Environmental Impact Assessment

October 2020

India: Bengaluru Metro Rail Project

Phase 2B (Airport Metro Line)
KR Puram to Kempegowda International Airport

Volume 3
Annex 5

Prepared by Bangalore Metro Rail Corporation Ltd. (BMRCL), India for the Asian Development Bank.

NOTES

(i) The fiscal year (FY) of the Government of India and its agencies ends on 31 March. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2019 ends on 31 March 2019.

(ii) In this report, "$" refers to United States dollars.

Annex 5: Noise and Vibration Study

NOISE ASSESSMENT

Noise Basics

1. Noise Basics. Sound is defined as small changes in air pressure above and below the standard atmospheric pressure and noise is usually considered to be unwanted sounds (FTA, 2018). The three parameters that define noise are:

    - Level: The level of sound is the magnitude of air pressure change above and below atmospheric pressure and is expressed in decibels (dB). Typical sounds fall within a range between 0 dB (the lower limits of human hearing) and 120 dB (the highest sound levels experienced in the environment). A 3-dB change in sound level is perceived as a barely noticeable change outdoors. A change by 5 dB(A) are clearly noticeable and a 10-dB change in sound level is perceived as a doubling (or halving) of the sound level.
    - Frequency: The frequency (pitch or tone) of sound is the rate of air pressure changes and is expressed in cycles per second, or Hertz (Hz). Human ears can detect a wide range of frequencies from around 20 Hz to 20,000 Hz; however, human hearing is not effective at high and low frequencies, and the A-weighting system (dBA) is used to correlate with human response to noise. The A-weighted sound level has been widely adopted by acousticians as the most appropriate descriptor for environmental noise.
    - Time Pattern: Because environmental noise is constantly changing, it is common to condense all of this information into a single number, called the “equivalent” sound level (Leq). The Leq represents the changing sound level over a period of time, typically 1 hour or 24-hours in transit noise assessments. For railway projects, the Day-Night Sound Level (Ldn) is the common noise descriptor used and has been adopted by most institutions as the best way to describe how people respond to noise in their environment. Ldn is a 24-hour cumulative A-weighted noise level that includes all noises that happen within a day, with a 10 dB penalty for nighttime noise (10 p.m. to 7 a.m.). This nighttime penalty means that any noise events at night are equivalent to ten similar events during the day.
    - Sound Pressure and Decibels: The main quantity to describe sound is the amplitude of pressure fluctuations. The threshold of hearing detects an amplitude of 20 micro Pascal (20x 10^{-6} Pa) while the threshold of pain is about 200 Pa. Decibel is a ratio between the measured amplitude pressure fluctuation and a reference pressure level as provided in equation 1. Equation 2 provides the procedure to add decibels. A doubling of the noise level will result to a 3 dB increase. This is significant in the noise assessment as later the 3 dB(A) allowable increase is taken as predicted project noise level equals the measured existing noise level at the point of the receiver.

$$Lp = 10 \log^*(p^2/po^2) = 20 \log (P/Po) \text{ dB where pref po} = 20x10^{-6} \text{ Pa} \quad (1)$$

$$L = 10 \, \mathrm{Log}_{10} \left(\sum_{i=1}^{n} 10^{(L_i / 10)} \right) \quad (2)$$

National Laws, Regulations, and Guidelines

Ambient Noise Standards

2. The Noise Pollution (Regulation and Control) Rules, 2000 (Amended 2002) provides for the prevention, control and abatement of noise pollution. The national ambient noise standards are provided in the following Table. Day and night times cover the hours between 6:00 AM to 10:00 PM, and 10:00PM to 6:00PM, respectively. While silent zones include at least 100 meter perimeter around hospitals, educational institutions, courts, religious places and similar area.

Table 1: India National Ambient Noise Quality Standards

Area Code	Category of Area/Zone	Limits in dB(A)) Leq	
		Day Time	Night Time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

1.1.1 World Bank Group's Environmental, Health, and Safety Guidelines on Noise Management

3. As part of the ADB's harmonization of safeguard policies with other multilateral financial institutions, it has adopted the World Bank's International Finance Corporation's general environmental, health, and safety guidelines (WBG EHS Guidelines 2007). Covered under the environmental guideline is the prevention and control of noise mainly though the noise level guideline as follows. The EHS Guidelines requires prevention and mitigation measures should the project related noise cause the exceedance of the guide values at the most sensitive point of reception. The WBG EHS Guidelines values are for noise levels measured out-of-doors or building façade and are based on Guidelines for Community Noise, World Health Organization (WHO), 1999. In addition, the IFC-EHS provides a 3 dB maximum increase from the background when the existing measure noise already exceeds the standards. A 3 dB noise increase represents a doubling of the existing noise level.

Table 2: WBG EHS (Noise Level) Guidelines

Receptor	**One Hour Laq dB(A)**	
	Daytime, 07:00-22:00	**Nighttime, 22:00-07:00**
Residential; institutional; educational	55	45
Industrial; commercial	70	70

4. Note that the GoI and WBG EHS noise guide values are similar for day and nighttime residential and nighttime industrial land uses. The GoI is more stringent in commercial land use at 65 and 55 dB(A) while the WB EHS is 70 dB(A) for day and nighttime and less stringent for daytime noise at 75 dB(A) for industrial. The WGB EHS does not provide guide values for silent zone. Another key difference is the lack of further guidance on how to

implement the GoI standards when the existing noise levels already exceeds the stipulated values.

Ambient Noise Levels

5. Details of the existing noise level measurements are discussed in detail in the description of the existing environment chapter of this report. Two sets of noise measurements were conducted for the proposed project. From November to 27-28, 2019 15 noise measurements were made along the entire alignment of which 7 were in Phase 2A and rest in 2B. These are long-term 24-hour 1-minute intervals covering the day (0600-2200 HRS) and night (2200-0600 HRS) for nighttime. The measurement time slices were adjusted to match the modeling assessment of 0700-2200 HRS and IFC EHS guide values. A recalculation of 1-hr equivalent continuous noise level of the long-term measurements are provided in the succeeding Table. Loudest equivalent 1-hr noise level (Leqh) was measured near the Bangladesh Metropolitan Transport Corporation (BMTC) at 82.4 dB(A) during the day while the lowest level was near the Airforce Station Kendriya. The difference between Phase 2A and 2B average daytime noise levels is 1.3 dB(A) while the nigh time difference is larger at 4 dB(A). Diurnal noise levels are mostly louder during the day and night with the exception of the areas surrounding the VIMS Hospital Marathhalli and Bhagmane Tech Park in Phase 2A supporting more activities occur during these the night periods. The biggest difference between the day and night time noise levels are remarkable in Bhagmane where the nighttime noise is higher by 12 dB(A) and near the Airforce Station Kendriya the nighttime noise is lower by almost 17 dB(A).

Table 3: Measured Equivalent Noise Level for day ang nighttime, Phase 2A and 2B in dB(A)

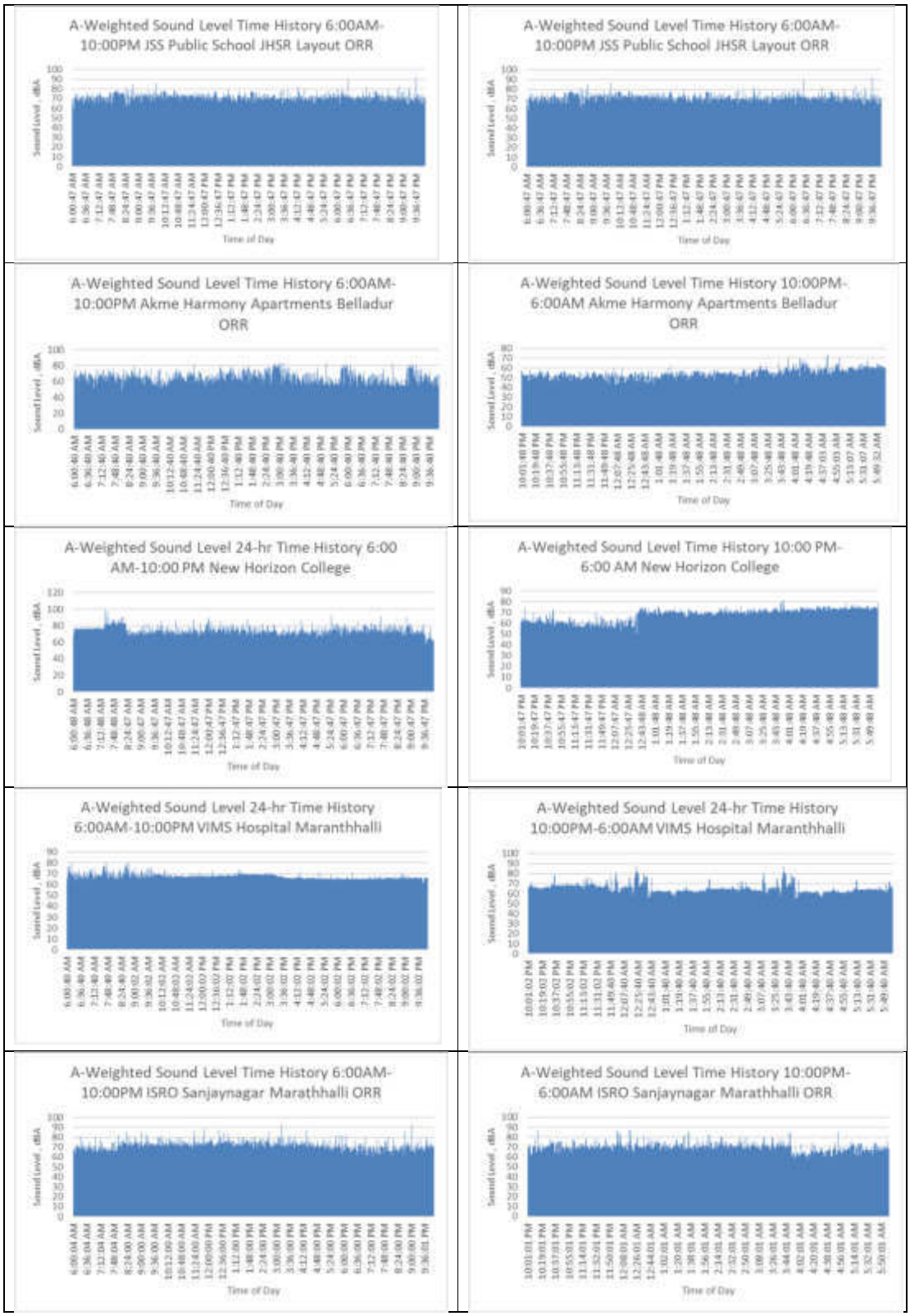
Sl. No.	Location	GPS Coordinates	Noise Measurements	
			Day	Night
Phase 2A				
1	JSS Public School, HSR Layout, Outer Ring Road, Bangalore	12°54'55.53"N 77°38'16.99"E	73.3	68.6
2	Akme Harmony Apartments, Bellandur, Outer Ring Road, Bangalore	12°55'22.56"N 77°40'14.50"E	70.6	58.1
3	New Horizon College of Engineering, Kaadabeesanahalli, Outer Ring Road, Bangalore	12°56'3.87"N 77°41'25.50"E	78.4	71.2
4	VIMS Hospital, Marathhalli, Outer Ring Road, Bangalore	12°56'54.11"N 77°41'57.78"E	68.5	70.3
5	Near ISRO, Sanjaynagar, Marathhalli, Outer Ring Road(Near Proposed ISRO Metro Station)	12°58'6.20"N 77°42'4.32"E	74.7	73.3
6	Bhagmane Tech Park, Mahadevapura, Outer Ring Road, Bangalore	12°58'56.76"N 77°41'35.62"E	72.3	84.4
7	Lowry Memorial Educational Institutions, Chinappa Colony, Mahadevapura, Outer Ring Road, Bangalore	12°59'56.63"N 77°40'53.38"E	69.2	60.4
Average for Phase 2A			72.4	69.5
Phase 2B				

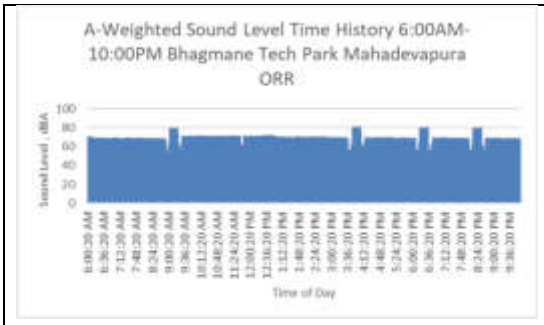
Sl. No.	Location	GPS Coordinates	Noise Measurements	
			Day	Night
8	Near Steel Authority of India, Outer Ring Road, Govindapura, Dooravani Nagar, Bangalore	13° 0'5.75"N 77°39'47.33"E	76.9	74.5
9	Near Kalyan Nagar BMTC Depot (Near Kalyan Nagar Metro Station)Outer Ring Road,Bangalore+C24	13° 1'35.37"N 77°38'18.38"E	82.4	70.5
10	Near Manyata Embassy Business Park (Near Proposed Verannana Palya Metro Station)Outer Ring Road Bangalore	13° 2'28.63"N 77°37'15.35"E	74.7	64.6
11	Near Aster CMI Hospital, Hebbala, Airport Road Bangalore	13° 3'16.73"N 77°35'35.49"E	71.0	61.4
12	Near Kogilu Cross Along Airport Road (Near Proposed Kogilu Cross Metro Station)	13° 6'17.59"N 77°36'2.15"E	78.2	74.7
13	Near University of Agricultural Sciences, Airport Road, Bangalore	13° 4'23.81"N 77°35'27.04"E	65.8	60.2
14	Near Airforce Station Kendriya Vidyalaya, Airport Road	13° 7'41.02"N 77°36'51.08"E	71.4	54.5
15	Near ITC Factory, Airport Road Trumphet Junction	13°11'10.79"N 77°38'33.16"E	69.5	63.1
Average for Phase 2B			73.7	65.4

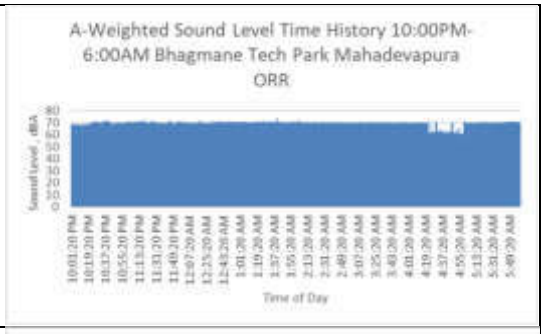
6. The succeeding Figures are plots of 1 minute equivalent noise levels over the entire day and nighttime periods as measured by the BMRCL. Noise level profiles at all 15 locations depicted continuous and fluctuating[1] noise profiles which indicates the principal noise source is traffic along the main road trunk lines of ORR and airport road. The diurnal noise pattern significantly varies across the project area. Some areas like in the JSS Public School, ISRO Sanjaynagar, and CMI Hospital areas have similar pattern of relative flat and steady noise profiles during the day and night. In contrast, well defined noise increase pattern that increases significantly starting at around 2:00-3:00 AM and tapers off from 4:00-7:00 PM are prevalent near the Steel Authority of India, BMTC Depot, Airforce Station, and Manyata Embassy Business Park. With the day and night time slices, a number of locations exhibited near the BMTC Depot. All long-term measured noise levels exceed the national noise standards including the IFC-EHS guide values.

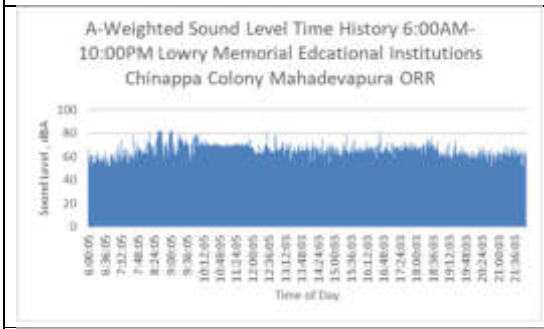
[1] A-weighted sound level measured at slow weighting setting varied by more than +/- 3 dB

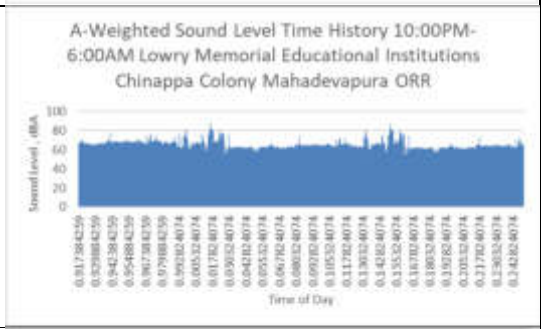
Figure 1: Compilation of A-weighted sound level time histories of the BMRCL noise measurements along the project alignment

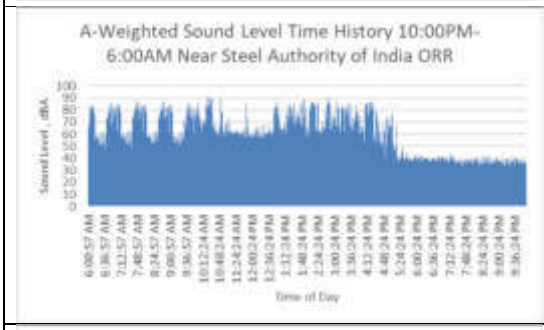


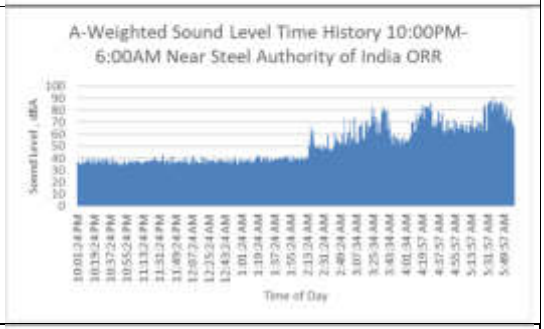

A-Weighted Sound Level Time History 6:00AM-10:00PM Bhagmane Tech Park Mahadevapura ORR
Sound Level , dBA
Time of Day

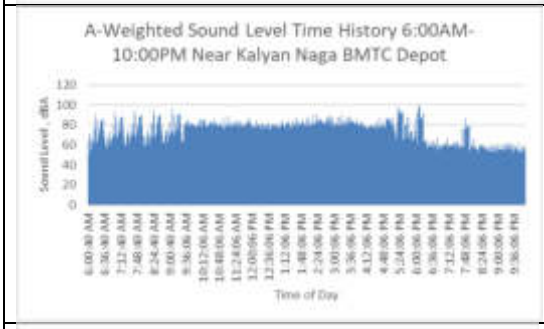

A-Weighted Sound Level Time History 10:00PM-6:00AM Bhagmane Tech Park Mahadevapura ORR
Sound Level , dBA
Time of Day

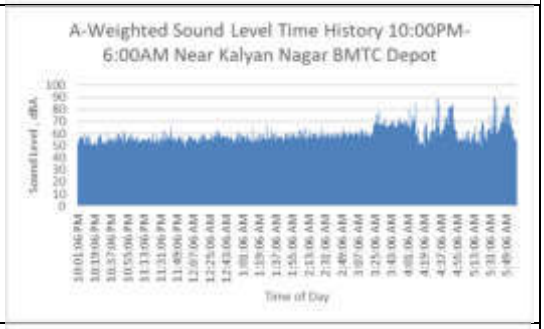

A-Weighted Sound Level Time History 6:00AM-10:00PM Lowry Memorial Edcational Institutions Chinappa Colony Mahadevapura ORR
Sound Level , dBA
Time of Day

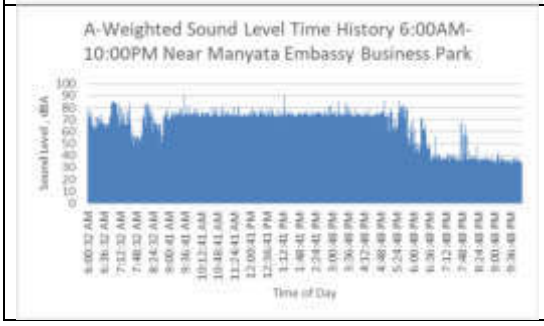

A-Weighted Sound Level Time History 10:00PM-6:00AM Lowry Memorial Educational Institutions Chinappa Colony Mahadevapura ORR
Sound Level , dBA
Time of Day

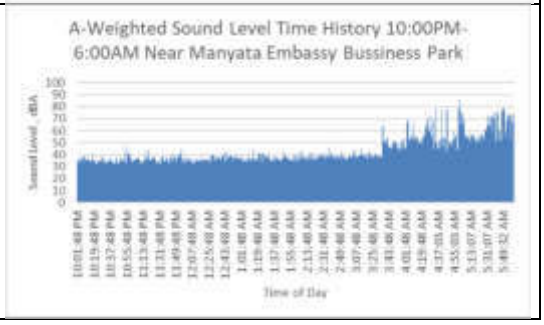

A-Weighted Sound Level Time History 10:00PM-6:00AM Near Steel Authority of India ORR
Sound Level , dBA
Time of Day

