.3 ft) free field
	MF: 100 dB, 1W / 1m (2.83 Vrms at 3.3 ft)
	HF: 111 dB, 1W / 1m (2.83 Vrms at 3.3 ft)
2W Passive	LF: 111 dB, 1W / 1m (2.83 Vrms at 3.3 ft)
	MF/HF: 108 dB, 1W / 1m (2.83 Vrms at 3.3 ft)
Maximum Peak Output ² :	
Active	130 dB SPL (LF), 133 dB SPL (MF), 142 dB SPL (HF) free field
2W Passive	129.5 dB SPL (LF), 141 dB SPL (MF/HF) free field
Required Amplification & Processing:	Crown® I-TechHD or VRack power amplification
	JBL HiQnet Performance Manager system control
System Impedance:	
Active	LF: 2 x 8 ohms
	MF: 1 x 8 ohms
	HF: 1 x 8 ohms
Passive	LF: 1 x 16 ohms
	MF/HF: 1 x 8 ohms
Transducers	
Low Frequency:	Two 2261H, 254 mm (10 in) dia., 76 mm (3 in) dia. dual coil, Neodymium Differential Drive®, Direct Cooled™
Mid Frequency:	Four 2164H, 130 mm (5 in) dia., 51 mm (2 in) single coil, Ultra Linear Motor
High Frequency:	Three 2415K D2 Dual Diaphragm Dual Voice Coil Compression Driver; two 38 mm (1.5 in) dia. voice coils; 21 mm (0.8 in) exit
Enclosure	
Construction:	Cast aluminum front baffles and HF waveguide; 18 mm, 11-ply Finnish birch plywood; black DuraFlex™ finish; integral recessed handles
Suspension:	Captive hinge bars and Quick Release Pins with Cam-wheel Angle Stop Mechanism. System can be deployed in tension (fixed angle) or compression mode. 0, 0.5, 0.75, 1, 1.5, 2, 2.5, 3, 4, 5, 7.5, 10, 12.5 degree inter-enclosure angles
Grille:	Powder coated 14 gauge hex-perforation steel with acoustically-transparent black cloth backing
Input Connectors:	
Active Mode:	Neutrik® Speakon® NL-8 (2x) : Pins 1+/- LF1, Pins 2+/- LF2, Pins 3+/- MF, Pins 4+/- HF
Passive Mode:	Neutrik® Speakon® NL-4 (2x) : Pins 1+/- LF1+LF2, Pins 2+/- MH Neutrik® Speakon® NL-8 (2x) : Pins 1+/- Thru, Pins 2+/- Thru, Pins 3+/- LF1+LF2, Pin 4+/- MH
Dimensions (H x W x D):	279.9 x 911.4 x 402.2mm (11.0 x 35.9 x 15.8 in)
Net Weight:	40.0 kg (88.0 lb)

Footnotes:

1: AES Standard, one decade pink noise with 6 dB crest factor within device's operational band, free air.
2: Calculated maximum SPL based on rated peak power and measured sensitivity.

JBL continually engages in research related to product improvement. Some materials, production methods and design refinements are introduced into existing products without notice as a routine expression of that philosophy. For this reason, any current JBL product may differ in some respect from its published description, but will always equal or exceed the original design specifications unless otherwise stated.

SPECSHEET

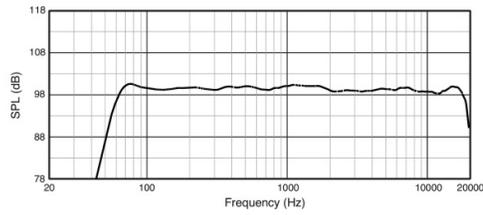
VTX V20

High Performance Dual 10" Line Array Element



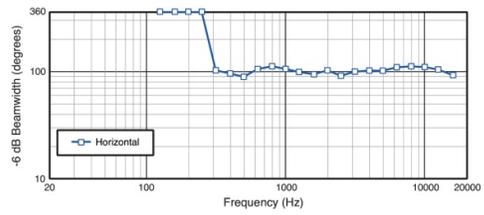
Acoustical Measurements

Frequency Response with Recommended Digital Signal Processing
 Preset: VTX V20 60 ST