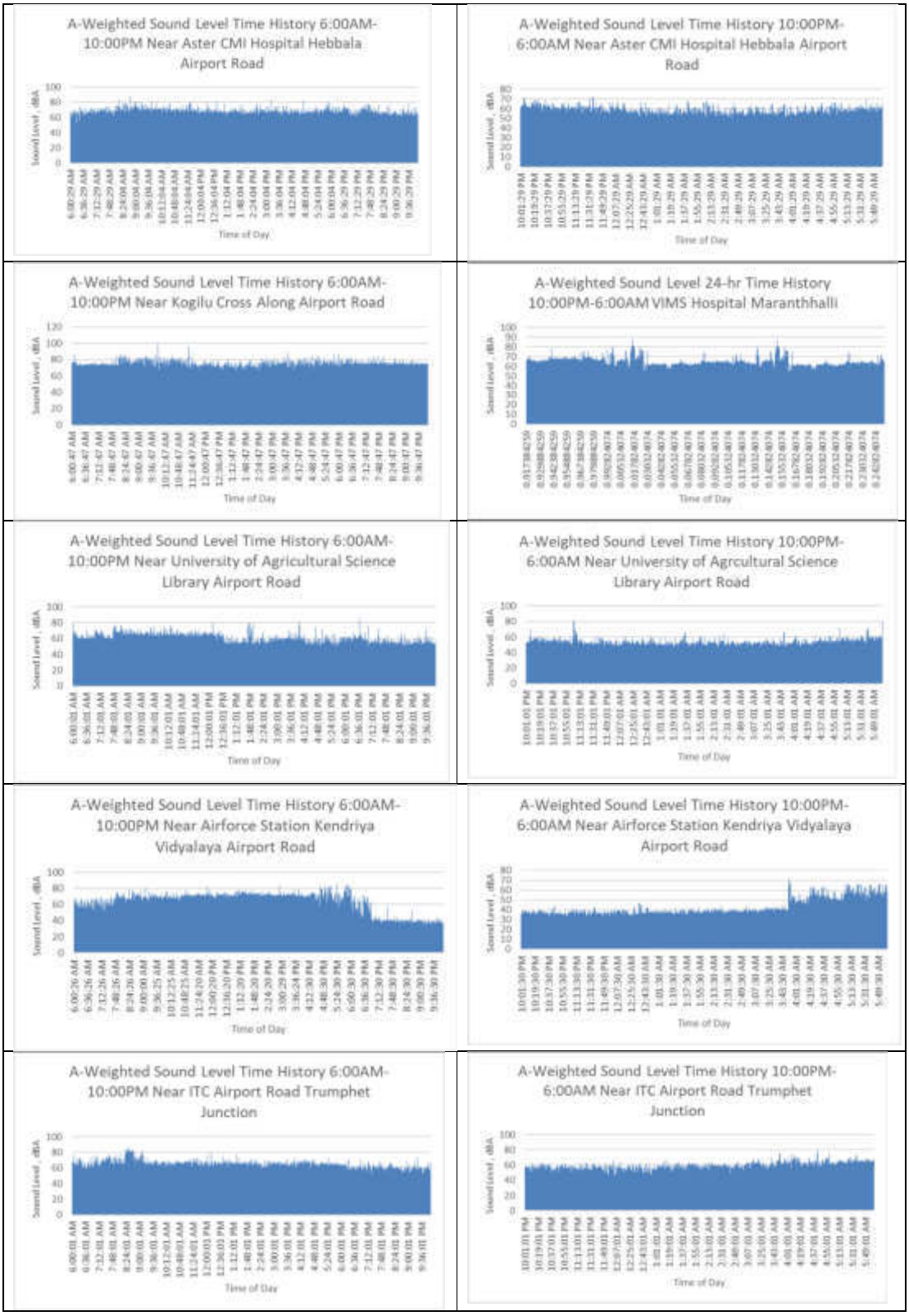

A-Weighted Sound Level Time History 10:00PM-6:00AM Near Steel Authority of India ORR
Sound Level , dBA
Time of Day


A-Weighted Sound Level Time History 6:00AM-10:00PM Near Kalyan Naga BMTC Depot
Sound Level , dBA
Time of Day


A-Weighted Sound Level Time History 10:00PM-6:00AM Near Kalyan Nagar BMTC Depot
Sound Level , dBA
Time of Day


A-Weighted Sound Level Time History 6:00AM-10:00PM Near Manyata Embassy Business Park
Sound Level , dBA
Time of Day


A-Weighted Sound Level Time History 10:00PM-6:00AM Near Manyata Embassy Bussiness Park
Sound Level , dBA
Time of Day



7. The second set of noise measurements was performed to supplement the BMRCL's activities and suffice the requirement for more detailed noise assessment. As previously mentioned, the BMRCL conducted 15 measurements along the project's almost 55

kilometers alignment translates into a density of 3.7 kms. Assuming the same noise regime exist within a 3.7 kilometer radius may result to inaccurate noise assessment in recognition of the wide range of noise levels measured by the BMRCL where the loudest 2 and second loudest 3 daytime and nighttime noise differences were 4 dB(A) and 9.6 dB(A), respectively. This substantiates the need for additional noise measurements considering the IFC-EHS 3 dB(A) allowable increase is reckoned against the existing noise levels.

8. The supplementary noise measurement builds on the findings from the BMRCL initial measurements particularly the site and duration. An additional 60 sites were identified in-between the 24-hour noise measurement points which will decrease the density of data from 1:3.7 kms to 1:1km which significantly improves the quality of the assessment. In contrast to the BMRCL measurements, the supplementary was shorter duration with each measurement spanning 30-minutes with 1-minute intervals. A shorter duration was made primarily to reduce cost, turnaround time and ability to represent one-hour Leq as required by the US Federal Highways Administration[4] Noise Measurement Handbook. A 30-minute measurement duration was selected in anticipation of widest range of noise fluctuations during the day of more than 30 dB(A). Below is a guide to determine the duration of short-term measurement based on anticipated fluctuations during the worst noise hour[5]:

    - Range of 10 dB or less: 10 minutes.
    - Range of 10–30 dB: 15–20 minutes.
    - Range greater than 30 dB: 30 or more minutes.

9. The succeeding Tables summarize the noise measurement from 60[6] locations stations established along the project alignment to characterize existing noise levels. These measurements were conducted between December 12-17, 2019. In summary, existing levels generally exceed national standards. Minimum day and night time noise levels were measured at 58 dB(A) and 47 dB(A) respectively, which exceed the national and WBG residential standards.

[2] Measured in BMTC Depot of 82.4 dB(A) during daytime and Bhagmane Tech Park of 84.4 dB(A) for nighttime

[3] Measured in the New Horizon College of 72.4 dB(A) during daytime and Near Kogilu Cross Along Airport of 74.7 dB(A)

[4] US FHWA (2018). “Noise Measurement Handbook (Final Report)” FHWA-HEP-18-065 US Department of Transportation.

[5] Another option was to model the baseline noise that is referenced on predicted road traffic and vehicle-noise emissions database of the Federal Highway Administration which is more cost-effective. However, discussions with the Navcon Engineering Network, the USA-based partner of the SoundPlan GMBH, indicated the nois emissions were based in the US and did not reflect the continuous use of horns. The study team resorted to intensive noise measurements that included 15 long-term (34-hour) and 60 hort-term (1-hour) to adequately characterize the noise level and basis for compliance assessment.

[6] 2 station measurements were disregarded as they yielded misleading results due to the presence of noise sources that do not represent the typical values in the area.

Table 4: Summary of Existing Noise Levels along the Project Alignment

Station No	Measured Noise			Measured Noise			Measured Noise	
	Day	Night	Station No	Day	Night	Station No	Day	Night
1	63.60	58.53	11	-	-	21	70.83	57.21
2	67.98	61.71	12	71.97	66.79	22	70.00	62.14
3	63.10	56.48	13	74.72	70.31	23	70.38	70.48
4	69.51	63.09	14	72.72	70.49	24	67.83	62.02
5	70.10	64.33	15	72.82	71.09	25	78.56	63.84
6	66.32	63.88	16	68.91	64.07	26	62.87	55.15
7	71.79	65.94	17	74.14	69.64	27	70.22	62.82
8	65.70	62.91	18	74.72	70.38	28	72.05	61.94
9	75.42	67.18	19	68.82	69.39	29	65.17	59.20
10	73.91	67.76	20	66.62	53.87	30	63.94	62.96
Station No	**Measured Noise**		**Station No**	**Measured Noise**		**Station No**	**Measured Noise**	
31	67.87	65.80	41	64.30	64.13	51	68.34	62.86
32			42	73.95	70.28	52	69.47	60.49
33	70.67	46.69	43	69.38	66.87	53	68.65	64.25
34	68.87	65.91	44	66.63	64.33	54	67.17	65.88
35	65.18	61.41	45	58.05	55.57	55	68.31	64.90
36	69.82	61.72	46	73.16	69.25	56	-	-
37	67.34	58.49	47	70.98	63.26	57	67.67	64.30
38	73.76	61.12	48	73.01	64.50	58	69.68	60.04
39	73.57	65.11	49	73.35	64.80	59	66.03	64.15
40	71.01	65.84	50	71.08	66.18	60	62.48	65.37

	Day	Night
Minimum	**58.05**	**46.69**
Maximum	**78.56**	**71.09**
Average	**69.38**	**63.67**

Method for Assessing Noise Impacts

10. The noise impact assessment methodology generally followed the guideline provided in the US Federal Transit Administration Guidance Manual (U.S. Department of Transportation, Federal Transportation Agency) following the steps outline below:

    - **Identification of receivers**. Noise receivers and land uses within the 300-meter corridor screening distance along the rail alignment were identified initially from Google Earth imagery and followed by site visits for confirmation to ensure the most recent developments are accounted. More than 16,000 building structures were identified inside the corridor. Of these structures, noise sensitive receivers were identified and consist of schools, hospitals, parks, first row of residential house, and places of worship. Noise impacts from the project will be assessed on all sensitive receptors. Several non-sensitive receivers were also identified and marked for impacts assessment consistent with Appendix D Clustering of

Receiver of Interest[7] of the FTA guideline that included vulnerable residential and commercial structures located nearest to the edge of the tracks and structures that represent a cluster of receivers. During the site visit, all building heights were estimated by noting the number of structure floors/storeys assuming the ground and succeeding floor heights are 3.5m and 3.0m, respectively.

- **Determine existing noise conditions.** Existing noise levels were measured throughout the project alignment as detailed in the previous section.
- **Apply prediction models.** In this study SoundPlan 8.1 following the TNM 2.5/30 and FRA standards as detailed in the FTA Guidance Manual was used to predict the noise levels at the identified sensitive receivers from train operation. The prediction model takes into account the planned daily number of train operations both up and down bound tracks, train distribution operating throughout the day (daytime 7AM-10PM, and evening or 10PM-7AM), the distance of sensitive receivers from the tracks, operating speeds, and the presence of noise protection walls that provide acoustic shielding to the receivers.
- **Evaluate receivers for predicted impact**. Predicted noise levels from the train operation were compared to the existing measured noise levels and evaluated based on the allowable 3 dB(A) increase as provided the IFC EHS Guidelines and referred to in the ADB SPS (2009). The predicted noise levels during the Project construction phase were compared to the FTA impact thresholds while the operational noise was assessed based on the 3 dB(A) IFC threshold. As previously mentioned in the comparison between the GoI and IFC-EHS, the baseline noise levels in the project areas already exceeded national standards which offers no guide on how to assess noise impacts and therefore was not used in this study.
- **Evaluate mitigation options**. Mitigation options, principally limited to the dimension, location, and shape of the noise protection walls were evaluated on sections where the predicted noise levels exceeded the 3dB(A) increase. Other mitigation measures were discussed but the quantitative impacts on noise reduction was limited to the noise protection walls.

Sensitive Receivers Identification

11. A total of 248 sensitive receivers were identified within the 300-m corridor centered along the Phase 2A and 2B. Of the total, 119 are in Phase 2A and 137 are in Phase 2B. About 40% of the identified sensitive receivers are residential (RES) that are mostly along the first row of structures nearest to the track alignment. Commercial and schools follow at 23%, and 16% respectively.

Table 5: Summary of Sensitive Receivers in the Project Area

Usage	Code	Inventory		Total	% of Total
		Phase 2A	Phase 2B		
Religious	REL	5	14	19	7%
Residential	RES	43	59	102	40%
Commercial	COM	42	18	60	23%
School	SCH	16	25	41	16%

[7] FTA Transit Noise and Vibration Assessment Manual (2018)

Sports Facility	SF	3	2	5	2%
Hospital	HSP	4	11	15	6%
Park	PRK	6	8	14	5%
TOTAL		**119**	**137**	256	100%

Table 6: List of Sensitive Receptors in Phase 2A, chainage, Usage, Including their chainage location and distance from the Nearest Edge of the Right-of-Way

No	Receiver Name	Type	Chainage (km)	Distance from the nearest track (m)
1	Silk Board Interchange (u/c)	COM	0.066	60.03
2	Central Silk Board	COM	0.155	59.79
3	Spadana Pearl	RES	0.582	104.47
4	Gayatri Luxury New Pg	RES	0.623	60.49
5	Footprints Playshool and Daycare	SCH	0.652	100.06
6	Sesame St School	RES	0.819	78.56
7	Fernhill Apartment	RES	1.163	62.29
8	Bhagavathi Hospital	COM	1.314	52.72
9	Oyo 14799 Hotel	RES	1.32	53.82
10	Matthew Hospital	COM	1.331	48.42
11	Bruhat Bengaluru Mahanagara Palike	RES	1.366	34.39
12	Jambu Savari EDFA in Edn	COM	1.42	48.5
13	Carmel Garden Public School	SCH	1.436	72.39
14	FITJEE	COM	1.541	50.81
15	Conflict receiver 2A	COM	1.541	7255.86
16	Chodeshwar Temple	SCH	1.568	45.99
17	Vidhya Bharati College	PRK	1.608	39.49
18	Devi Eye Hospital	COM	1.924	24.6
19	JSS Public School	SCH	1.958	121.99
20	Freedom Park	PRK	2.286	67.28
21	Freedom International School	SCH	2.404	110.01
22	NPS Montessori HSR	SCH	2.535	71.59
23	Mantri Surovar Condominium	RES	2.65	69.22
24	Agara Park	PRK	3.251	81.17
25	Ayyappa Temple	PRK	3.473	52.84
26	Rama and Radha Krishna Temple	REL	3.58	76.51
27	Sun Temple	REL	3.585	45.9
28	Mosque	REL	3.602	104.1
29	Oman Topaz	RES	3.863	30.46
30	Sobha Oryx	RES	3.936	33.45
31	HSR Traffic police Station	COM	4.929	18.89
32	Jai Hanuman Temple	COM	4.955	35.84
33	Sri Laxmi PG	RES	5.289	51.32
34	Columbia Asia Hospital	HSP	5.351	64.25
35	Royale Concorde International School	SCH	5.57	133.58

No	Receiver Name	Type	Chainage (km)	Distance from the nearest track (m)
36	Microsoft Corporation India	COM	5.739	66.57
37	Sopha Hbiscus Apt	RES	5.838	32.77
38	Salapuri Softzone	COM	6.053	36.11
39	Citrus Hotel	RES	6.161	36.26
40	Kristal Jade Apartment	RES	6.228	31.45
41	The Eye Foundation	HSP	6.259	37.8
42	Cloudnine Fertility Hospital	COM	6.291	25.61
43	Golden Residency	RES	6.378	43.62
44	Apollo Hospital	COM	6.717	27.99
45	Broadcom	COM	7.162	77.01
46	Accenture	COM	7.289	81.21
47	Marriot Courtyard Fairfield	RES	7.407	64.2
48	Novotel Bengaluru	RES	7.549	44.04
49	Passport Seva Kedra	COM	7.653	31.68
50	Dugra Saffron Square Apartments	RES	7.709	23.76
51	The Grand Adigas Residency	RES	7.731	35.14
52	Icon Premier Hotel	RES	7.811	38.37
53	Vajram Esteva Condominium	RES	7.875	45.63
54	Sakra World Hospital	HSP	7.892	133.11
55	Sri Abhayahastha Ganapathi Temple	COM	7.933	19.33
56	Country Club	SF	8	134.42
57	Wells Fargo	COM	8.403	57.56
58	Salarpuria Touchstone Bldg	COM	8.63	79.45
59	Salarpuria Aura	COM	8.664	52.62
60	Salarpuria HAllmark	COM	8.744	35.28
61	Salarpuria Primeria	COM	8.815	22.99
62	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07
63	V Care Sports Academy	SF	9.108	61.66
64	Swammy Legato Bldg	COM	9.194	1.2
65	Aakruthi Sushine Apartment	RES	9.204	84.78
66	VR Chambers	COM	9.27	1.91
67	Oracle Tech Hub	COM	9.519	9.67
68	SLS Serenity Apartments	RES	9.53	67.71
69	IndiQube Gamma	COM	9.605	47.48
70	JP Morgan	COM	9.654	39.75
71	High Sky Hotels	RES	9.713	98.79
72	Adobe Tower Blk A	COM	9.778	30.35
73	Kadubeesannahali Cricket Ground	SF	9.808	106.4
74	Fujitsu India	COM	9.851	69.95
75	Little Karthik Nagar School	SCH	9.852	2827.7
76	Radisson Blue Bengaluru	RES	10.539	33.87

No	Receiver Name	Type	Chainage (km)	Distance from the nearest track (m)
77	SNS Pg for Women	RES	10.553	71.86
78	Ashray Pg for Women	RES	10.629	67.45
79	The Orange Hotel	RES	10.679	24.38
80	Neha Pg for Ladies	RES	10.873	124.05
81	V Care Health Center	COM	10.873	140.25
82	Aishwarya Opulance Apartments	RES	10.986	16.03
83	Sri Chaitanya School	COM	11.235	30.52
84	Govt Primary School	SCH	11.713	151.99
85	FabHotel Lotus Park	RES	12.258	37.16
86	Jeevika Hospital	HSP	12.39	42.5
87	Hindustan Academy Boys Hostel	SCH	12.566	82.71
88	REGIONAL REMOTE SENSING INSTITUTE	COM	12.632	77.93
89	Karthik Nagar Park	PRK	12.72	73.22
90	Little Karthik Nagar School	SCH	12.756	37.75
91	Serra International Preschool - Marathah	SCH	12.819	35.98
92	DVL Residency	RES	12.9	23.65
93	Pleasant Villa	RES	13.091	45.35
94	Ring View Residency	RES	13.155	36.93
95	KTR Residency	RES	13.237	56.06
96	Laymen's Evangelical Fellowship Church	REL	13.442	124.81
97	Durga Petals F Block	RES	13.607	123.1
98	Lore Pride Apartment	RES	13.742	144.11
99	Darovar Portico ORR Hotel	RES	14.008	16.18
100	Lenovo India	COM	14.025	76.26
101	Bagmane Constellation Business Park	COM	14.51	99.82
102	Soul Space Arena Mall	COM	14.543	19.18
103	IndiQube ETA	COM	14.662	55.71
104	DEll EMC Tower B	COM	14.755	62.77
105	DELL EMC Tower A	COM	14.856	62.35
106	VTB Shenhameru Convention Hall	COM	14.947	55.21
107	Bagmane World Technology Center	COM	14.977	54.9
108	The Iris Inn	RES	15.965	54.51
109	Anjaneva Temple	REL	16.318	103.89
110	Kempegoda Playground	PRK	16.38	70.45
111	NCC Ivory Heights	RES	16.438	35.03
112	Mapple Heights Apartments	RES	16.523	101.58
113	Lowry Memorial Educational Institutions	SCH	16.682	117.37
114	Lowry Memorial High School	SCH	16.855	55.84
115	Lowry Adventist College	SCH	17.038	39.12

No	Receiver Name	Type	Chainage (km)	Distance from the nearest track (m)
116	Lowry Adventist College 2	SCH	17.04	58.33
117	Lowry Guest Rooms	RES	17.093	90.56
118	Gentry Mens Hotel	RES	17.143	53.72
119	Aisshwarya Excellency Apartment	RES	17.929	111.1

Table 7: List of Sensitive Receptors in Phase 2B, chainage, Usage, Including their chainage location and distance from the Nearest Edge of the Right-of-Way

No	Receiver Name	Type	Chainage (km)	Distance from the nearest track (m)
1	Kasturinagar Park	PRK	0.478	14.65
2	Adjeter Media	COM	0.836	4.84
3	Shrivaram Karanth Park	PRK	0.987	136.25
4	Presidency School	SCH	1.285	158.64
5	New Horizon PU College	SCH	1.302	191.39
6	Naranaya Olympiad School	SCH	1.624	78.35
7	Church of Jesus Christ of Latter Day	REL	2.06	20.28
8	Keerthi Royal Apt	RES	2.232	19.08
9	NMR Pearl Bldg	RES	2.47	4.17
10	Nandi Toyota	COM	2.538	22
11	Vijaya Bank Colony 5th Cross	RES	2.617	88.77
12	Ajmera Rista Apts	RES	2.889	44.6
13	Curious Caterpillars Montessori House	SCH	2.909	84.76
14	Vinayaka Heights Apt	RES	2.951	31.48
15	Coconut Grove	PRK	2.964	112.58
16	FLM Church	REL	3.014	124.03
17	DSR Sunshine Apts.	RES	3.124	64.3
18	Living Walls Apt Cmplx	RES	3.199	54.08
19	Dr. Zamindar Microsurgical Eye Ctr	HSP	3.211	121.93
20	KR Inn Manyata	RES	3.226	44.05
21	King Lounge PG for Men	RES	3.378	77.95
22	BWSSNB Office	COM	3.807	64.36
23	BDA Office	COM	3.962	65.3
24	Sri Surabharathi Sanskrit Foundation	COM	3.966	48.73
25	Bangalore One Mini-HRRR	COM	4.012	47.27
26	Chethana Super Specialty Child Clinic	HSP	4.16	55.53
27	Sri Anjaneya Swamy Temple	HSP	4.235	50.83
28	Hennur Police Station	COM	4.391	76.88
29	Treebo Mafoosta Corporate Suites	RES	4.506	112.93
30	The Pommels Business Hotel	RES	4.745	31.45
31	Royal Concorde International School	SCH	4.763	83.96

No	Receiver Name	Type	Chainage (km)	Distance from the nearest track (m)
32	Millennial Inn Premier Apt Hotel	RES	4.863	52.98
33	Oyo 13670 Skylark Service Apt	RES	4.907	83.21
34	VJR High School	SCH	4.911	94.28
35	Ventakeshwara PG Hostel for Men	RES	5.014	87.26
36	Building 73530	RES	5.054	124.36
37	Sail Leela Palace Apts	RES	5.068	159.26
38	Hotel Jamayca	RES	5.084	53.71
39	SLV PG for Ladies	RES	5.105	98.31
40	North Bangalore Hospital	HSP	5.125	110.14
41	First Assempby of Zion	REL	5.143	32.52
42	Oyo 37916 Paradise Stay In Business Hotel	RES	5.3	31.94
43	Spectrum E Kid International	SCH	5.49	107.6
44	Shamana Specialty Clinic Endoscopy	HSP	5.496	85.9
45	Indi Asian Academy Group of Institutions	SCH	5.499	47.85
46	Royal School of Hotel Management	SCH	5.791	54.09
47	St Hopkins International College	SCH	5.821	107.17
48	Daughter of St Camillus Provincialate	REL	5.88	67.75
49	Chris Super Specialty Hospital	HSP	5.923	60.71
50	St Mary's Malankara Catholic School	SCH	5.937	54.87
51	God Will Fulfill His Will	REL	5.99	101.2
52	Garden City AG International Worship	REL	6.027	87.81
53	Teachers Academy Degree College	SCH	6.035	104.47
54	New Life College	SCH	6.132	52.49
55	Nandhi Royale Apt	RES	6.286	57.86
56	Capital O 1078 Royal Serenity Hotel	RES	6.539	57.45
57	Podar Jumbo Kids Plus	SCH	6.627	89.3
58	Parijma Medical Cener	HSP	6.629	34.79
59	VPR PU College	SCH	6.644	98.33
60	TRi Star Orchids Apt	RES	6.71	97.08
61	Lake Hennur Biodiversity Park	PRK	6.812	159.96
62	Visishta the Unique Playschool	SCH	7.036	69.72
63	Oyo 10295 Dvarka Inn	RES	7.151	48.04
64	Dr BR Ambedkar Play Ground	PRK	7.279	36.2
65	Asangi Maruthi High School	SCH	7.31	59.74
66	Hotel Raj Elegance	RES	7.392	12.81
67	Oyo Flagship 45502 Sree Banashankar	RES	7.438	70.29
68	Akshaya Residency	RES	7.546	79.38
69	Zolo Sagan Youth Hostel	RES	7.596	71.86
70	JMJ Hospital	HSP	7.627	115.33

No	Receiver Name	Type	Chainage (km)	Distance from the nearest track (m)
71	Sri Lakshmi Narisma Swamy PG for Ladies	RES	7.784	90.34
72	Shri Shakthi Balaji Pg for Ladies	RES	7.805	21.93
73	Lakshmi Narasimha PG for Gents	RES	7.889	56.28
74	MTPK Block	COM	7.9	62.51
75	Shree Shree Amruta Muneshwara Swamy	SCH	8.577	17
76	RS Valshnavi Reddy Gents PG	RES	8.648	36.37
77	Sri Gangamma Devi	PRK	8.656	154.52
78	Mind Space Apartments	RES	8.763	74.34
79	BVR Lakefront	COM	8.781	37.75
80	Country Inn and SUites Radisson	RES	8.801	22.71
81	Lumbini Gardens	PRK	9.13	43.21
82	C2	RES	9.22	15.94
83	Temple of God	REL	10.67	49.11
84	Bethel AG Church	REL	10.798	89.19
85	ELT Tower 5	RES		41.6
86	Columbia Asia Hospital Hebbal	RES	12.028	51.48
87	Columbia Asia Hospital Hebbal	RES	12.028	51.48
88	The Parsee Tower of Silence Cemetery	PRK	12.364	20.95
89	Godrej Platinum Bangalore Condo	RES	12.503	25.08
90	Citizen Cars	COM	12.694	9.29
91	Digicall Teleservices	COM	12.707	99.56
92	Brigade Magnum	COM	12.798	24.53
93	Salarapuria Galleria	RES	13.387	25.54
94	Renaissance Prospero Apt	RES	13.542	36.56
95	ATIC	RES	14.64	90.26
96	My flying in-microflight	SF	15.066	47.68
97	Bangalore Aerosports	SCH	15.16	17.53
98	NCC Urban Windsor	COM	15.377	102.8
99	Silver Key Exec Stays 35627 Hotel	RES	15.689	45.49
100	Capital O 65381 Sln Residency	RES	15.733	94.96
101	Lagacy Cirocco Apts	RES	16.199	13.44
102	Vidyashilp Academy School	SCH	16.273	137.07
103	C3	COM	16.508	20.01
104	YKS Convention Center	COM	16.529	85.29
105	Radiant Jasmine Tower	RES	17.058	24.94
106	Shreyas Residency	RES	17.959	71.69
107	Narayana Comforts	RES	17.998	65.84
108	Kendriya Vihar Community Center	RES	18.154	131.72
109	Batavia Square	RES	18.212	9.67
110	Holy Rosary Church	REL	18.601	20.97

No	Receiver Name	Type	Chainage (km)	Distance from the nearest track (m)
111	Jeevan Hospital	HSP	18.757	109.34
112	Bhuvan Polytechnic School	SCH	18.891	23.92
113	Northgate Office Park Gate 1	COM	19.261	107.04
114	Hanuman Temple	SCH	19.502	58.49
115	Capital O 8846 Golden Amulya Hotel	RES	20.083	72.91
116	Church of God	REL	20.101	76.33
117	Yelhanka AFS Medical	HSP	21.519	46.27
118	Passport Inn	RES	22.325	9.91
119	Transit In Airport Stay	RES	22.783	79.31
120	Hunasamaranahalli Government School	SCH	22.894	55.92
121	LK Royal Gardenia	SF	22.932	17.51
122	Air Avenue Suites	RES	23.206	99.07
123	Oyo 10242 Hotel Shelton Suites	RES	23.243	103.76
124	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31
125	Sri Anjaneva Temple, Sonnapanahali	REL	23.932	7.42
126	Arna Hotel	RES	24.45	75.73
127	Academy Group of Institutions	SCH	24.464	9.99
128	Lakshmi Hospital	HSP	24.51	55.54
129	NRV Hospital	RES	25.239	42
130	KNS Convention Center	RES	25.73	67.61
131	Agape Bible Church	REL	26.116	48.32
132	Chikkajala Police Station	COM	26.319	60.99
133	Chikkajala Public School	SCH	26.345	35.3
134	Chikkajala Old Fort and Temple	REL	26.574	26.35
135	Sri Anjaneya Swamy Temple	REL	28.166	10.09
136	Shivaji Hotel and Re	COM	29.027	87.7
137	Sunny Villa Farms	RES	29.168	33.29

Noise Assessment

Construction Phase

12. The assessment criteria adopted for this project is the maximum allowable 3 dB(A) increase provided in the IFC World Bank Group's Environment, Health, and Safety Guidelines.

Assessment Area

13. The assessment of construction noise was confined on a selected corridor of impact based on the following: i) construction period for each construction stage or activity on a specific stretch is short-term, ii) the same set or "gang" of equipment will be used and upon completion will be transferred to a new construction front, and iii) similar mitigation measure will be used by the contractor with slight variations based on noise monitoring and complaints received. The selection of an assessment area also avoids the repetitive

voluminous calculations required if the entire alignment was considered as what was done in the operational noise assessment.

14. The selected assessment area should represent the most sensitive stretch of the project area during the construction phase. Sensitivity is defined in terms of the density, variety, and nearness to the construction front (here taken as the centerline to coincide with the footing, pier, and box girder construction) of the receivers. The findings and recommendations, including limitations of noise controls on this particular stretch will be applicable to the rest of the project alignment. The selection of the assessment area followed was made in a step-wised manner as follows:

    - Based on the rail alignment and land use maps , the section was selected in consultation[8] with the national consultants, based on the above criteria.

    - Reconnaissance windshield survey of the entire alignment on 24 September 2019

    - Confirmation with the BMRCL management on the selected assessment area on September 24, 2019 and presentation of preliminary findings on 29 September 2019

    - Detailed walkthrough of the construction noise assessment area to conduct structure survey and identification of sensitive receptors on 26 September 2019

15. In the assessment of construction noise impacts, a railway section was selected as a representative of the entire alignment in terms of train operation, topography, and location of receiver. For this exercise, a 300-m corridor between chainages 1+059 – 2.009 km shown in the succeeding Figure was selected due to the high density and variety of receivers particularly within the first row of structures along the ORR. The succeeding Table enumerates the receivers in the construction noise assessment area.

[8] September 23, 2019 with AECOM and ES Safeguards Consultants

Figure 2: Selected Project Section to Assess Construction Noise Impacts

Table 8: Inventory of Receivers Considered in the Construction Noise Assessment

No	Name of Receiver	Type	Chainage (km)	Distance from track, m
1	Fernhill Apartment	RES	1+163	62.29
2	Bhagavathi Hospital	COM	1+314	52.72
3	Oyo 14799 Hotel	RES	1+320	53.82
4	Matthew Hospital	COM	1+331	48.42
5	Bruhat Bengaluru Mahanagara Palike	SCR	1+366	34.39
6	Jambu Savari EDFA in Edn	COM	1+420	48.5
7	Carmel Garden Public School	SCH	1+436	72.39
9	FITJEE	COM	1+541	50.81
10	Chodeshwar Temple	REL	1+568	45.99
11	Vidhya Bharati College	SCH	1+608	39.49
12	Devi Eye Hospital	HSP	1+924	24.6
13	JSS Public School	SCH	1+958	121.99

2.4.1.3 Construction Methodology

16. The entire construction stage of metro rail projects can be divided into several sub-activities that includes piling, footing, and piers construction, erection of box girder segment, and station building. This section describes these sub-activities by defining the individual equipment that will be used and their respective sound power levels and acoustical usage factor. To focus the construction noise assessment on the activity that poses the highest risk to receivers, an inventory of all the equipment to be used for each of this construction activity was made with their noise power level and acoustic usage factors. The succeeding Tables present the typical set of equipment used on each of the construction sub-activities. The list of piling equipment was provided by the BMRCL[9] while the rest were adapted from the ADB's Malolos-Clark Railway Project[10].

Table 9: List of Cast-In-Situ Pile Construction Equipment

Construction Equipment	Impact Device	Acoustical Usage Factor (%) 1/	Sound Power Level, Lw dB(A)
Hydraulic Rig	N	20	92
Winch	N	20	81
Service Cranes	N	20	82.6
DG 125 KVA		50	113
DG 62.5 KVA	N	50	81
JCB (1)	N	40	76
Displacement pump	N	50	69
Air compressor (1)	N	40	74.9

Notes: 1/ Roadway Construction Noise Model User Guide

[9] ITD Cemindia JV Construction proposal for the elevated structures dated 21 Feb 2018-Method Statement for piling

[10] Sovereign (Public) Project - 52083-002. "Malolos-Clark Railway Project." https://www.adb.org/projects/52083-002/main

Table 10: List of Footing Construction Equipment

Construction Equipment	Impact Device	Acoustical Usage Factor (%) 1/	Sound Power Level, Lw dB(A)
Vibro Hammers (Hydraulic)	Y	20	132
Generators	N	50	81
Backhoe (breaker)	Y	40	92.5
Backhoe	N	40	62.2
Drainage Pump	N	50	68.9
Welding Machine	N	40	72.9
Cranes	N	16	82.6
Concrete Bucket	N	15	83
Air Compressor	N	40	80

Table 11: List of Pier Construction Equipment

Construction Equipment	Impact Device	Acoustical Usage Factor (%) 1/	Sound Power Level, Lw dB(A)
Generators	N	50	81
Cranes	N	16	82.6
Concrete Pump Vehicles	N	40	83
Air Compressors	N	40	80
Concrete Bucket	N	15	83
Steel Formworks (column) 1/	N	30	103.8
Steel Formworks (Pier Head)	N	30	103.8

Table 12: List of Box Girder Erection Equipment

Construction Equipment	Impact Device	Acoustical Usage Factor (%) 1/	Sound Power Level, Lw dB(A)
Erection Girders 1/	N	16	82.6
Cranes	N	16	82.6
Tension Jack 2/	N	50	85
Air Compressors	N	40	80
Generators	N	50	81
Segment Carrier 1/	N	16	82.6

Notes:
1/ SPL assumed equal to Crane
2/ SPL assumed equal to pneumatic equipment

Table 13:List of Station Structure Construction Equipment

Crane	N	16	82.6
Truck (steel Materials	N	40	62.2
Air Compressors	N	40	80

Generators	N	50	81
Welding Machine	N	40	75.9

17. To screen the sub-activities that are likely to pose risk from elevated noise exposure of the identified receivers, the equivalent single noise level from each set of equipment construction set of each the construction activity was calculated using the equation below, adding all individual noise level, and then identifying 3 loudest sets which will then be subjected to further assessment and mitigation using SoundPlan 8.1. The computed noise levels for in-situ piling, footing construction, and piers construction, erection of box girder segment, and station building are 95.5, 128.0, 104.6, 88.4, and 84.7 dB(A), respectively.

$$L_{10} \text{ in dBA} = L_{max}@50ft - 20 \text{ LOG } (D/50) + 10 \text{ LOG } (U.F.\%/100) + 3 - IL_{bar}$$

Where: Lmax@50 = emission level for the equipment at 50ft, i
D = distance in feet between the equipment and the receptor
U.F% = time averaging equipment usage factor
ILbar = insertion loss of any intervening barriers

18. A brief description of the 3 loudest construction sub-activities, namely: in-situ piling, footing, and piers construction are provided below:

- In-situ piling. Piling construction starts with the survey works that involves the use of total stations and measuring tapes to establish pillars and coordinates for all pile points, foundations, including vertical controls. Bored cast in-situ piling starts with the initial boring for the installation of guide casing. Once the hydraulic rig is centered, a 4.0m bore is made to install a temporary guide casing. This guide casing will have a diameter equal to the pile and progressively driven to the desired depth by simultaneously boring and driving. Further boring done to hard rock level using a Kelly bar inside the casing. Once the pile boring reaches the termination level, the reinforcement caged is lowered into the bored hole using piling rigs and cranes with double sling ropes. Tremmie pipes with hoppers are then lowered ready for concreting.

- Footing. Footing works includes excavation, pile head treatment and concrete work. The excavation requires placing sheet piles and temporary retaining walls. Pile head treatment is performed with a breaker attached to the backhoe and simultaneously handled by a manual breaker to prevent the rebar from being damaged. This operation creates the loudest noise during footing construction. Large steels formwork is used requiring a crane to stay in the work area. Concrete will be applied using bucket or concrete pump lorry.

- Pier Construction. Will be carried out using large steel formwork and reusable mobile scaffolding that will be used as a working platform for the rebar installation. There will be a resident crane for each construction gang. The formwork consists of two types, a column and pier head. The column formworks are fabricated in the different heights. Concrete is placed in the column and pier head through a bucket or pump lorry.

19. The succeeding Tables presents summaries of the unmitigated and mitigated noise levels at each of the receiver during in-situ piling, footing, and pier construction sub-activities. Noise mitigation is confined to the current practice of the BMRCL's installing temporary 3-m noise enclosure around the active construction site to control, among others, noise impacts. Also shown in the Tables are the existing noise measurements surround these receivers, identified as day and night times noise limits, which are the bases to assess if the sub-activities exceed the maximum allowable 3 dB(A). It should be emphasized the 3 dB(A) is not added arithmetically to the existing noise e.g. if the existing noise is 55 dB(A), the maximum allowed noise level is 58 dB(A). Noise levels are added in logarithm therefore, the allowable noise level contribution at the receiver level should not exceed the existing noise level, i.e. 55 dB(A) + 55 dB(A) = 58 dB(A). The Table cells are color-coded indicating two results, green when the receiver is exposed to a noise increase less than or equal to 3dB(A) and red when it is exceeded.

20. The following findings from the assessment of construction at the receivers are:

- In-situ piling will not result to noise impacts greater than 3 db(A). Although the use of a 3-meter noise wall will further reduce the noise levels, the improvements are not noticeable by the receivers since the unmitigated noise levels are already lower than the existing measured noise (see Table 16)
- During piers construction, unmitigated noise levels will exceed the allowable 3 dB(A) increase during nighttime. It is anticipated that at the facades of the Bruhat Bengaluru Mahanagara Palike (Residential, chainage 1.366kms, 34.39m from the tracks), 2nd-7th Floor Fernhill Apartment (Residential, 1.163 kms, 62.29m), Jambu Savari EDFA in Edn (Commercial, 1.42kms, 48.5m), and FITJEE (Commercial, 1.541kms, 50.81m) the noise increases will be greater than 3 dB(A). Detailed noise assessment of the point receivers (the number of floors in the assessment area) indicated that of the total 47 individual floors where the noise levels are predicted, without the 3-meter noise wall, 16 floors will be at risk of being exposed to higher than 3 db(A) increase or 34% non-compliance. However, the installation of the noise wall will be effective in reducing the noise impacts on all receivers to lower than 3 db(A) increase (see Table 17)
- Conversely, during footing construction there are two equipment will generate loud noise that that cannot be mitigated by the 3m wall. There may be instances where vibro-hammers will be utilized to drive piles where there is a need to stabilize the excavation and prevent the roads from collapsing. Backhoe equipped with pavement breakers may also be used when the metro alignment crosses existing main and service roads and foundation footing will be located on existing pavement. These impact devices have relatively high rated noise power levels of 132 and 93 dB(A), respectively[11]. Without the 3-m noise wall, footing equipment may increase noise levels by 21 dB(A) at the façade of the Chodeswar Temple and Bruhat Bengaluru Mahanagara Palike by as much as 28 dB(A). With noise impacts exceeding the baseline by these magnitudes the increase in noise at the receiver location are expected to be from 13-14 dB(A) indicating the inadequacy of noise wall which are usually effective to mitigate by 5-10 dB(A) as a general rule. The use of the vibro-hammers and pavement breakers will result to noise levels that are so high the use of the temporary 3-meter noise walls will be infective to reduce the noise lower than 3 dB(A) increase. This assessment recognizes the conditions to use these high noise equipment will be very limited and will occur only when the metro alignment shifts from one side of the road to the other. The Table below identified

[11] These was assumed by the author since the BMRCL has not yet identified the construction equipment during footing construction. These equipment were adapted from the Manila Railway Project.

these locations. Additional measures, including non-structural must be considered by the BMRCL to further reduce the noise levels.