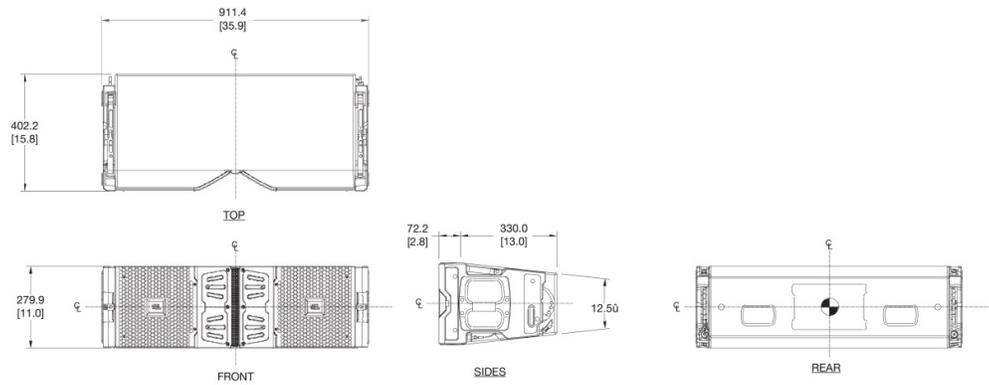


Beamwidth

-6dB Horizontal Coverage

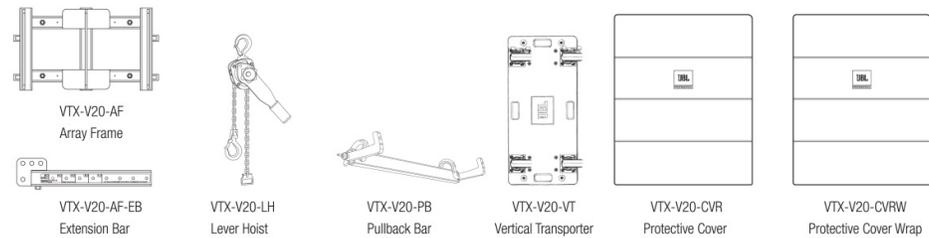


Dimensions



Accessories

- VTX-LZ-K
- VTX-LZ-V20-MB





VTX F15

15" 2-Way
Loudspeaker

Application

VTX F15 delivers studio monitor sound quality in a premium two-way multipurpose enclosure featuring point and shoot flexibility along with patented D2 Dual Diaphragm Dual Voice Coil compression driver and Differential Drive® LF technologies employed in VTX V25 and the M2 Studio Reference Monitor. Ideal for sound reinforcement rental companies, live performance venues, theatrical sound design, performing arts centers, high-impact A/V presentations, houses of worship and themed entertainment venues, VTX F15 is a highly-versatile sound design tool.

Key Features

- ▶ Bi-Amplified 2-Way System
- ▶ D2430K D2 Dual Diaphragm Dual Voice Coil Compression Driver
- ▶ Progressive Transition Waveguide (90° x 50°)
- ▶ Differential Drive®, dual neodymium magnet, dual voice coil, Direct Cooled™ 15" transducer for low weight and high output
- ▶ BSS Audio OmniDriveHD V5 Processing for use with Crown iTechHD and Crown VRack
- ▶ Dedicated OEM factory presets provide unparalleled application flexibility
- ▶ JBL HiQnet Performance Manager™ Control

For point-and-shoot fill applications, VTX F15 is a perfect sound design complement to VTX V25 due to the sonic consistency provided by common large format D2 and differential drive component technology. The patented D2 Dual Diaphragm, Dual Voice Coil high frequency compression driver delivers a dramatic increase in high frequency extension and sound pressure levels with significantly lower distortion, reduced power compression, increased dynamic headroom and reduced weight. For the low frequency section, JBL's patented Differential Drive® dual voice coil, dual magnetic gap cone transducer technology dramatically reduces weight while providing high linear excursion capability and greatly enhancing all critical performance parameters: frequency response, power output and distortion.