Table 14: Locations where the proposed alignment crosses the existing roads

Chainage	Direction of shift	Google View
Phase 2A		
8+800-9+000	Median to left side	
9+500-9+800	Left side to median	
11+100-11+300	Median to right side and then back to median	

Chainage	Direction of shift	Google View
12+800-13+000	Median to right side	
13+300-13+800	Left side to median	
17+900-18+200	Left side to right side	
18+429 to 0+200 (transition to Phase 2B)	Left side to right side	
Phase 2B		

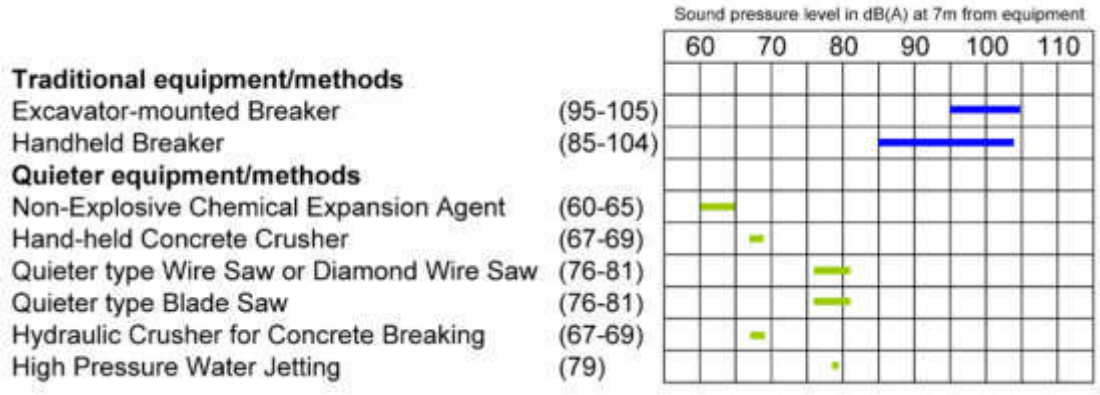
Chainage	Direction of shift	Google View
0+600 to 0+900	Left side to median	
2+400-2+600	Median to left side	
8+400-8+600	Left side to right side	
10+800-11+100	Left side to right side	

Chainage	Direction of shift	Google View
22+500-22+700	Right side to left side (service road)	

Recommendations to Mitigate Construction Noise Impacts

21. The foregoing assessment re-enforces the practicality, effectivity, and limitations of BMRCL use of 3-meter temporary wall in controlling noise from active construction sites. Although the 3-meter perimeter was designed mainly for occupational health, community safety, and work area security purposes and not purpose-built to control noise, it has demonstrated its effectiveness particularly during pier construction and its ability to effectively reduce the non-compliance rate from 34% to zero which translates to full-compliance in the selected assessment area. On the other hand, the 3-meter wall proves inefficient in controlling noise during footing construction due to the inherent high sound energy levels from vibro-hammers and backhoe pavement breakers. Notwithstanding the significant magnitude of the noise increase during footing construction, the frequency and extent are limited to areas where road pavements are affected small and translating to a lower therefore the risk of exposure is lower. Installing taller noise walls is not effective and practical. There are other methods of pavement breaking that will generate less noise. Traditional pavement breaking method using excavator-mounted breakers typically generate noise between 95-105 dB(A) while handheld breakers range from 85-103 dB(A) at a distance of 7m from the equipment. According to the Hong Kong Environmental Protection Department (2020) using alternative methods like saws and high pressure water jetting to cut pavement will reduce noise levels by about 20 dB(A) compared to excavated mounted breakers. The BMRCL should explore the use of less noisy pavement breakers as summarized in the Figure below.

Table 15: Alternative Methods of Pavement Making to Reduce Noise



Source: The Government of Hong Kong (2020). "Concrete Removal." Environmental Protection Department. https://www.epd.gov.hk/epd/misc/construction_noise/contents/index.php/en/concrete-removal/55-quieter-construction-methods.html

22. In addition to the structural and engineer practice measures to control noise, good communication with affected communities is often the most effective way to manage potential construction noise impacts. Therefore, the Contractor should ensure the affected receivers well informed of the progress of the works, including when and where the noisiest activities will be taking place and how long they are expected to last. All noise complaints should be effectively recorded, investigated, and addressed. Account should be taken of the needs of residents near the project alignment in the choice of working hours and consider among others:

    - Avoid nighttime and weekend working;
    - Avoid working during prayer time; and to
    - Carry out noisy works near offices during holiday periods

23. In addition, the Contractor will observe general good working practices including the following which are particularly relevant to road construction:

    - Modern, silenced and well-maintained plant and construction equipment should be used;
    - All vehicles and plant should be fitted with effective exhaust silencers which should be maintained in good and efficient working order.
    - Fitted acoustic covers should be kept in a good state of repair and should be kept closed when plant is in use.
    - vehicles should not wait or queue on the road with engines running, shut down when not in use or where this is impracticable, throttled down to a minimum.
    - Where activities, including delivery of material to site, cannot take place during normal working hours they should be carried out as close to normal working hours as is reasonably practicable.
    - Concrete mixers should not be cleaned by hammering the drums.
    - When handling materials, care should be taken not to drop materials from excessive heights

24. The succeeding Figures present the noise contour maps without and with the 3-meter noise walls during in-situ piling, footing, and pier construction.

Table 16: Single Point Noise Calculation during In-Situ Piling Construction, in dB(A)

Floor	Name	Usage	Station	Distance	Limit		Construction Piling		Construction Piling with Noise Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]					
G	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	39.2	39.2	35.8	35.8
F2	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	39.7	39.7	36.4	36.4
F3	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	40.2	40.2	36.9	36.9
F4	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	40.8	40.8	37.4	37.4
F5	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	41.3	41.3	37.6	37.6
F6	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	41.5	41.5	38	38
F7	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	41.6	41.6	38.3	38.3
G	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	41.1	41.1	38.1	38.1
F2	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	41.9	41.9	38.8	38.8
F3	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	42.5	42.5	39.5	39.5
F4	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	43.1	43.1	40.1	40.1
G	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	40.3	40.3	37.7	37.7
F2	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	41.1	41.1	38.6	38.6
F3	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	41.6	41.6	39.2	39.2
F4	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	42.2	42.2	39.1	39.1
G	Matthew Hospital	COM	1.331	48.42	67.98	61.71	41.1	41.1	38.4	38.4
F2	Matthew Hospital	COM	1.331	48.42	67.98	61.71	41.7	41.7	39.2	39.2
G	Bruhat Bengaluru Mahanagara Palike	RES	1.366	34.39	63.1	56.48	43.8	43.8	41.3	41.3
G	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	42.1	42.1	40.8	40.8
F2	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	42.8	42.8	41.4	41.4

Floor	Name	Usage	Station	Distance	Limit		Construction Piling		Construction Piling with Noise Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]					
F3	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	43.2	43.2	41.7	41.7
F4	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	43.3	43.3	42	42
G	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	39.1	39.1	37.7	37.7
F2	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	39.6	39.6	38.3	38.3
F3	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	40.2	40.2	38.9	38.9
F4	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	40.8	40.8	39.7	39.7
G	FITJEE	COM	1.541	50.81	63.1	56.48	42.5	42.5	39.4	39.4
F2	FITJEE	COM	1.541	50.81	63.1	56.48	43.2	43.2	39.8	39.8
F3	FITJEE	COM	1.541	50.81	63.1	56.48	43.7	43.7	40.2	40.2
F4	FITJEE	COM	1.541	50.81	63.1	56.48	43.9	43.9	40.6	40.6
F5	FITJEE	COM	1.541	50.81	63.1	56.48	44	44	41.2	41.2
G	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	41.3	41.3	40.6	40.6
F2	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	42	42	41.5	41.5
F3	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	42.2	42.2	41.6	41.6
F4	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	42.7	42.7	42.6	42.6
F5	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	43.3	43.3	43.1	43.1
F6	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	43.5	43.5	43.7	43.7
G	Vidhya Bharati College	PRK	1.608	39.49	63.1	56.48	41.6	41.6	40	40
G	Devi Eye Hospital	HSP	1.924	24.6	69.5	63.09	45.8	45.8	41.6	41.6

Floor	Name	Usage	Station	Distance	Limit		Construction Piling		Construction Piling with Noise Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]					
F2	Devi Eye Hospital	HSP	1.924	24.6	69.5	63.09	46.6	46.6	42.8	42.8
F3	Devi Eye Hospital	HSP	1.924	24.6	69.5	63.09	46.7	46.7	43.5	43.5
F4	Devi Eye Hospital	HSP	1.924	24.6	69.5	63.09	46.6	46.6	44.3	44.3
F5	Devi Eye Hospital	HSP	1.924	24.6	69.5	63.09	46.5	46.5	44.3	44.3
G	JSS Public School	SCH	1.958	121.99	69.5	63.09	34.1	34.1	31	31
F2	JSS Public School	SCH	1.958	121.99	69.5	63.09	34.4	34.4	31.7	31.7
F3	JSS Public School	SCH	1.958	121.99	69.5	63.09	34.8	34.8	32.2	32.2
F4	JSS Public School	SCH	1.958	121.99	69.5	63.09	35.2	35.2	32.6	32.6

Note: Green color-filled cells indicate anticipated noise increase is less than 3 dB(A) while red color-filled cells indicate exceedance of 3 dB(A)

Table 17: Single Point Noise Calculation during Pier Construction, in dB(A)

Floor	Name	Usage	Station	Distance	Limit		Construction Noise Pier		Construction Noise Pier with NW	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]					
G	Fernhill Apartment	RES	1.163	62.29	63.1	56.48	57.5	57.5	49.8	49.8
F2	Fernhill Apartment	RES	1.163	62.29	63.1	56.48	57.5	57.5	51.3	51.3
F3	Fernhill Apartment	RES	1.163	62.29	63.1	56.48	57.5	57.5	52.5	52.5
F4	Fernhill Apartment	RES	1.163	62.29	63.1	56.48	57.5	57.5	53.2	53.2
F5	Fernhill Apartment	RES	1.163	62.29	63.1	56.48	57.2	57.2	55.5	55.5
F6	Fernhill Apartment	RES	1.163	62.29	63.1	56.48	57.2	57.2	56	56
F7	Fernhill Apartment	RES	1.163	62.29	63.1	56.48	57.1	57.1	56.1	56.1
G	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	60.7	60.7	53	53
F2	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	60.8	60.8	54.8	54.8
F3	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	60.8	60.8	56.1	56.1
F4	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	60.8	60.8	58.6	58.6
G	Oyo 14799 Hotel	RES	1.32	53.82	69.5	63.09	59.4	59.4	52.9	52.9
F2	Oyo 14799 Hotel	RES	1.32	53.82	69.5	63.09	59.7	59.7	54.2	54.2
F3	Oyo 14799 Hotel	RES	1.32	53.82	69.5	63.09	59.7	59.7	56.3	56.3
F4	Oyo 14799 Hotel	RES	1.32	53.82	69.5	63.09	59.7	59.7	57.4	57.4
G	Matthew Hospital	COM	1.331	48.42	69.5	63.09	60.1	60.1	54.5	54.5
F2	Matthew Hospital	COM	1.331	48.42	69.5	63.09	60.1	60.1	55.6	55.6
G	Bruhat Bengaluru Mahanagara Palike	RES	1.366	34.39	67.98	61.71	62.5	62.5	55.2	55.2
G	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	60.3	60.3	53.3	53.3
F2	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	60.3	60.3	54.9	54.9

Floor	Name	Usage	Station	Distance	Limit		Construction Noise Pier		Construction Noise Pier with NW	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]					
F3	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	60.3	60.3	56.3	56.3
F4	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	60.3	60.3	58	58
G	Carmel Garden Public School	SCH	1.436	72.39	67.98	61.71	57.9	57.9	50.8	50.8
F2	Carmel Garden Public School	SCH	1.436	72.39	67.98	61.71	57.4	57.4	52.2	52.2
F3	Carmel Garden Public School	SCH	1.436	72.39	67.98	61.71	57.5	57.5	52.9	52.9
F4	Carmel Garden Public School	SCH	1.436	72.39	67.98	61.71	57.5	57.5	54.5	54.5
G	FITJEE	COM	1.541	50.81	63.1	56.48	60.2	60.2	53	53
F2	FITJEE	COM	1.541	50.81	63.1	56.48	60.5	60.5	54.7	54.7
F3	FITJEE	COM	1.541	50.81	63.1	56.48	60.5	60.5	55.9	55.9
F4	FITJEE	COM	1.541	50.81	63.1	56.48	60.4	60.4	58	58
F5	FITJEE	COM	1.541	50.81	63.1	56.48	60.4	60.4	58.7	58.7
G	Chodeshwar Temple	REL	1.568	45.99	67.98	61.71	60.5	60.5	52.5	52.5
F2	Chodeshwar Temple	REL	1.568	45.99	67.98	61.71	60.7	60.7	54.5	54.5
F3	Chodeshwar Temple	REL	1.568	45.99	67.98	61.71	60.7	60.7	57	57
F4	Chodeshwar Temple	REL	1.568	45.99	67.98	61.71	60.2	60.2	58.3	58.3
F5	Chodeshwar Temple	REL	1.568	45.99	67.98	61.71	60.1	60.1	57.9	57.9
F6	Chodeshwar Temple	REL	1.568	45.99	67.98	61.71	60	60	59	59
G	Vidhya Bharati College	SCH	1.608	39.49	69.5	63.09	61.5	61.5	52.7	52.7
G	Devi Eye Hospital	COM	1.924	24.6	67.98	61.71	54.5	54.5	48.3	48.3

Floor	Name	Usage	Station	Distance	Limit		Construction Noise Pier		Construction Noise Pier with NW	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]					
F2	Devi Eye Hospital	COM	1.924	24.6	67.98	61.71	54.5	54.5	49.2	49.2
F3	Devi Eye Hospital	COM	1.924	24.6	63.1	56.48	54.6	54.6	50.6	50.6
F4	Devi Eye Hospital	COM	1.924	24.6	63.1	56.48	54.6	54.6	50.5	50.5
F5	Devi Eye Hospital	COM	1.924	24.6	63.1	56.48	54.6	54.6	51.7	51.7
G	JSS Public School	SCH	1.958	121.99	63.1	56.48	48.6	48.6	41.7	41.7
F2	JSS Public School	SCH	1.958	121.99	63.1	56.48	49	49	42.5	42.5
F3	JSS Public School	SCH	1.958	121.99	69.5	63.09	49	49	43.1	43.1
F4	JSS Public School	SCH	1.958	121.99	69.5	63.09	49.1	49.1	43.7	43.7

Note: Green color-filled cells indicate anticipated noise increase is less than 3 dB(A) while red color-filled cells indicate exceedance of 3 dB(A)

Table 18: Single Point Noise Calculation during Footing Construction, in dB(A)

Floor	Name	Usage	Station	Distance	Limit		Construction Footing		Construction Footing with Noise Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]					
G	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	74.4	74.4	73	73
F2	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	74.8	74.8	73.3	73.3
F3	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	75.2	75.2	73.5	73.5
F4	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	75.6	75.6	73.7	73.7
F5	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	76	76	73.8	73.8
F6	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	76.4	76.4	73.8	73.8
F7	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	76.9	76.9	73.9	73.9
G	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	79.2	79.2	77.3	77.3
F2	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	79.9	79.9	77.6	77.6
F3	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	80.5	80.5	77.9	77.9
F4	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	81.2	81.2	78.3	78.3
G	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	79.1	79.1	76.7	76.7
F2	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	79.9	79.9	77.3	77.3
F3	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	80.6	80.6	77.8	77.8
F4	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	81.4	81.4	78.1	78.1
G	Matthew Hospital	COM	1.331	48.42	67.98	61.71	80.3	80.3	77.7	77.7
F2	Matthew Hospital	COM	1.331	48.42	67.98	61.71	81.3	81.3	78.2	78.2
G	Bruhat Bengaluru Mahanagara Palike	RES	1.366	34.39	63.1	56.48	84.8	84.8	79.6	79.6
G	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	80.4	80.4	77.7	77.7
F2	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	81.2	81.2	78.1	78.1
F3	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	81.9	81.9	78.5	78.5

Floor	Name	Usage	Station	Distance	Limit		Construction Footing		Construction Footing with Noise Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]					
F4	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	82.6	82.6	78.8	78.8
G	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	76.6	76.6	72.9	72.9
F2	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	77.7	77.7	73.7	73.7
F3	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	78.4	78.4	74.3	74.3
F4	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	79.1	79.1	75	75
G	FITJEE	COM	1.541	50.81	63.1	56.48	80.6	80.6	78.1	78.1
F2	FITJEE	COM	1.541	50.81	63.1	56.48	81.3	81.3	78.6	78.6
F3	FITJEE	COM	1.541	50.81	63.1	56.48	82	82	78.9	78.9
F4	FITJEE	COM	1.541	50.81	63.1	56.48	82.8	82.8	79.2	79.2
F5	FITJEE	COM	1.541	50.81	63.1	56.48	83.5	83.5	79.4	79.4
G	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	81.1	81.1	78	78
F2	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	82.6	82.6	78.8	78.8
F3	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	83.6	83.6	79.4	79.4
F4	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	83.8	83.8	80.2	80.2
F5	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	83.9	83.9	80.4	80.4
F6	Chodeshwar Temple	REL	1.568	45.99	63.1	56.48	84.1	84.1	80.6	80.6
G	Vidhya Bharati College	PRK	1.608	39.49	63.1	56.48	81.1	81.1	79	79
G	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	83.7	83.7	79.2	79.2
F2	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	85	85	80.7	80.7
F3	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	84.9	84.9	81.1	81.1
F4	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	84.8	84.8	80.4	80.4

Floor	Name	Usage	Station	Distance	Limit		Construction Footing		Construction Footing with Noise Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]					
F5	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	84.7	84.7	80.7	80.7
G	JSS Public School	SCH	1.958	121.99	69.5	63.09	72.4	72.4	69.8	69.8
F2	JSS Public School	SCH	1.958	121.99	69.5	63.09	72.9	72.9	70.1	70.1
F3	JSS Public School	SCH	1.958	121.99	69.5	63.09	73.3	73.3	70.4	70.4
F4	JSS Public School	SCH	1.958	121.99	69.5	63.09	73.7	73.7	70.7	70.7

Note: Green color-filled cells indicate anticipated noise increase is less than 3 dB(A) while red color-filled cells indicate exceedance of 3 dB(A)

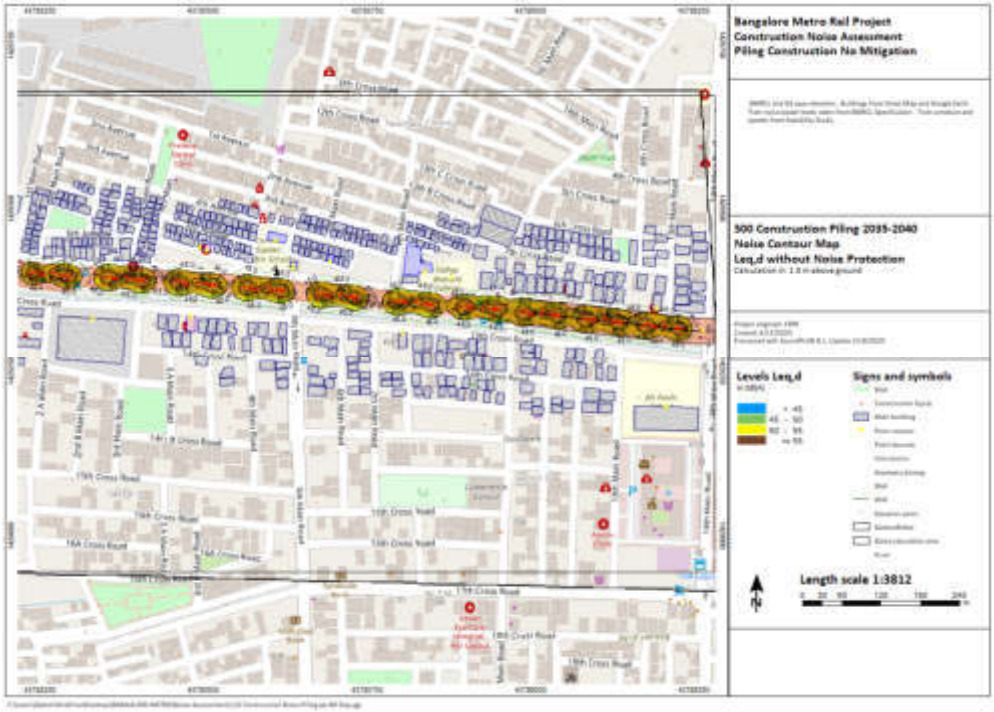


Figure 3: Predicted Noise Contours during Piling Activity without Noise Wall, daytime in Leq-1hr dB(A)

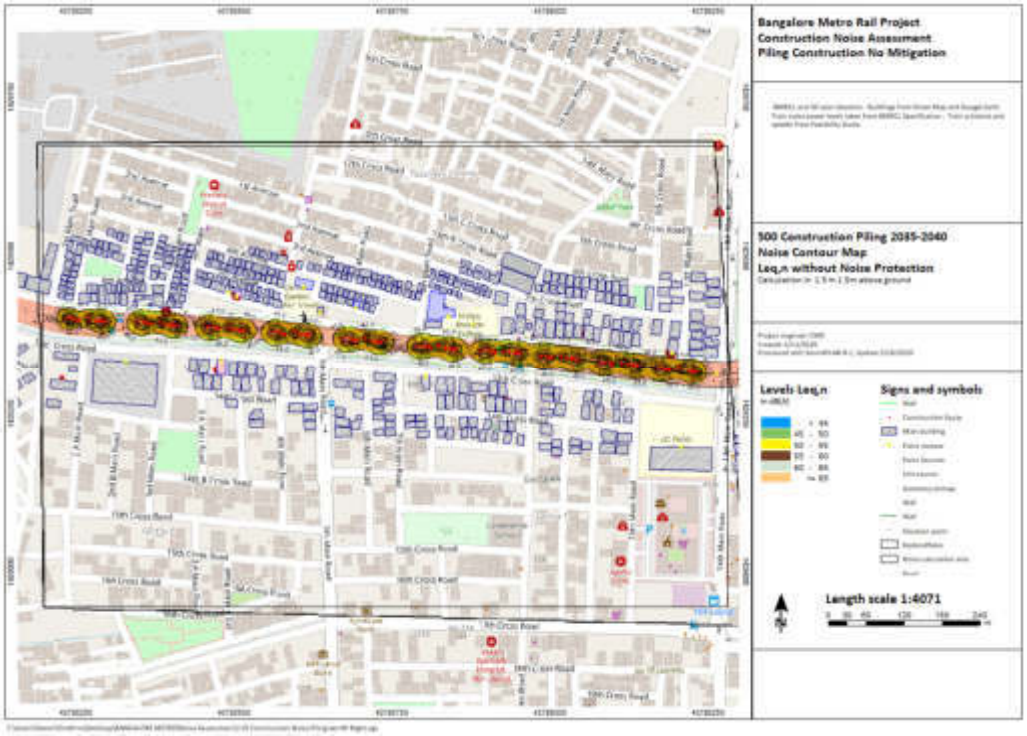


Figure 4: Predicted Noise Contours during Piling Activity without Noise Wall, nighttime in Leq-1hr dB(A)

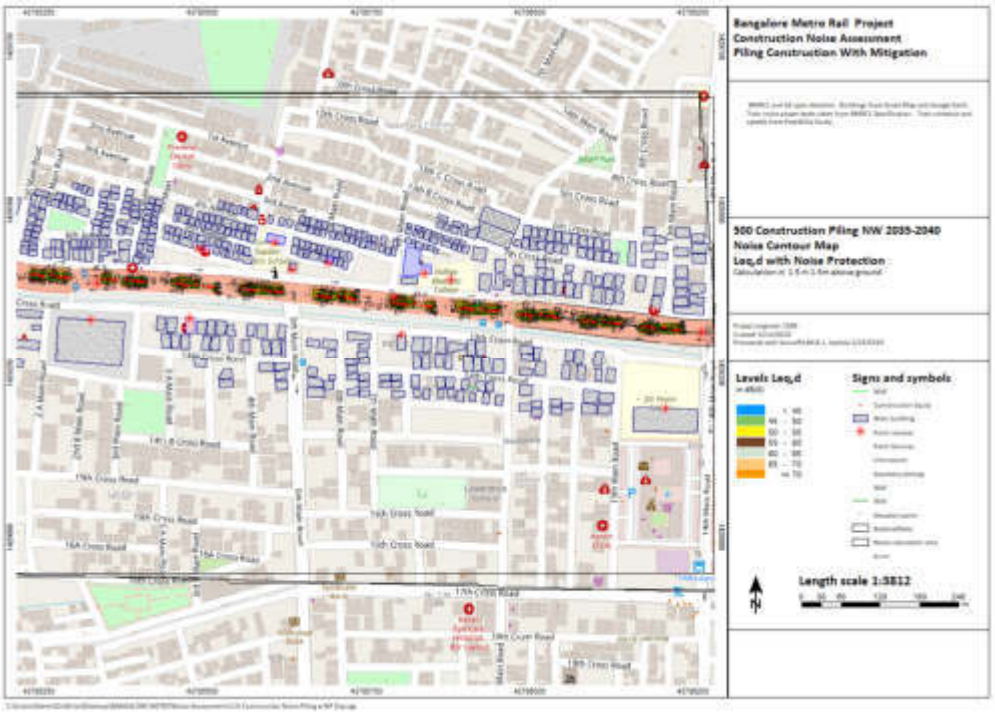


Figure 5: Predicted Noise Contours during Piling Activity with Noise Wall, dayttime in Leq-1hr dB(A)

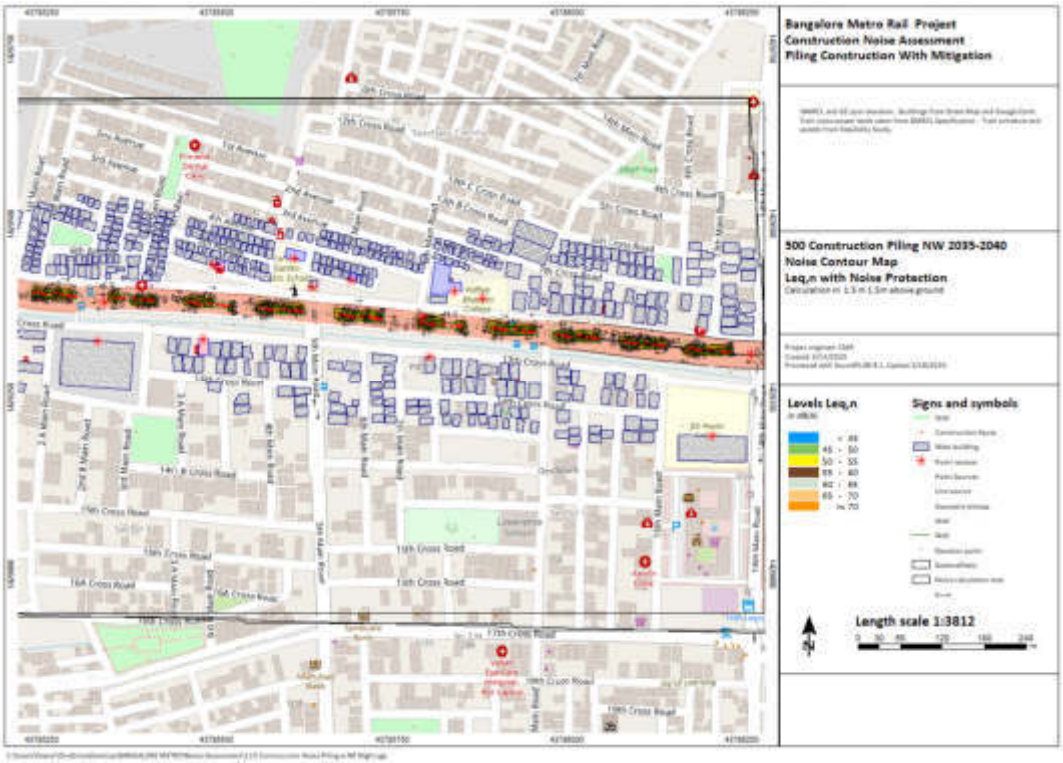
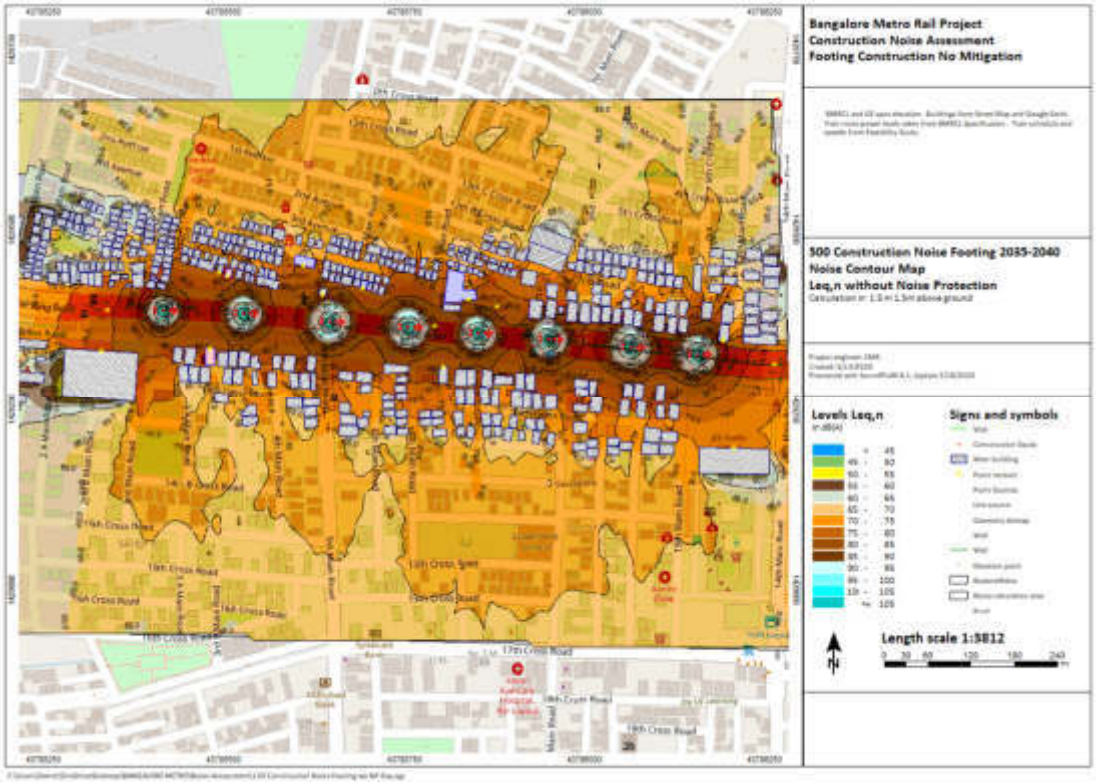
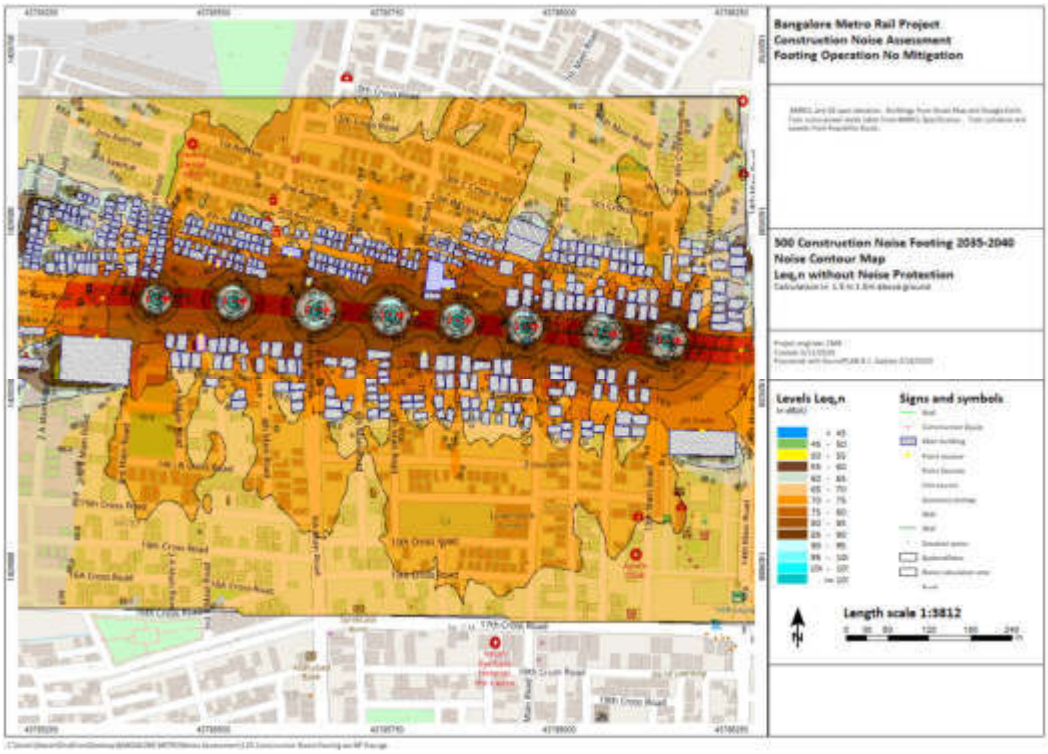


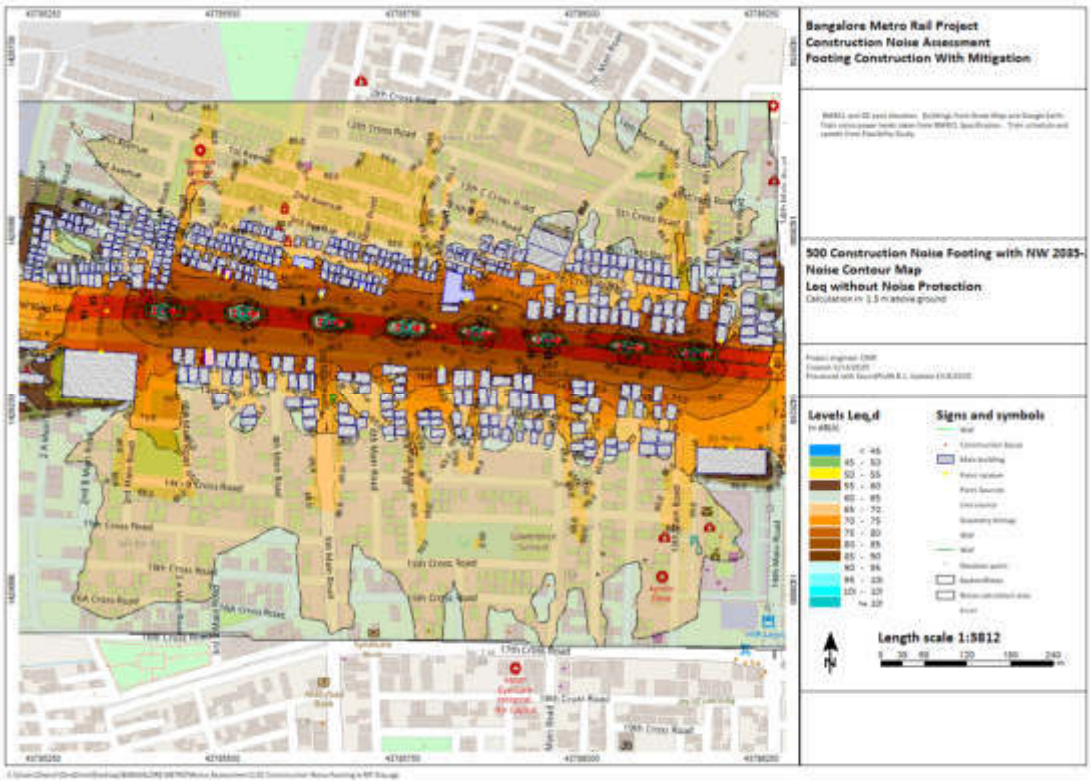
Figure 6: Predicted Noise Contours during Piling Activity with Noise Wall, nighttime in Leq-1hr dB(A)



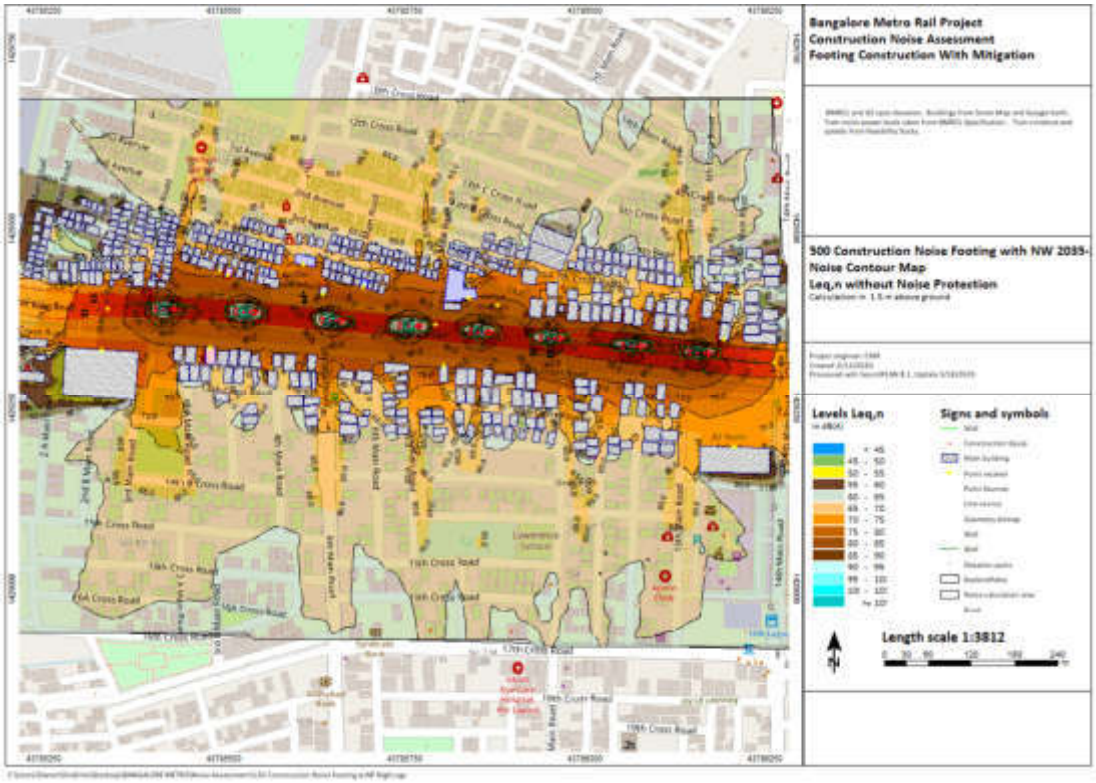
Predicted Noise Contour Map during Footing Construction Activity without Noisewall, Daytime in Leq1hr dB(A)



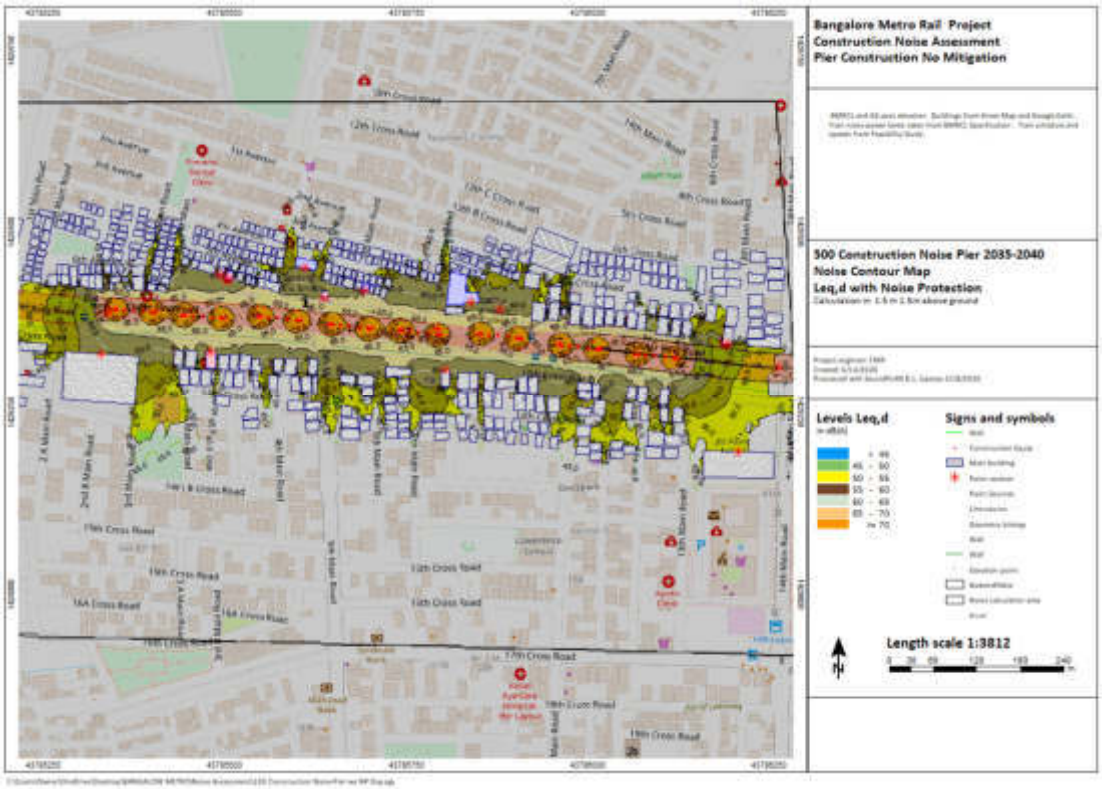
Predicted Noise Contour Map during Footing Construction Activity Without Noise Wall, Night time in Leq1hr dB(A)