VTX F15 fully integrates with JBL's comprehensive amplification and intelligent control, including BSS® Audio OmniDriveHD Linear Phase FIR Processing, Crown® iTech HD or Crown VRACK amplification and JBL HiQnet® Performance Manager™ Control. A comprehensive set of application-specific V5 OEM factory presets for Crown iTech HD amplifiers provide optimized, plug-and-play performance for short throw (ST), long throw (LT) and stage monitor modes.

When paired with the VTX F18S subwoofer, F15 provides a premium-quality, compact Front-of-House, Sidefill or Drum Monitoring solution and with their clean lines, F15 is perfectly suited for demanding tour sound stage monitoring requirements.

Standard pole mount socket, M10 mount points and an optional U-bracket accessory allow VTX F15 to be used in a wide variety of distributed fill applications.



Specifications:

System	Frequency Range (-10 dB):	43 Hz - 21.5 kHz (short throw mode, free field) 42 Hz - 21.5 kHz (monitor mode, half-space)
	Frequency Response (±3 dB):	59 Hz - 20.0 kHz (short throw mode, free field) 58 Hz - 20.0 kHz (monitor mode, half-space)
	Coverage Pattern:	90 x 50 degrees nominal (Vertical Orientation)
	System Input Power Rating:	LF: 1000 W Continuous, 4000 W Peak (AES / 2 hour) HF: 200 W Continuous, 800 W Peak (AES / 2 hour)
	Maximum Peak Output ¹ :	134 dB SPL (LF), 137 dB SPL (HF), free-field 140 dB SPL (LF), 137 dB SPL (HF), half-space
	Recommended Amplification:	LF: 1400 - 2000 W into 8 ohms HF: 540 - 800 W into 20 ohms
	Recommended Signal Processing:	Crown® i-Tech HD power amplification VTX F Series presets available for download at www.jblpro.com
Transducers	Low Frequency:	One 2265H, 381 mm (15 in) dia., 76 mm (3 in) dual voice coil, dual neodymium magnet, Differential Drive®, Direct Cooled™
	Bandpass Nominal Impedance:	8 ohms
	Input Power Rating ² :	1000 W Continuous, 4000 W Peak (AES / 2 hour) 700 W Continuous, 2800 W Peak (100 hour)
	Bandpass Sensitivity:	98 dB, 1W / 1m (2.83 Vrms at 3.3 ft) free-field 104 dB, 1W / 1m (2.83 Vrms at 3.3 ft) half-space
	High Frequency:	One 2430K D2 Dual Diaphragm Dual Voice Coil Compression Driver; two 76 mm (3 in) diameter voice coils; 38 mm (1.5 in) exit
	Bandpass Nominal Impedance:	20 ohms
	Input Power Rating ² :	200 W Continuous, 800 W Peak (AES / 2 hour)
	Bandpass Sensitivity:	108 dB, 1W / 1m (2.83 Vrms at 3.3 ft)
Enclosure	Construction:	Symmetrical stage monitor (53 degree angle); 18 mm, 11-ply Baltic birch plywood; black DuraFlex™ finish; integral recessed handle
	Suspension:	Integral pole mount socket (35 mm diameter); 16 x M10 mount points; Optional U-bracket and extension rod (SS5-BK) accessories available
	Grille:	Powder coated 14 gauge hex-perforation steel with acoustically transparent black cloth backing
	Input Connectors:	Neutrik® Speakon® NL-4 (4x) Pins 1+/- LF, Pin 2+/- HF
	Dimensions (H x W x D):	640.1 x 457.2 x 327.7 mm (25.2 x 18 x 12.9 inches)
	Net Weight:	22.9 kg (50.5 lbs)
	Shipping Weight:	26.5 kg (58.5 lbs)
Optional Accessories	SS5-BK:	Adjustable extension rod with M20 thread for attachment to VTX F18S; hand crank height adjustment; patented expanding mandrel system for secure vibration free attachment to F18S using either integral pole mount socket or optional UB universal bracket accessory
	VTX F15 UB:	Universal bracket accessory