Predicted Noise Contour Map during Footing Construction Activity With Noise Wall, Daytime in Leq1hr dB(A)

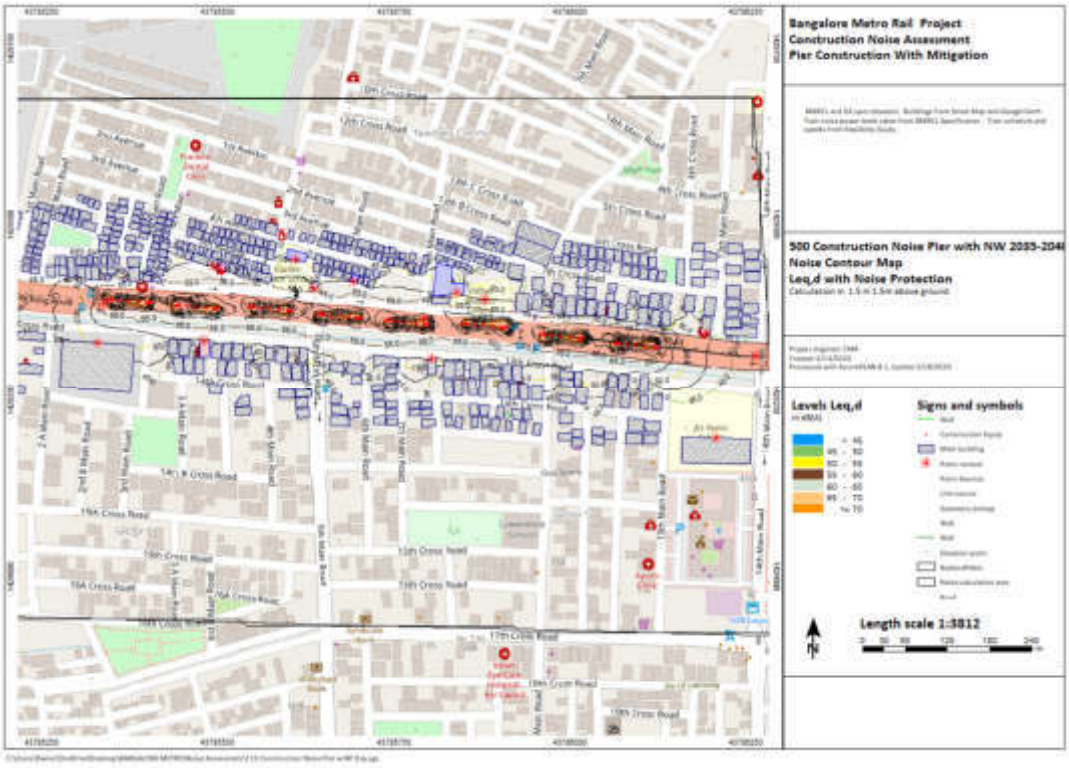


Predicted Noise Contour Map during Footing Construction Activity With Noise Wall, Nighttime in Leq1hr dB(A)

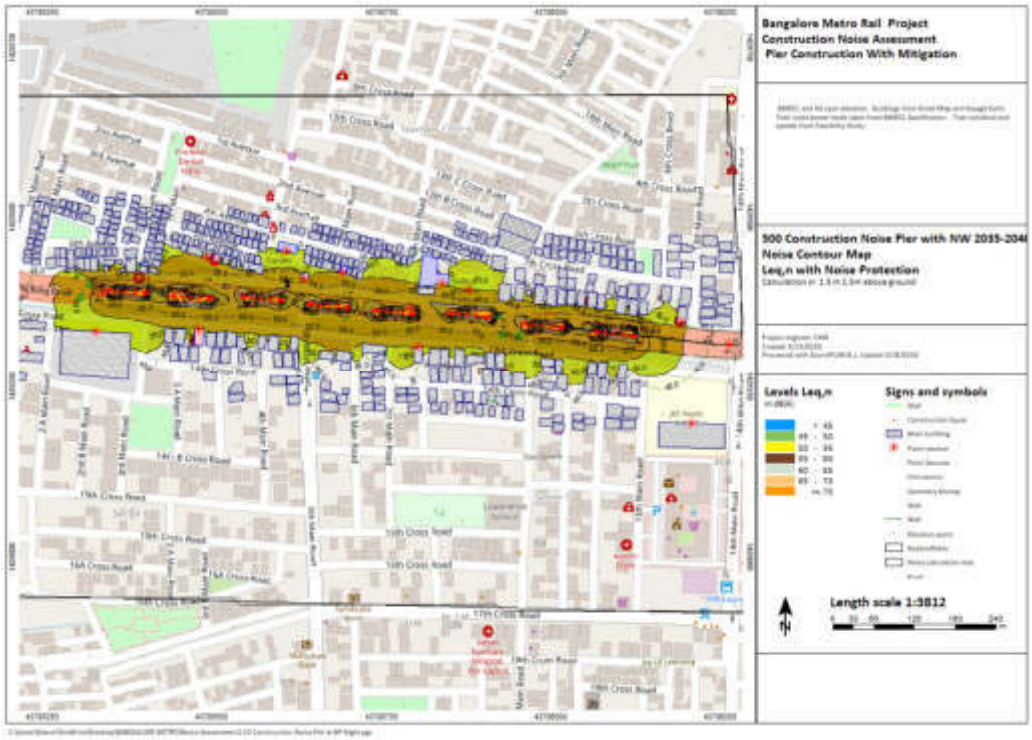


Predicted Noise Contour Map during Pier Construction Activity Without Noise Wall Daytime in Leq1hr dB(A)

Predicted Noise Contour Map during Pier Construction Activity Without Noise Wall Nighttime in Leq1hr dB(A



Predicted Noise Contour Map during Pier Construction Activity With Noise Wall Daytime in Leq1hr dB(A



Predicted Noise Contour Map during Pier Construction Activity With Noise Wall Nighttime in Leq1hr dB(A)

1.1.2 Operation Phase Noise Impact Assessment

25. This section describes the assessment methodology adopted to evaluate the operational noise impacts.

    a) Train Noise

26. The reference noise level of the proposed trains were taken from the bidding documents for the Bangalore Metro Rail Project Phase-2[12] that requires suppliers of the rolling stock should comply with the following specification for the exterior noise level for elevated and at-grade (free field):

    - When measured at 7.5m from the center of the track along the train, the equivalent continuous noise level ($L_{pAeq20sec}$) measured over an observation period of 5 sec I free field conditions as specified in ISO 3095 while a train is stationary all auxiliary equipment operating simultaneously at maximum capacity will not exceed 67 dBA at 1.2 meters above the rail
    - When measured at 7.5m from the center of the track, the equivalent continuous noise level ($L_{pAeq20sec}$) measured while a train running in the free field conditions, specifies in the ISO 3095, is passing will not exceed 82 dB(A), at a stabilized speed of 75 kmph

27. This specification was modeled to determine the train's equivalent 1-hour noise emission level at 50 feet as required in the FTA/FRA regulatory standards. The LpAeq20sec was converted to sound exposure level which is referenced to 1 second duration which wah then converted into a one-hour single equivalent noise level (Leq1h), and finally adjusted to the required reference distance of 50feet or 15.3m.

Leq_{20sec}	= 82 dB(A)
SEL	= 82 + 10 log(20)
	= 82 + 13
	= 95
Leq1hr	= 95 + 10 log(1/3600)
	= 59.4 dB(A) at 7.5m
Leq1hr	= 56.4 dB(A) at 15m

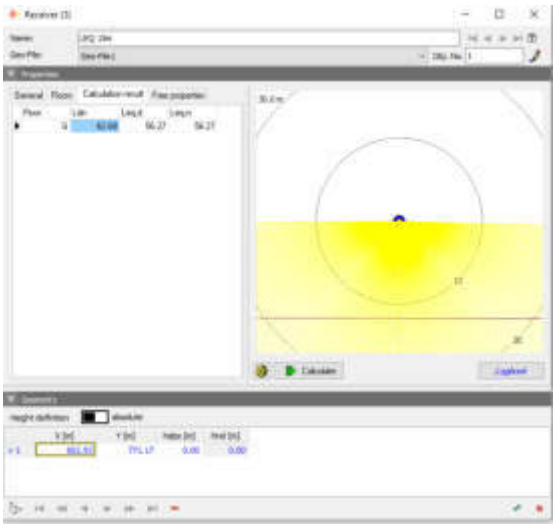
28. The sound level of the proposed Bangalore Metro rolling stocks (driving motor and trailer/motor cars) was modeled using Soundplan 8.1 to match the computed Leq1h of 56.4 dB(A) cumulative noise exposure of a single train pass-by over a period of 1 hour with the following assumptions:

    - Train Formation – DMC-TC-MC-MC-TC-DMC (Driving Motor, Trailer Car, Motor Car)
    - Train dimensions (LxWxH): DMC 21.05x2.88x3.8; Trailer car/Motor Car 20.8x2.88x3.8m
    - Design train speeds of 34 and 60 kph per hour are very low to cause aerodynamic noise from the nose, wheel region, and pantograph and therefore these factors were neglected.

[12] BMRLC (2019). "Bidding Documents for Supply of Standard Gauge Metro Cars 126 Nos (DTG Signaling) and 90 Cars (CBTC Signaling) Including Design, Manufacture, testing, Commissioning and Training of Personnel Under BMRCL Phase-2 Project."

For the DMC only the propulsion and rail-wheel noise were considered and for the trailer the rail-wheel noise were considered.

29. The figure below is a screen grab from SoundPlan 8.1 that models the a single pass-by of the BMRCL train showing an Leq of 56.27 dB(A) approximating the computed Leq of 56.4 dB(A). This train characterization was utilized in the assessment.



30. The succeeding Tables present the input values for the noise model from SoundPlan and commuter train operation schedule as provided BMRCL.

Table 19: FTA/Federal Railroad Administration Input Values for Noise Model

Detail	BMRCL Train
Reference SEL at 15m	
Propulsion, dB(A)	86
Wheel Rail, dB(A)	95
Aerodynamic dB(A) 2/	0
Speed Coefficient, K for Power Units	0
Speed Coefficient, K for Rail Cars	20
Reference heights Propulsion Wheel-Rail (m)	 0.61 0.30
Train Speed (km/h)	34-60
Number of Propulsion	2
Number of Cars per train	6
Total Length (m)	126.3 (6 x 21.05)

Table 20: Phase 2A Daily Train Operational Plan 2024, 2031 and 2041

Time of Day		Number of Trains per Day					
		2024		2031		2041	
From	To	Up	Down	Up	Down	Up	Down
5	6	6	6	7.5	7.5	7.5	7.5
6	7	6	6	7.5	7.5	7.5	7.5
7	8	6	6	7.5	7.5	7.5	7.5
8	9	12	12	15	15	15	15
9	10	12	12	15	15	15	15
10	11	12	12	15	15	15	15
11	12	6	6	7.5	7.5	7.5	7.5
12	13	6	6	7.5	7.5	7.5	7.5
13	14	6	6	7.5	7.5	7.5	7.5
14	15	6	6	7.5	7.5	7.5	7.5
15	16	6	6	7.5	7.5	7.5	7.5
16	17	6	6	7.5	7.5	7.5	7.5
17	18	12	12	15	15	15	15
18	19	12	12	15	15	15	15
19	20	12	12	15	15	15	15
20	21	6	6	7.5	7.5	7.5	7.5
21	22	6	6	7.5	7.5	7.5	7.5
22	23	6	6	7.5	7.5	7.5	7.5
23	24	6	6	7.5	7.5	7.5	7.5
Sum		**150**	**150**	**187.5**	**187.5**	**187.5**	**187.5**

Source: Detailed Project Report, 2019

Table 21: Phase 2B KR Puram to Yelahanka Daily Train Operational Plan 2024, 2031 and 2041

Time of Day		Number of Trains per Day					
		2024		2031		2041	
From	To	Up	Down	Up	Down	Up	Down
5	6	6	6	7.5	7.5	12	12
6	7	6	6	7.5	7.5	12	12
7	8	6	6	7.5	7.5	12	12
8	9	12	12	15	15	24	24
9	10	12	12	15	15	24	24
10	11	12	12	15	15	24	24
11	12	6	6	7.5	7.5	12	12
12	13	6	6	7.5	7.5	12	12
13	14	6	6	7.5	7.5	12	12
14	15	6	6	7.5	7.5	12	12
15	16	6	6	7.5	7.5	12	12
16	17	6	6	7.5	7.5	12	12
17	18	12	12	15	15	24	24
18	19	12	12	15	15	24	24
19	20	12	12	15	15	24	24
20	21	6	6	7.5	7.5	12	12
21	22	6	6	7.5	7.5	12	12
22	23	6	6	7.5	7.5	12	12
23	24	6	6	7.5	7.5	12	12
Sum		**150**	**150**	**187.5**	**187.5**	**300**	**300**

Source: Detailed Project Report, 2019

Table 22: Phase 2B Yelahanka to Airport Terminal Daily Train Operational Plan 2024, 2031 and 2041

Time of Day		Number of Trains per Day					
		2024		2031		2041	
From	To	Up	Down	Up	Down	Up	Down
5	6	4	4	5	5	12	12
6	7	4	4	5	5	12	12
7	8	4	4	5	5	12	12
8	9	4	4	5	5	24	24
9	10	4	4	5	5	24	24
10	11	4	4	5	5	24	24
11	12	4	4	5	5	12	12
12	13	4	4	5	5	12	12
13	14	4	4	5	5	12	12
14	15	4	4	5	5	12	12
15	16	4	4	5	5	12	12
16	17	4	4	5	5	12	12
17	18	4	4	5	5	24	24
18	19	4	4	5	5	24	24
19	20	4	4	5	5	24	24
20	21	4	4	5	5	12	12
21	22	4	4	5	5	12	12
22	23	4	4	5	5	12	12
23	24	4	4	5	5	12	12
Sum		**76**	**76**	**95**	**95**	**300**	**300**

Source: Detailed Project Report, 2019

b) Train Speeds

31. The operating speeds provided in the Detailed Project Reports for 2A and 2B were used in the noise modelling at 35 km/hr throughout Phase 2A tracks and from KR Puram to Yelahanka, and 60 km/hr from Yelahanka to Airport Terminal. At the time of noise assessment, the speed profiles of the trains are not available and by default it was assumed that these operating speeds are sustained throughout the entire corridor.

c) U-Girder Details

32. The Figure below provides the typical cross-section of the precast U-girder designed for the project. The height of the parapet walls above the railhead is considered in this study that defines the initial noise wall design scenario and taken at 1.072m.

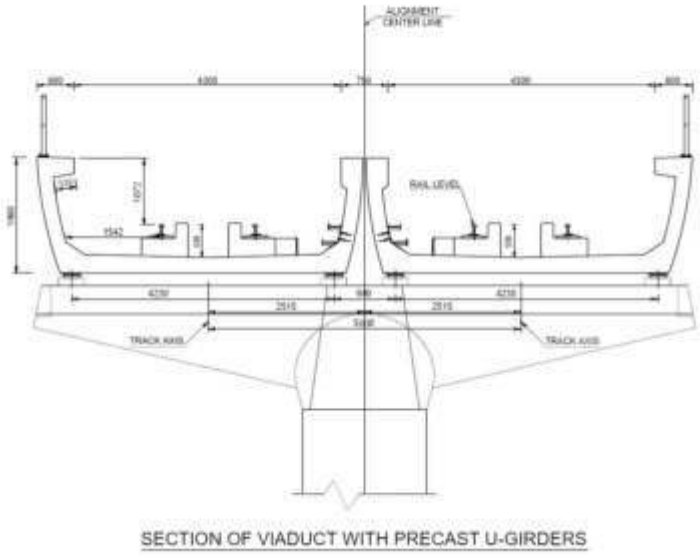


Figure 7: Details of the Pre-Cast U-Girders Highlighting the Height of the Parapet Wall above the Railhead

d) Ground Elevation and Digital Ground Model

33. The study team was not able to secure more detailed ground elevation data within the 300-meter screening distance and defaulted to use the Google Earth elevation data. The use of the GE elevation data is a sufficient characterization of the general flat terrain of Bangalore, however, it does not capture the elevated roads that runs along the proposed metro.

e) Rail elevation

34. The rail elevations from the engineering vertical profiles were used to establish the absolute and relative height of the railway every 20 meters.

f) Building Location and Heights

35. Building locations were taken from OpenStreet and Google Maps while the building heights were extrapolated from the number of floors as observed from field survey.

Noise Model

36. Using SoundPlan 8.1, the calculation options that were selected for this project provided a balance between accuracy of noise assessment and time to complete the computation. As mentioned earlier, in addition to the FTA/FRA-HSGT (2005) standards that were applied, the following options were adopted:

- Assessment: Day, Night, Ldn
- Emission time slices: 7-22, 22-7
- Reflection order: 2

- Maximum Search Radius: 1,500 km
- Maximum reflection distance: 200m
- Grid noise map spacing: 5m

Assessment Findings

37. The summary of the single point noise calculations for Phase 2A and 2B for operating years 2024, 2031, and 2041 are provided in the succeeding Tables. Similar in the construction noise assessment, table cells that are shaded green indicates the predicted noise level at the receiver location is within the 3 dB(A) allowable increase while shaded in red indicates an exceedance. The key findings and recommendations are as follow:

    - For the Phase 2A, the designed parapet wall height is adequate to ensure noise level increase is kept within the 3 dB(A). No residual noise impacts are anticipated, and no further mitigation is required until 2041.

    - For Phase 2B, the noise assessment had similar findings on the adequacy of the parapet walls to control noise except in one receiver - the Embassy Lake Terraces Main Building at chainage 11.885km and 41.59m away from the tracks.

        - The measured noise levels near the Embassy Lake Terraces are 58.05 and 55.57 dB(A) during the day and nighttime, respectively. The operational noise impacts on the 7th to the 20th Floor of Tower 5 which nearest to the project alignment are anticipated to reach 59.8 dB(A) and 61.7 dB(A) during the daytime for operating years 2031 and 2041, respectively. Nighttime noise levels are anticipated to reach 56.8 dB(A) by operating year 2041. These noise levels will result to an increase of 3.95 and 5.25 dB(A) during the day by years 2031 and 2041, and 3.63 dB(A) nighttime by year 2041.

    - To mitigate the noise impacts on the Embassy Lake Terraces facade, a 3-m noise wall with two elements each measuring 0.25m on the side of the parapet along the line (or the side nearest the Embassy Lake Terraces) from chainage 11.772 to 12.279km is can effectively reduce the noise level with 3 dB(A) as shown in Figure and Table below. An element refers to an additional wall segment that differs from the vertical base wall. In this design, the base vertical wall has a 3-m height, the first element is a 0.25m oriented 45 degrees in the direction of the centerline, on top of the base wall. Further, the second element is on top of the first element also measuring 0.25m and oriented another 45 degrees making it parallel to the track surface.