¹Calculated maximum SPL based on rated peak power and measured sensitivity

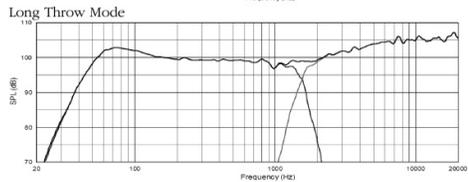
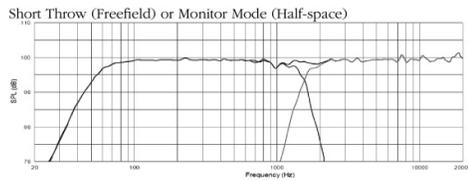
²AES Standard, one decade pink noise with 6 db crest factor within device's operational band, free air. Standard AES 2 hr rating plus long term 100 hr rating.

JBL continually engages in research related to product improvement. Some materials, production methods and design refinements are introduced into existing products without notice as a routine expression of that philosophy. For this reason, any current JBL product may differ in some respect from its published description, but will always equal or exceed the original design specifications unless otherwise stated.

► VTX F15 15" 2-Way Loudspeaker

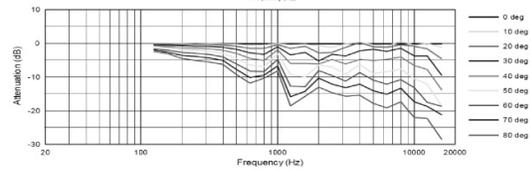
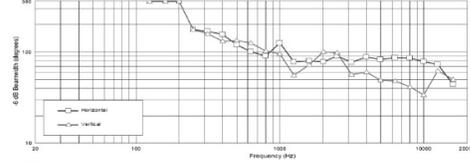
Acoustical Measurements

Frequency Response with Recommended V5 DSP
 (Individual Bandpasses with Composite Overlay)

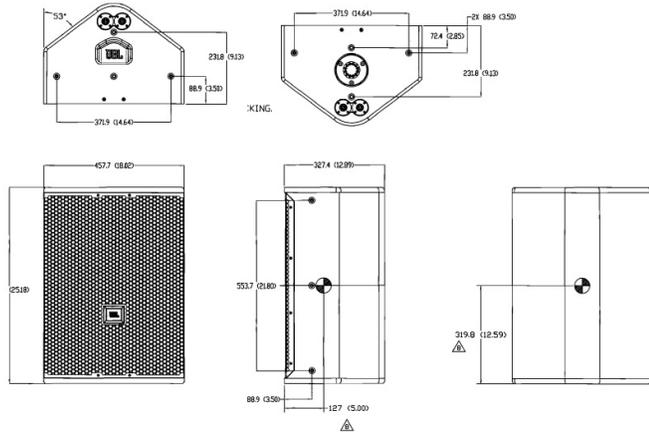


Beamwidth and Normalized Off-Axis Response

(Vertical enclosure orientation)



Dimensions



System Configurations



Floor Monitor



Small Format
Front of House



Drum/
DJ Monitoring



by HARMAN
 JBL Professional
 8500 Balboa Boulevard, P.O. Box 2200
 Northridge, California 91329 U.S.A.

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SS VTX F15
 CRP
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Appendix II

Calibration Certificates



聲學測試服務有限公司
Acoustic Testing Services Limited

Unit E, 2/F., Century Industrial Centre, 33-35 Au Pui Wan Street, Fo Tan, Shatin, New Territories, Hong Kong
Tel: (852) 2690 9126 Fax: (852) 2690 9125 E-mail: info@ATSL.com.hk http://www.ATSL.com.hk

Certificate of Calibration

Certificate No. ATS21-016-CC003

Customer: **Aeolian View Consultants**
Room 1907 Tung Che Commercial Centre,
246 Des Voeux Road West,
Hong Kong

Unit-under-test (UUT):

Description:	Sound Analyzer	, Microphone	, Pre-amplifier
Manufacturer:	NTi Audio		
Type No.:	XL2-TA	, MC230	, MA220
Serial No.:	A2A-08670-E0	, 9422	, 5045

Conditions during calibration:

Temperature:	25°C
Relative Humidity:	55%

Test Specifications: Calibration Check

Date of calibration: 04th June 2021

Test Results: All calibration points are within manufacturer's specification.