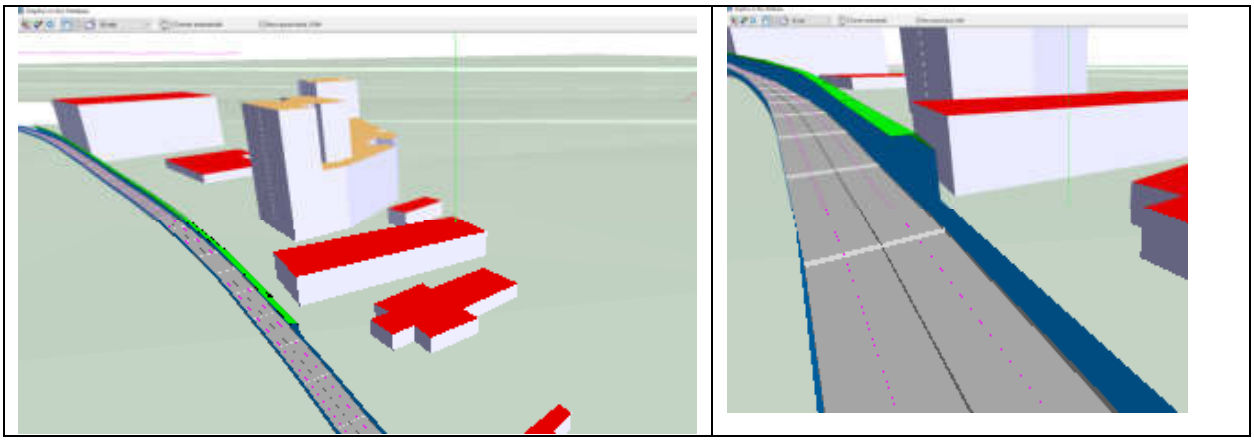


Figure 8: Recommended Noise 3M+0.25m+0.25M Wall Design to Mitigate the Noise Impacts on the Embassy Lake Terraces

Source: Embassy Lake Terraces Website

Figure 9: Photograph of the Embassy Lake Terraces Showing the Relative Distance Between Tower 3 Façade and the Airport. Note that In-Between these Structures is the Propose Phase 2B Alignment

Table 23: Summary of Single Point Noise Calculation With 3M+0.25M+0.25M Noise Wall to Mitigate the 2041 Operation Noise Impacts on the Embassy Lake Terraces Building Tower 3

Floor	Name	Existing Noise		2024 2B with 3m+0.25m+25m one side Parapet Wall	
		Day	Night	Leq,d	Leq,n
		dB(A)			
G	Embassy Lake Terraces Main Bldg	58.05	55.57	47.4	44.9
F2	Embassy Lake Terraces Main Bldg	58.05	55.57	47.3	44.7
F3	Embassy Lake Terraces Main Bldg	58.05	55.57	46.8	44.2
F4	Embassy Lake Terraces Main Bldg	58.05	55.57	46.4	43.8
F5	Embassy Lake Terraces Main Bldg	58.05	55.57	47.7	45.1
F6	Embassy Lake Terraces Main Bldg	58.05	55.57	48.8	46.2
F8	Embassy Lake Terraces Main Bldg	58.05	55.57	49.8	47.2
F9	Embassy Lake Terraces Main Bldg	58.05	55.57	50	47.4
F10	Embassy Lake Terraces Main Bldg	58.05	55.57	50.2	47.6
F11	Embassy Lake Terraces Main Bldg	58.05	55.57	50.4	47.9
F12	ELT Tower 5	58.05	55.57	50.6	48.1
F13	ELT Tower 5	58.05	55.57	50.8	48.3
F14	ELT Tower 5	58.05	55.57	50.9	48.4
F15	ELT Tower 5	58.05	55.57	51	48.4
F16	ELT Tower 5	58.05	55.57	51	48.4
F17	ELT Tower 5	58.05	55.57	51	48.4
F18	ELT Tower 5	58.05	55.57	51.2	48.6
F19	ELT Tower 5	58.05	55.57	52.3	49.7
F20	ELT Tower 5	58.05	55.57	56	53.4
F21	ELT Tower 5	58.05	55.57	55	52.4

Table 24: Summary of Single Point Noise Calculation During Train Operation for Years 2024, 2031, 2041, Phase 2A

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
G	Silk Board Interchange (u/c)	COM	0.066	60.03	63.59	58.23	41.8	36.9	42.4	37.4	42.4	37.4
G	Central Silk Board	COM	0.155	59.79	63.59	58.23	42.2	37.2	42.7	37.7	42.7	37.7
G	Spadana Pearl	RES	0.582	104.47	63.59	58.23	39.6	34.6	40.2	35.2	40.2	35.2
F2	Spadana Pearl	RES	0.582	104.47	63.59	58.23	39.5	34.5	40.3	35.3	40.3	35.3
F3	Spadana Pearl	RES	0.582	104.47	63.59	58.23	40	35	40.8	35.8	40.8	35.8
F4	Spadana Pearl	RES	0.582	104.47	63.59	58.23	41.4	36.4	42.3	37.3	42.3	37.3
F5	Spadana Pearl	RES	0.582	104.47	63.59	58.23	42.7	37.7	43.7	38.7	43.7	38.7
G	Gayatri Luxury New Pg	RES	0.623	60.49	63.59	58.23	42.1	37.1	42.6	37.6	42.6	37.6
F2	Gayatri Luxury New Pg	RES	0.623	60.49	63.59	58.23	41.6	36.6	42.3	37.3	42.3	37.3
F3	Gayatri Luxury New Pg	RES	0.623	60.49	63.59	58.23	41.6	36.6	42.5	37.5	42.5	37.5
F4	Gayatri Luxury New Pg	RES	0.623	60.49	63.59	58.23	41.9	36.9	42.8	37.8	42.8	37.8
F5	Gayatri Luxury New Pg	RES	0.623	60.49	63.59	58.23	42.6	37.6	43.5	38.5	43.5	38.5
F6	Gayatri Luxury New Pg	RES	0.623	60.49	63.59	58.23	43.6	38.7	44.6	39.6	44.6	39.6
G	FootRESints Playshool and Daycare	SCH	0.652	100.06	63.59	58.23	41.7	36.7	42	37	42	37
G	Sesame St School	RES	0.819	78.56	67.98	61.71	42.9	38	43.2	38.2	43.2	38.2
F2	Sesame St School	RES	0.819	78.56	67.98	61.71	42.6	37.6	43.2	38.2	43.2	38.2
F3	Sesame St School	RES	0.819	78.56	67.98	61.71	42.7	37.8	43.6	38.6	43.6	38.6
G	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	45.4	40.4	45.3	40.3	45.3	40.3
F2	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	45.9	40.9	46.1	41.1	46.1	41.1
F3	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	46.7	41.7	47.2	42.2	47.2	42.2
F4	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	48.5	43.5	49.2	44.2	49.2	44.2
F5	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	50.8	45.9	51.8	46.8	51.8	46.8
F6	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	54.1	49.1	55.1	50.1	55.1	50.1

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F7	Fernhill Apartment	RES	1.163	62.29	67.98	61.71	56.1	51.2	57.1	52.1	57.1	52.1
G	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	45.3	40.4	45.3	40.3	45.3	40.3
F2	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	45.8	40.9	46.1	41.1	46.1	41.1
F3	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	46.8	41.8	47.3	42.3	47.3	42.3
F4	Bhagavathi Hospital	COM	1.314	52.72	67.98	61.71	48.5	43.5	49.2	44.2	49.2	44.2
G	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	45.8	40.8	45.8	40.8	45.8	40.8
F2	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	46.6	41.7	46.8	41.8	46.8	41.8
F3	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	48	43	48.4	43.4	48.4	43.4
F4	Oyo 14799 Hotel	RES	1.32	53.82	67.98	61.71	50.4	45.4	51.1	46.1	51.1	46.1
G	Matthew Hospital	COM	1.331	48.42	67.98	61.71	46.2	41.2	46.2	41.2	46.2	41.2
F2	Matthew Hospital	COM	1.331	48.42	67.98	61.71	46.8	41.9	47.1	42.1	47.1	42.1
G	Bruhat Bengaluru Mahanagara Palike	RES	1.366	34.39	63.1	56.48	45.4	40.5	45.7	40.7	45.7	40.7
G	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	43.9	38.9	44.1	39.1	44.1	39.1
F2	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	43.7	38.7	44.1	39.2	44.1	39.2
F3	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	44	39	44.7	39.7	44.7	39.7
F4	Jambu Savari EDFA in Edn	COM	1.42	48.5	63.1	56.48	45	40	45.9	40.9	45.9	40.9
G	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	44.2	39.3	44.3	39.3	44.3	39.3
F2	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	44.2	39.2	44.6	39.6	44.6	39.6
F3	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	44.5	39.5	45.2	40.2	45.2	40.2
F4	Carmel Garden Public School	SCH	1.436	72.39	63.1	56.48	45.6	40.6	46.5	41.5	46.5	41.5
G	FITJEE	COM	1.541	50.81	63.1	56.48	43.8	38.8	44	39	44	39
G	Conflict receiver 2A	COM	1.541	7255.86	63.1	56.48	47.8	42.9	0	0	0	0
F2	FITJEE	COM	1.541	50.81	63.1	56.48	43.4	38.4	43.9	38.9	43.9	38.9
F3	FITJEE	COM	1.541	50.81	63.1	56.48	43.5	38.5	44.3	39.3	44.3	39.3
F4	FITJEE	COM	1.541	50.81	63.1	56.48	44.4	39.4	45.4	40.4	45.4	40.4

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F5	FITJEE	COM	1.541	50.81	63.1	56.48	46	41	47	42	47	42
G	Chodeshwar Temple	SCH	1.568	45.99	63.1	56.48	43.7	38.8	44	39	44	39
F2	Chodeshwar Temple	SCH	1.568	45.99	63.1	56.48	43.3	38.3	43.8	38.8	43.8	38.8
F3	Chodeshwar Temple	SCH	1.568	45.99	63.1	56.48	43.3	38.4	44.2	39.2	44.2	39.2
F4	Chodeshwar Temple	SCH	1.568	45.99	63.1	56.48	44.2	39.3	45.2	40.2	45.2	40.2
F5	Chodeshwar Temple	SCH	1.568	45.99	63.1	56.48	46.1	41.1	47.1	42.1	47.1	42.1
F6	Chodeshwar Temple	SCH	1.568	45.99	63.1	56.48	49	44.1	50	45	50	45
G	Vidhya Bharati College	PRK	1.608	39.49	69.5	63.09	45	40	45.1	40.1	45.1	40.1
G	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	46.4	41.4	46.7	41.7	46.7	41.7
F2	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	46.4	41.5	46.9	41.9	46.9	41.9
F3	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	48	43	48.6	43.6	48.6	43.6
F4	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	51.6	46.7	52.5	47.5	52.5	47.5
F5	Devi Eye Hospital	COM	1.924	24.6	69.5	63.09	58.2	53.2	59.2	54.2	59.2	54.2
G	JSS Public School	SCH	1.958	121.99	69.5	63.09	44.4	39.4	44.1	39.1	44.1	39.1
F2	JSS Public School	SCH	1.958	121.99	69.5	63.09	44.1	39.1	44.2	39.2	44.2	39.2
F3	JSS Public School	SCH	1.958	121.99	69.5	63.09	44.6	39.6	45	40	45	40
F4	JSS Public School	SCH	1.958	121.99	69.5	63.09	45.5	40.5	46.2	41.2	46.2	41.2
G	Freedom Park	PRK	2.286	67.28	69.5	63.09	43.8	38.8	43.6	38.6	43.6	38.6
G	Freedom Park	PRK	2.288	66.29	69.5	63.09	0	0	0	0	0	0
G	Freedom International School	SCH	2.404	110.01	69.5	63.09	44	39.1	43.7	38.7	43.7	38.7
F2	Freedom International School	SCH	2.404	110.01	69.5	63.09	44.1	39.1	44	39	44	39
F3	Freedom International School	SCH	2.404	110.01	69.5	63.09	44.3	39.3	44.5	39.5	44.5	39.5
F4	Freedom International School	SCH	2.404	110.01	70.1	64.33	44.7	39.8	45.3	40.3	45.3	40.3

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F5	Freedom International School	SCH	2.404	110.01	70.1	64.33	45.5	40.6	46.4	41.4	46.4	41.4
G	NPS Montessori HSR	SCH	2.535	71.59	70.1	64.33	45	40	45	40	45	40
F2	NPS Montessori HSR	SCH	2.535	71.59	70.1	64.33	45.3	40.3	45.5	40.5	45.5	40.5
F3	NPS Montessori HSR	SCH	2.535	71.59	70.1	64.33	45.8	40.8	46.3	41.3	46.3	41.3
G	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	43.7	38.7	43.9	38.9	43.9	38.9
F2	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	43.8	38.8	44.3	39.3	44.3	39.3
F3	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	44.2	39.2	45	40	45	40
F4	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	45.4	40.4	46.3	41.3	46.3	41.3
F5	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	47.4	42.4	48.4	43.4	48.4	43.4
F6	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	50.3	45.3	51.2	46.2	51.2	46.2
F7	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	53.4	48.4	54.4	49.4	54.4	49.4
F8	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	55	50	56	51	56	51
F9	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	55.9	50.9	56.9	51.9	56.9	51.9
F10	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	56.4	51.5	57.4	52.4	57.4	52.4
F11	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	56.9	51.9	57.9	52.9	57.9	52.9
F12	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	56.6	51.6	57.6	52.6	57.6	52.6

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F13	Mantri Surovar Condominium	RES	2.65	69.22	70.1	64.33	56.2	51.2	57.2	52.2	57.2	52.2
G	Agara Park	RESK	3.251	81.17	66.32	63.88	44	39	43.7	38.7	43.7	38.7
G	Ayyappa Temple	REL	3.473	52.84	66.32	63.88	45.1	40.2	44.9	39.9	44.9	39.9
G	Rama and Radha Krishna Temple	REL	3.58	76.51	66.32	63.88	46.3	41.3	46	41	46	41
F2	Rama and Radha Krishna Temple	REL	3.58	76.51	66.32	63.88	46.6	41.7	46.7	41.7	46.7	41.7
G	Sun Temple	REL	3.585	45.9	66.32	63.88	45.9	41	45.8	40.8	45.8	40.8
F2	Sun Temple	REL	3.585	45.9	66.32	63.88	46.5	41.5	46.6	41.6	46.6	41.6
G	Mosque	REL	3.602	104.1	66.32	63.88	45.1	40.1	44.6	39.6	44.6	39.6
G	Oman Topaz	RES	3.863	30.46	71.79	65.94	45.3	40.3	45.5	40.5	45.5	40.5
F2	Oman Topaz	RES	3.863	30.46	71.79	65.94	45.6	40.6	46	41	46	41
F3	Oman Topaz	RES	3.863	30.46	71.79	65.94	47	42	47.6	42.6	47.6	42.6
F4	Oman Topaz	RES	3.863	30.46	71.79	65.94	50	45	50.8	45.8	50.8	45.8
F5	Oman Topaz	RES	3.863	30.46	71.79	65.94	55.4	50.4	56.3	51.3	56.3	51.3
G	Sobha Oryx	RES	3.936	33.45	71.79	65.94	44.9	40	45.2	40.2	45.2	40.2
F2	Sobha Oryx	RES	3.936	33.45	71.79	65.94	44.7	39.7	45.1	40.1	45.1	40.1
F3	Sobha Oryx	RES	3.936	33.45	71.79	65.94	45.2	40.2	45.8	40.8	45.8	40.8
F4	Sobha Oryx	RES	3.936	33.45	71.79	65.94	46.9	42	47.8	42.8	47.8	42.8
F5	Sobha Oryx	RES	3.936	33.45	71.79	65.94	49.9	44.9	50.9	45.9	50.9	45.9
F6	Sobha Oryx	RES	3.936	33.45	71.79	65.94	54.8	49.8	55.7	50.7	55.7	50.7
F7	Sobha Oryx	RES	3.936	33.45	71.79	65.94	58.5	53.5	59.5	54.5	59.5	54.5
F8	Sobha Oryx	RES	3.936	33.45	71.79	65.94	59.7	54.7	60.7	55.7	60.7	55.7
F9	Sobha Oryx	RES	3.936	33.45	71.79	65.94	59.8	54.8	60.8	55.8	60.8	55.8
F10	Sobha Oryx	RES	3.936	33.45	71.79	65.94	59.4	54.4	60.4	55.4	60.4	55.4

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F11	Sobha Oryx	RES	3.936	33.45	71.79	65.94	59.1	54.1	60.1	55.1	60.1	55.1
F12	Sobha Oryx	RES	3.936	33.45	71.79	65.94	59.2	54.2	60.2	55.2	60.2	55.2
G	HSR Traffic police Station	COM	4.929	18.89	71.79	65.94	45.6	40.7	46.2	41.2	46.2	41.2
F2	HSR Traffic police Station	COM	4.929	18.89	71.79	65.94	45.5	40.5	46.2	41.2	46.2	41.2
G	Jai Hanuman Temple	REL	4.955	35.84	71.79	65.94	44.5	39.5	44.9	39.9	44.9	39.9
F2	Jai Hanuman Temple	REL	4.955	35.84	71.79	65.94	44	39.1	44.7	39.7	44.7	39.7
F3	Jai Hanuman Temple	REL	4.955	35.84	71.79	65.94	43.6	38.6	44.5	39.5	44.5	39.5
G	Jio Residency	RES	5.228	41.76	71.79	65.94	45.1	40.1	45.2	40.2	45.2	40.2
F2	Jio Residency	RES	5.228	41.76	71.79	65.94	45.5	40.5	45.8	40.8	45.8	40.8
F3	Jio Residency	RES	5.228	41.76	71.79	65.94	46.4	41.4	47	42	47	42
F4	Jio Residency	RES	5.228	41.76	71.79	65.94	48	43	48.8	43.8	48.8	43.8
F5	Jio Residency	RES	5.228	41.76	71.79	65.94	50.8	45.8	51.8	46.8	51.8	46.8
F6	Jio Residency	RES	5.228	41.76	71.79	65.94	55.4	50.4	56.4	51.4	56.4	51.4
F7	Jio Residency	RES	5.228	41.76	71.79	65.94	58	53	59	54	59	54
F8	Jio Residency	RES	5.228	41.76	71.79	65.94	59	54.1	60	55	60	55
F9	Jio Residency	RES	5.228	41.76	71.79	65.94	59.3	54.3	60.2	55.3	60.2	55.3
F10	Jio Residency	RES	5.228	41.76	71.79	65.94	59.2	54.2	60.2	55.2	60.2	55.2
F11	Jio Residency	RES	5.228	41.76	71.79	65.94	58.7	53.7	59.7	54.7	59.7	54.7
G	Sri Laxmi PG	RES	5.289	51.32	71.79	65.94	45.8	40.8	45.8	40.8	45.8	40.8
F2	Sri Laxmi PG	RES	5.289	51.32	71.79	65.94	46.2	41.2	46.5	41.5	46.5	41.5
F3	Sri Laxmi PG	RES	5.289	51.32	71.79	65.94	47	42	47.5	42.5	47.5	42.5
F4	Sri Laxmi PG	RES	5.289	51.32	71.79	65.94	48.4	43.4	49.1	44.1	49.1	44.1
F5	Sri Laxmi PG	RES	5.289	51.32	71.79	65.94	50.7	45.7	51.6	46.6	51.6	46.6
F6	Sri Laxmi PG	RES	5.289	51.32	71.79	65.94	54.2	49.3	55.2	50.2	55.2	50.2
F7	Sri Laxmi PG	RES	5.289	51.32	71.79	65.94	57.2	52.2	58.1	53.1	58.1	53.1
F8	Sri Laxmi PG	RES	5.289	51.32	71.79	65.94	58.2	53.2	59.2	54.2	59.2	54.2

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F9	Sri Laxmi PG	RES	5.289	51.32	71.79	65.94	58.9	53.9	59.9	54.9	59.9	54.9
G	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	43.4	38.4	43.3	38.3	43.3	38.3
F2	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	43.9	38.9	44.1	39.1	44.1	39.1
F3	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	44.7	39.8	45.2	40.2	45.2	40.2
F4	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	46.1	41.1	46.8	41.8	46.8	41.8
F5	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	48	43	49	44	49	44
F6	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	50.9	46	51.9	46.9	51.9	46.9
F7	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	53.9	48.9	54.8	49.8	54.8	49.8
F8	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	55.2	50.2	56.2	51.2	56.2	51.2
F9	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	55.9	50.9	56.8	51.8	56.8	51.8
F10	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	56.4	51.5	57.4	52.4	57.4	52.4
F11	Columbia Asia Hospital	HSP	5.351	64.25	71.79	65.94	56.4	51.4	57.4	52.4	57.4	52.4
G	Royale Concorde International School	SCH	5.57	133.58	70.6	58.1	42.1	37.1	41.8	36.8	41.8	36.8
F2	Royale Concorde International School	SCH	5.57	133.58	70.6	58.1	41.6	36.6	41.6	36.6	41.6	36.6
F3	Royale Concorde International School	SCH	5.57	133.58	70.6	58.1	41.2	36.2	41.5	36.5	41.5	36.5
F4	Royale Concorde International School	SCH	5.57	133.58	70.6	58.1	40.9	35.9	41.5	36.5	41.5	36.5
F5	Royale Concorde International School	SCH	5.57	133.58	70.6	58.1	42.5	37.6	43.5	38.5	43.5	38.5
G	Microsoft Corporation India	COM	5.739	66.57	70.6	58.1	45.9	40.9	46	41	46	41
F2	Microsoft Corporation India	COM	5.739	66.57	70.6	58.1	46.5	41.5	46.8	41.8	46.8	41.8
F3	Microsoft Corporation India	COM	5.739	66.57	70.6	58.1	48	43	48.6	43.6	48.6	43.6
F4	Microsoft Corporation India	COM	5.739	66.57	70.6	58.1	50.1	45.1	51	46	51	46
F5	Microsoft Corporation India	COM	5.739	66.57	70.6	58.1	53.1	48.1	54	49	54	49