Certified by: _____
Mr. Y. T. LEUNG
MIOA, MHKIOA, MHKIQEP

Issue Date: 04th June 2021

Certificate No.: ATS21-016-CC003 Page 1 of 3



1. The instrument under test was allowed to stabilize in the laboratory for over 24 hours.

2. Calibration equipment:

Description:	Acoustical Calibrator
Manufacturer:	Brüel & Kjær
Type No.:	4231
Serial No.:	2478237
Last Calibration Date:	13 th April 2021
Certificate No.:	AV210055

The test equipment used for calibration is traceable to Standards and Calibration Laboratory, the Government of the HKSAR.

3. The Sound Analyzer has been calibrated in accordance with the requirements as specified in IEC 61672 Class 1, and vendor specific procedures.

4. The values given in this certification only related to the values measured at the time of the calibration and any uncertainties quoted will not allowance for the equipment long-term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the calibration. Acoustic Testing Services Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Certificate No.: ATS21-016-CC003

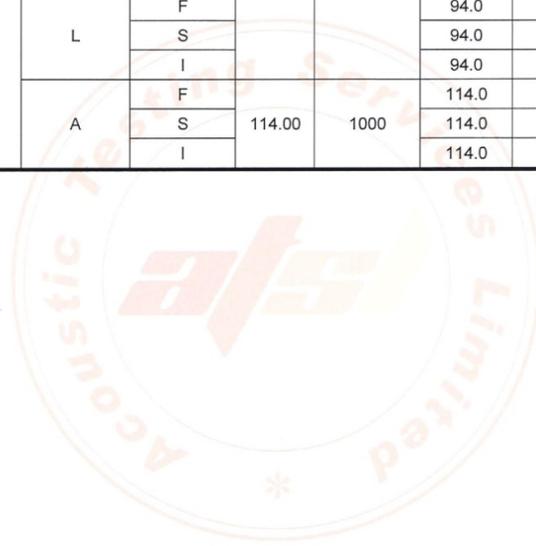


Page 2 of 3



5. Calibration Results

Setting of unit-under-test (UUT)				Applied value		UUT Reading, dB	IEC 61672-1 Class 1 Tolerance Limits, dB	Conclusion		
Range, dB	Parameter	Frequency Weighting	Response	Level, dB	Frequency, Hz					
20-120	SPL	A	F	94.00	1000	94.0	± 1.1	PASS		
			S			94.0	± 1.1	PASS		
			I			94.0	± 1.1	PASS		
		C	F			94.0	± 1.1	PASS		
			S			94.0	± 1.1	PASS		
			I			94.0	± 1.1	PASS		
		L	F			94.0	± 1.1	PASS		
			S			94.0	± 1.1	PASS		
			I			94.0	± 1.1	PASS		
		A	F			114.00	1000	114.0	± 1.1	PASS
			S					114.0	± 1.1	PASS
			I					114.0	± 1.1	PASS





Unit E, 2/F., Century Industrial Centre, 33-35 Au Pui Wan Street, Fo Tan, Shatin, New Territories, Hong Kong
Tel: (852) 2690 9126 Fax: (852) 2690 9125 E-mail: info@ATSL.com.hk http://www.ATSL.com.hk

Certificate of Calibration

Certificate No. ATS21-016-CC002

Customer: **Aeolian View Consultants**
Room 1907, Tung Che Commercial Centre,
246 Des Voeux Road West,
Hong Kong

Unit-under-test (UUT):

Description: Acoustic Calibrator
Manufacturer: Svantek
Type No.: SV-30A
Serial No.: 7441

Conditions during calibration:

Temperature: 21°C
Relative Humidity: 75%

Test Specifications: Calibration Check

Date of calibration: 08 February 2021

Test Results: All calibration points are within manufacturer's specification.

Certified by: 
Mr. Y. T. LEUNG
MIOA, MHKIOA, MHKIQEP



Issue Date: 09 February 2021

Certificate No.: ATS21-016-CC002

Page 1 of 2



Unit E, 2/F., Century Industrial Centre, 33-35 Au Pui Wan Street, Fo Tan, Shatin, New Territories, Hong Kong
 Tel: (852) 2690 9126 Fax: (852) 2690 9125 E-mail: info@ATSL.com.hk http://www.ATSL.com.hk

1. The instrument under test was allowed to stabilize in the laboratory for over 24 hours.
2. Calibration equipment

	Type	Serial No.	Last Calibration Date	Calibration Report Number	Traceable to
Sound Analyzer	B&K 2270	2821591	06-Nov-2020	AV200136	SCL, HKSAR
Reference Microphone	B&K 4189	2799478	06-Nov-2020	AV200136	SCL, HKSAR

The test equipment used for calibration is traceable to National Standards via Standards and Calibration Laboratory, the Government of the HKSAR.

3. Calibration Results

Nominal value dB	Measured value dB	Expanded Measurement Uncertainty of Reference Microphone B&K 4189 at 1000 Hz dB
94.00	94.0	0.2
114.00	114.0	0.2



Certificate No.: AT521-016-CC002

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Appendix III

Derivation of Commissioning Noise Limits for Loudspeaker Sources

20:00-23:00

Noise Sensitive Receiver (NSR)	Fixed Plant Noise Assessment Criteria *	Total Predicted SPL (Normal Operation Source)	Source (F&B Area) to NSR Distance [as in Figure 1]	Maximum Allowable SWL (All 15 speakers at the 3 attraction spots)	Maximum Allowable SWL (Single speaker)	Commissioning Noise Limit (10 m from speaker) **		
	SPL _(NSR)	SPL _(Total)	d	SWL _(All)	SWL _(Single)	Quantity	SPL	SWL
	dB(A)	dB(A)	m	dB(A)	dB(A)		dB(A)	dB(A)
BC1 (Broadview Court)	57	54	965	119	107	1 speaker	76	107
						2 speakers	79	110
						3 speakers	81	112
						6 speakers	84	115

Notes :

1. SPL = Sound Pressure Level ; SWL = Sound Power Level
2. * Extracted from Table 3.1.e, Environmental Review Report (ERR) in May 2014
3. ** under free field condition
4. $SPL = SWL_{(Single)} - 20\log(10) - 11 + 10\log(\text{No. of speakers})$
 $SWL = SPL + 20\log(10) - 11 + 10\log(\text{No. of speakers})$
 where $SWL_{(Single)} = SWL_{(All)} - 10\log(15)$; $SWL_{(All)} = 10\log[10^{\frac{SPL_{(NSR)}}{10}} - 10^{\frac{SPL_{(Total)}}{10}}] - 3 + 20\log(d) + 8$

23:00-01:00

Noise Sensitive Receiver (NSR)	Fixed Plant Noise Assessment Criteria *	Total Predicted SPL (Normal Operation Source)	Source (F&B Area) to NSR Distance [as in Figure 1]	Maximum Allowable SWL (All 15 speakers at the 3 attraction spots)	Maximum Allowable SWL (Single speaker)	Commissioning Noise Limit (10 m from speaker) **		
	SPL _(NSR)	SPL _(Total)	d	SWL _(All)	SWL _(Single)	Quantity	SPL	SWL
	dB(A)	dB(A)	m	dB(A)	dB(A)		dB(A)	dB(A)
BC1 (Broadview Court)	54	47	965	118	106	1 speaker	75	106
						2 speakers	78	109
						3 speakers	80	111
						6 speakers	83	114

Notes :

1. SPL = Sound Pressure Level ; SWL = Sound Power Level
2. * Extracted from Table 3.1.e, Environmental Review Report (ERR) in May 2014
3. ** under free field condition
4. $SPL = SWL_{(Single)} - 20\log(10) - 11 + 10\log(\text{No. of speakers})$
 $SWL = SPL + 20\log(10) - 11 + 10\log(\text{No. of speakers})$
 where $SWL_{(Single)} = SWL_{(All)} - 10\log(15)$; $SWL_{(All)} = 10\log[10^{\frac{SPL_{(NSR)}}{10}} - 10^{\frac{SPL_{(Total)}}{10}}] - 3 + 20\log(d) + 8$

Total Predicted SPL Estimation (Normal Operation Source)

Plant ID	Plant *	Location	Predicted SPL *, dB(A)	
			20:00-23:00	23:00-01:00
SF02	Split-type A/C unit	South Pole Spectacular	6	6
SF04	Split-type A/C unit	North Pole Encounter	15	15
SF05	AC plant	South Pole Spectacular	12	12
SF07	AC plant	North Pole Encounter	21	21
SF08	AC plant	Rainforest	22	22
SF09	Chiller	North Pole Encounter	26	26
SF10	Pump	North Pole Encounter	18	18
SF12	PA system	Rainforest	27	27
SF13	PA system	Thrill Mountain	34	34
SF14	PA system	Polar Adventure	33	33
N-R14	Arctic Blast	Polar Adventure	38	38
N-R17	Hair Raiser	Thrill Mountain	50	-
N-R13	Rev Booster	Thrill Mountain	46	46
N-R12	Whirly Bird	Thrill Mountain	34	34
N-R11	The Flash	Thrill Mountain	49	-
N-R15	Bumper Blasters	Thrill Mountain	22	22
N-R16	The Rapids	Rainforest	28	28
Total Predicted SPL at BC1, SPL _(Total) =			54	47
Notes : * Extracted from Annex C10, Environmental Review Report (ERR)				

Environmental Review Report (ERR) in May 2014

Table 3.1e Proposed Fixed Plant Noise Assessment Criteria during the Proposed Extended Opening Hours

NSR	Description	Noise Monitoring Location	Minimum Measured Noise Levels, during 09:00-10:00 hrs / 22:00-23:00 hrs, dB(A)	Fixed Plant Noise Assessment Criteria during 10:00 - 22:00 hrs ^(a) , dB(A)	Fixed Plant Noise Assessment Criteria, during 09:00-10:00 hrs / 22:00-23:00 hrs, dB(A), ie Minimum of [1] and [2]	Minimum Measured Noise Levels, during 23:00-01:00 hrs of the next day, dB(A)	Minimum Measured Noise Levels, during 08:00-09:00/01:00-02:00 hrs of the next day, dB(A)	IND-TM ANL-5, during 07:00-23:00 hrs/23:00-07:00 hrs of the next day, dB(A)	Fixed Plant Noise Assessment Criteria, during 23:00-01:00 hrs of the next day, dB(A), i.e. Minimum of [3] and [5]	Fixed Plant Noise Assessment Criteria, during 08:00-09:00/01:00-02:00 hrs of the next day, dB(A), i.e. Minimum of [4] and [5]
PTS1	Old Teaching Block (Police Training School)	NM1	66/62	60	60	61	66/63	60/50	50	60/50
SW2	Wong Chuk Hang San Wai	NM3	64/61	60	60	54	66/53	60/50	50	60/50
HA	The Hazelton									
CV2	Country Villa									
XC	Xanadu Court									
OR	Orchid Valley	NM5	56/55	55	55	50	55/45	60/50	50	55/45
HY	Hau Yau									
IV1	Island View	NM6	59/54	60	54	53	58/54	60/50	50	58/50
MV	Manly Villa	NM4	59/54	56	54	53	57/53	60/50	50	57/50
BC1	Broadview Court	NM8	57/57	62	57	54	53/52	65/55 ^(b)	54	53/52

Notes:

- (a) The noise criteria during 10:00 - 22:00 hrs are taken from Table 3.4 of the approved EIA Report.
(b) The Broadview Court is located within 100m from the industrial area.