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F6	Microsoft Corporation India	COM	5.739	66.57	70.6	58.1	55.2	50.2	56.2	51.2	56.2	51.2
F7	Microsoft Corporation India	COM	5.739	66.57	70.6	58.1	56.2	51.2	57.2	52.2	57.2	52.2
F8	Microsoft Corporation India	COM	5.739	66.57	70.6	58.1	56.8	51.8	57.8	52.8	57.8	52.8
F9	Microsoft Corporation India	COM	5.739	66.57	70.6	58.1	57.3	52.3	58.3	53.3	58.3	53.3
G	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	45.9	41	46.1	41.1	46.1	41.1
F2	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	46.7	41.7	47.1	42.1	47.1	42.1
F3	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	48.6	43.6	49.2	44.2	49.2	44.2
F4	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	52.3	47.3	53.1	48.1	53.1	48.1
F5	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	57.6	52.6	58.6	53.6	58.6	53.6
F6	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	59.4	54.4	60.4	55.4	60.4	55.4
F7	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	59.9	54.9	60.9	55.9	60.9	55.9
F8	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	59.8	54.8	60.8	55.8	60.8	55.8
F9	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	59.2	54.3	60.2	55.2	60.2	55.2
F10	Sopha Hbiscus Apt	RES	5.838	32.77	70.6	58.1	59.2	54.2	60.2	55.2	60.2	55.2
G	Salapuri Softzone	COM	6.053	36.11	70.6	58.1	45.8	40.9	45.9	40.9	45.9	40.9
F2	Salapuri Softzone	COM	6.053	36.11	70.6	58.1	46.5	41.5	46.8	41.8	46.8	41.8
F3	Salapuri Softzone	COM	6.053	36.11	70.6	58.1	47.9	42.9	48.5	43.5	48.5	43.5
F4	Salapuri Softzone	COM	6.053	36.11	70.6	58.1	50.8	45.8	51.6	46.6	51.6	46.6
F5	Salapuri Softzone	COM	6.053	36.11	70.6	58.1	55.6	50.7	56.6	51.6	56.6	51.6
F6	Salapuri Softzone	COM	6.053	36.11	70.6	58.1	58.4	53.4	59.4	54.4	59.4	54.4
F7	Salapuri Softzone	COM	6.053	36.11	70.6	58.1	59.5	54.5	60.5	55.5	60.5	55.5
G	Citrus Hotel	RES	6.161	36.26	70.6	58.1	46.3	41.3	46.3	41.3	46.3	41.3
F2	Citrus Hotel	RES	6.161	36.26	70.6	58.1	46.2	41.2	46.5	41.5	46.5	41.5
F3	Citrus Hotel	RES	6.161	36.26	70.6	58.1	46.9	41.9	47.4	42.4	47.4	42.4
F4	Citrus Hotel	RES	6.161	36.26	70.6	58.1	48.7	43.7	49.4	44.4	49.4	44.4
F5	Citrus Hotel	RES	6.161	36.26	70.6	58.1	52.6	47.6	53.6	48.6	53.6	48.6

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F6	Citrus Hotel	RES	6.161	36.26	70.6	58.1	57.8	52.8	58.7	53.7	58.7	53.7
F7	Citrus Hotel	RES	6.161	36.26	70.6	58.1	59.3	54.4	60.3	55.3	60.3	55.3
F8	Citrus Hotel	RES	6.161	36.26	70.6	58.1	59.8	54.8	60.7	55.7	60.7	55.7
F9	Citrus Hotel	RES	6.161	36.26	75.42	67.18	59.2	54.2	60.2	55.2	60.2	55.2
G	Kristal Jade Apartment	RES	6.228	31.45	75.42	67.18	46.4	41.4	46.6	41.6	46.6	41.6
F2	Kristal Jade Apartment	RES	6.228	31.45	75.42	67.18	46.1	41.1	46.5	41.5	46.5	41.5
F3	Kristal Jade Apartment	RES	6.228	31.45	75.42	67.18	46.7	41.7	47.3	42.3	47.3	42.3
F4	Kristal Jade Apartment	RES	6.228	31.45	75.42	67.18	48.7	43.8	49.6	44.6	49.6	44.6
G	The Eye Foundation	HSP	6.259	37.8	75.42	67.18	46.1	41.1	46.2	41.2	46.2	41.2
F2	The Eye Foundation	HSP	6.259	37.8	75.42	67.18	45.9	40.9	46.2	41.2	46.2	41.2
F3	The Eye Foundation	HSP	6.259	37.8	75.42	67.18	46.5	41.5	47	42	47	42
G	Cloudnine Fertility Hospital	HSP	6.291	25.61	75.42	67.18	46.5	41.5	46.7	41.7	46.7	41.7
F2	Cloudnine Fertility Hospital	HSP	6.291	25.61	75.42	67.18	46.1	41.1	46.5	41.5	46.5	41.5
F3	Cloudnine Fertility Hospital	HSP	6.291	25.61	75.42	67.18	46.2	41.2	46.8	41.8	46.8	41.8
F4	Cloudnine Fertility Hospital	HSP	6.291	25.61	75.42	67.18	47.5	42.5	48.3	43.3	48.3	43.3
G	Golden Residency	RES	6.378	43.62	75.42	67.18	44.9	39.9	44.9	39.9	44.9	39.9
F2	Golden Residency	RES	6.378	43.62	75.42	67.18	44.5	39.5	44.8	39.8	44.8	39.8
F3	Golden Residency	RES	6.378	43.62	75.42	67.18	44.4	39.4	44.9	39.9	44.9	39.9
F4	Golden Residency	RES	6.378	43.62	75.42	67.18	44.8	39.8	45.6	40.6	45.6	40.6
G	Apollo Hospital	HSP	6.717	27.99	73.91	67.76	46.3	41.3	46.5	41.5	46.5	41.5
F2	Apollo Hospital	HSP	6.717	27.99	73.91	67.76	45.8	40.9	46.2	41.3	46.2	41.3
F3	Apollo Hospital	HSP	6.717	27.99	73.91	67.76	45.9	40.9	46.5	41.5	46.5	41.5
F4	Apollo Hospital	HSP	6.717	27.99	73.91	67.76	47.3	42.3	48.1	43.1	48.1	43.1
G	Broadcom	COM	7.162	77.01	73.91	67.76	42.9	38	43.1	38.1	43.1	38.1
F2	Broadcom	COM	7.162	77.01	73.91	67.76	43	38	43.4	38.4	43.4	38.4
F3	Broadcom	COM	7.162	77.01	73.91	67.76	43.2	38.3	43.9	38.9	43.9	38.9

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F4	Broadcom	COM	7.162	77.01	73.91	67.76	44	39	44.9	39.9	44.9	39.9
F5	Broadcom	COM	7.162	77.01	73.91	67.76	45.3	40.3	46.2	41.2	46.2	41.2
F6	Broadcom	COM	7.162	77.01	73.91	67.76	47	42	47.9	42.9	47.9	42.9
F7	Broadcom	COM	7.162	77.01	73.91	67.76	49.1	44.1	50	45	50	45
G	Accenture	COM	7.289	81.21	73.91	67.76	44	39	43.9	38.9	43.9	38.9
F2	Accenture	COM	7.289	81.21	73.91	67.76	44	39	44.2	39.2	44.2	39.2
F3	Accenture	COM	7.289	81.21	73.91	67.76	44.4	39.4	44.9	39.9	44.9	39.9
F4	Accenture	COM	7.289	81.21	73.91	67.76	45	40	45.8	40.8	45.8	40.8
F5	Accenture	COM	7.289	81.21	73.91	67.76	46.3	41.3	47.3	42.3	47.3	42.3
F6	Accenture	COM	7.289	81.21	73.91	67.76	48.4	43.5	49.4	44.4	49.4	44.4
G	MArriot Courtyard Fairfield	RES	7.407	64.2	73.91	67.76	45.1	40.1	45.1	40.1	45.1	40.1
F2	MArriot Courtyard Fairfield	RES	7.407	64.2	73.91	67.76	45.7	40.7	45.9	40.9	45.9	40.9
F3	MArriot Courtyard Fairfield	RES	7.407	64.2	73.91	67.76	46.6	41.6	47.1	42.1	47.1	42.1
F4	MArriot Courtyard Fairfield	RES	7.407	64.2	73.91	67.76	48.2	43.2	49	44	49	44
F5	MArriot Courtyard Fairfield	RES	7.407	64.2	73.91	67.76	50.6	45.6	51.5	46.5	51.5	46.5
F6	MArriot Courtyard Fairfield	RES	7.407	64.2	73.91	67.76	53.6	48.7	54.6	49.6	54.6	49.6
F7	MArriot Courtyard Fairfield	RES	7.407	64.2	73.91	67.76	55.7	50.7	56.7	51.7	56.7	51.7
F8	MArriot Courtyard Fairfield	RES	7.407	64.2	73.91	67.76	56.6	51.6	57.6	52.6	57.6	52.6
F9	MArriot Courtyard Fairfield	RES	7.407	64.2	73.91	67.76	57.3	52.3	58.2	53.2	58.2	53.2
G	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	44.4	39.4	44.6	39.6	44.6	39.6
F2	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	45.5	40.5	46	41	46	41
F3	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	46.8	41.8	47.5	42.5	47.5	42.5
F4	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	48.8	43.8	49.7	44.7	49.7	44.7
F5	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	52.3	47.3	53.3	48.3	53.3	48.3
F6	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	56.3	51.4	57.3	52.3	57.3	52.3
F7	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	57.7	52.7	58.7	53.7	58.7	53.7

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F8	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	58.6	53.6	59.6	54.6	59.6	54.6
F9	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	58.6	53.6	59.5	54.5	59.5	54.5
F10	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	58.1	53.1	59.1	54.1	59.1	54.1
F11	Novotel Bengaluru	RES	7.549	44.04	73.91	67.76	57.7	52.7	58.7	53.7	58.7	53.7
G	Passport Seva Kedra	COM	7.653	31.68	71.97	66.79	45.4	40.4	45.8	40.8	45.8	40.8
F2	Passport Seva Kedra	COM	7.653	31.68	71.97	66.79	45.5	40.6	46.1	41.1	46.1	41.1
F3	Passport Seva Kedra	COM	7.653	31.68	71.97	66.79	46.6	41.6	47.3	42.3	47.3	42.3
F4	Passport Seva Kedra	COM	7.653	31.68	71.97	66.79	48.8	43.8	49.7	44.7	49.7	44.7
G	Dugra Saffron Square Apartments	RES	7.709	23.76	71.97	66.79	45.7	40.7	46.2	41.2	46.2	41.2
F2	Dugra Saffron Square Apartments	RES	7.709	23.76	71.97	66.79	45.5	40.5	46.1	41.1	46.1	41.1
F3	Dugra Saffron Square Apartments	RES	7.709	23.76	71.97	66.79	45.7	40.7	46.5	41.5	46.5	41.5
F4	Dugra Saffron Square Apartments	RES	7.709	23.76	71.97	66.79	47.5	42.5	48.4	43.4	48.4	43.4
G	The Grand Adigas Residency	RES	7.731	35.14	71.97	66.79	45.4	40.4	45.7	40.7	45.7	40.7
F2	The Grand Adigas Residency	RES	7.731	35.14	71.97	66.79	44.9	39.9	45.4	40.4	45.4	40.4
F3	The Grand Adigas Residency	RES	7.731	35.14	71.97	66.79	44.9	39.9	45.6	40.6	45.6	40.6
F4	The Grand Adigas Residency	RES	7.731	35.14	71.97	66.79	46.2	41.2	47.1	42.1	47.1	42.1
G	Icon RESemier Hotel	RES	7.811	38.37	71.97	66.79	44.4	39.4	44.8	39.8	44.8	39.8
F2	Icon RESemier Hotel	RES	7.811	38.37	71.97	66.79	44	39	44.6	39.6	44.6	39.6
F3	Icon RESemier Hotel	RES	7.811	38.37	71.97	66.79	43.7	38.7	44.5	39.5	44.5	39.5
F4	Icon RESemier Hotel	RES	7.811	38.37	71.97	66.79	44.5	39.5	45.4	40.4	45.4	40.4
F5	Icon RESemier Hotel	RES	7.811	38.37	71.97	66.79	46.4	41.5	47.4	42.4	47.4	42.4
F6	Icon RESemier Hotel	RES	7.811	38.37	71.97	66.79	49.9	45	50.9	45.9	50.9	45.9
F7	Icon RESemier Hotel	RES	7.811	38.37	71.97	66.79	55.6	50.6	56.6	51.6	56.6	51.6

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
G	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	43.2	38.2	43.7	38.7	43.7	38.7
F2	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	42.8	37.8	43.5	38.5	43.5	38.5
F3	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	43.2	38.2	44.1	39.1	44.1	39.1
F4	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	44.7	39.7	45.6	40.6	45.6	40.6
F5	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	47	42	47.9	42.9	47.9	42.9
F6	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	50.3	45.3	51.2	46.2	51.2	46.2
F7	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	55	50	55.9	50.9	55.9	50.9
F8	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	57.4	52.4	58.4	53.4	58.4	53.4
F9	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	58.4	53.4	59.3	54.4	59.3	54.4
F10	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	58.8	53.8	59.8	54.8	59.8	54.8
F11	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	58.2	53.2	59.2	54.2	59.2	54.2
F12	Vajram Esteva Condominium	RES	7.875	45.63	71.97	66.79	57.9	52.9	58.9	53.9	58.9	53.9
G	Sakra World Hospital	HSP	7.892	133.11	71.97	66.79	42.2	37.3	42.3	37.3	42.3	37.3
F2	Sakra World Hospital	HSP	7.892	133.11	71.97	66.79	41.8	36.8	42.3	37.3	42.3	37.3
F3	Sakra World Hospital	HSP	7.892	133.11	71.97	66.79	41.7	36.7	42.4	37.4	42.4	37.4
F4	Sakra World Hospital	HSP	7.892	133.11	71.97	66.79	42.1	37.1	43	38	43	38
F5	Sakra World Hospital	HSP	7.892	133.11	71.97	66.79	42.7	37.7	43.7	38.7	43.7	38.7
F6	Sakra World Hospital	HSP	7.892	133.11	71.97	66.79	43.9	38.9	44.8	39.8	44.8	39.8
G	Sri Abhayahastha Ganapathi Temple	REL	7.933	19.33	71.97	66.79	45.6	40.6	46.2	41.2	46.2	41.2
F2	Sri Abhayahastha Ganapathi Temple	REL	7.933	19.33	71.97	66.79	45.4	40.5	46.2	41.2	46.2	41.2
G	Country Club	SF	8	134.42	71.97	66.79	42	37	42	37	42	37
F2	Country Club	SF	8	134.42	71.97	66.79	41.7	36.7	42	37	42	37
F3	Country Club	SF	8	134.42	71.97	66.79	41.5	36.5	42.2	37.2	42.2	37.2
G	Wells Fargo	COM	8.403	57.56	71.97	66.79	45.3	40.3	45.3	40.3	45.3	40.3

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F2	Wells Fargo	COM	8.403	57.56	71.97	66.79	46.2	41.2	46.5	41.5	46.5	41.5
F3	Wells Fargo	COM	8.403	57.56	71.97	66.79	47.7	42.7	48.2	43.2	48.2	43.2
F4	Wells Fargo	COM	8.403	57.56	71.97	66.79	50	45	50.7	45.7	50.7	45.7
F5	Wells Fargo	COM	8.403	57.56	71.97	66.79	53.3	48.3	54.3	49.3	54.3	49.3
F6	Wells Fargo	COM	8.403	57.56	71.97	66.79	55.7	50.7	56.7	51.7	56.7	51.7
F7	Wells Fargo	COM	8.403	57.56	71.97	66.79	56.8	51.8	57.8	52.8	57.8	52.8
F8	Wells Fargo	COM	8.403	57.56	71.97	66.79	57.5	52.6	58.5	53.5	58.5	53.5
F9	Wells Fargo	COM	8.403	57.56	71.97	66.79	57.8	52.8	58.8	53.8	58.8	53.8
F10	Wells Fargo	COM	8.403	57.56	71.97	66.79	57.3	52.3	58.2	53.2	58.2	53.2
G	Salarpuria Touchstone Bldg	COM	8.63	79.45	71.97	66.79	44.5	39.6	44.3	39.3	44.3	39.3
F2	Salarpuria Touchstone Bldg	COM	8.63	79.45	71.97	66.79	44.8	39.8	44.9	39.9	44.9	39.9
F3	Salarpuria Touchstone Bldg	COM	8.63	79.45	71.97	66.79	45.2	40.2	45.6	40.6	45.6	40.6
F4	Salarpuria Touchstone Bldg	COM	8.63	79.45	71.97	66.79	45.9	40.9	46.6	41.6	46.6	41.6
F5	Salarpuria Touchstone Bldg	COM	8.63	79.45	71.97	66.79	47.1	42.1	48	43	48	43
F6	Salarpuria Touchstone Bldg	COM	8.63	79.45	71.97	66.79	49.4	44.4	50.3	45.3	50.3	45.3
G	Salarpuria Aura	COM	8.664	52.62	74.77	70.31	44.5	39.5	44.4	39.4	44.4	39.4
F2	Salarpuria Aura	COM	8.664	52.62	74.77	70.31	44.9	39.9	45.1	40.1	45.1	40.1
F3	Salarpuria Aura	COM	8.664	52.62	74.77	70.31	45.7	40.7	46.1	41.1	46.1	41.1
F4	Salarpuria Aura	COM	8.664	52.62	74.77	70.31	47	42.1	47.7	42.7	47.7	42.7
F5	Salarpuria Aura	COM	8.664	52.62	74.77	70.31	49.2	44.2	50.2	45.2	50.2	45.2
F6	Salarpuria Aura	COM	8.664	52.62	74.77	70.31	52.9	47.9	53.9	48.9	53.9	48.9
F7	Salarpuria Aura	COM	8.664	52.62	74.77	70.31	55.9	50.9	56.8	51.8	56.8	51.8
F8	Salarpuria Aura	COM	8.664	52.62	74.77	70.31	56.9	51.9	57.9	52.9	57.9	52.9
G	Salarpuria HAllmark	COM	8.744	35.28	74.77	70.31	45.2	40.2	45.4	40.4	45.4	40.4
F2	Salarpuria HAllmark	COM	8.744	35.28	74.77	70.31	45.6	40.6	46	41	46	41
F3	Salarpuria HAllmark	COM	8.744	35.28	74.77	70.31	46.9	41.9	47.5	42.5	47.5	42.5

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F4	Salarpuria HAllmark	COM	8.744	35.28	74.77	70.31	49.3	44.3	50.1	45.1	50.1	45.1
G	Salarpuria RESimeria	COM	8.815	22.99	74.77	70.31	46.3	41.3	46.7	41.7	46.7	41.7
F2	Salarpuria RESimeria	COM	8.815	22.99	74.77	70.31	46	41	46.5	41.5	46.5	41.5
F3	Salarpuria RESimeria	COM	8.815	22.99	74.77	70.31	46.5	41.5	47.1	42.1	47.1	42.1
G	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	42.5	37.6	42.3	37.3	42.3	37.3
F2	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	42.5	37.5	42.5	37.6	42.5	37.6
F3	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	42.4	37.4	42.9	37.9	42.9	37.9
F4	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	42.5	37.5	43.3	38.3	43.3	38.3
F5	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	43.2	38.2	44.1	39.1	44.1	39.1
F6	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	44.2	39.2	45.2	40.2	45.2	40.2
F7	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	45.3	40.4	46.3	41.3	46.3	41.3
F8	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	46.5	41.5	47.5	42.5	47.5	42.5
F9	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	47.7	42.7	48.7	43.7	48.7	43.7
F10	Aloft Bengaluru Cessna Business Park	COM	9.063	171.07	74.77	70.31	48.9	43.9	49.9	44.9	49.9	44.9
G	V Care Sports Academy	SF	9.108	61.66	74.77	70.31	42.7	37.7	42.9	37.9	42.9	37.9
F2	V Care Sports Academy	SF	9.108	61.66	74.77	70.31	42.1	37.1	42.5	37.5	42.5	37.5
F3	V Care Sports Academy	SF	9.108	61.66	74.77	70.31	41.9	36.9	42.5	37.5	42.5	37.5
G	Swammy Legato Bldg	COM	9.194	1.2	74.77	70.31	44.2	39.2	45	40	45	40

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F2	Swammy Legato Bldg	COM	9.194	1.2	74.77	70.31	44.8	39.8	45.8	40.8	45.8	40.8
F3	Swammy Legato Bldg	COM	9.194	1.2	74.77	70.31	42.6	37.6	43.6	38.6	43.6	38.6
F4	Swammy Legato Bldg	COM	9.194	1.2	74.77	70.31	35.1	30.1	36	31	36	31
F5	Swammy Legato Bldg	COM	9.194	1.2	74.77	70.31	68.3	63.3	69.3	64.3	69.3	64.3
F6	Swammy Legato Bldg	COM	9.194	1.2	74.77	70.31	66.7	61.7	67.6	62.6	67.6	62.6
F7	Swammy Legato Bldg	COM	9.194	1.2	74.77	70.31	63.7	58.7	64.7	59.7	64.7	59.7
F8	Swammy Legato Bldg	COM	9.194	1.2	74.77	70.31	62	57	62.9	57.9	62.9	57.9
G	Aakruthi Sushine Apartment	RES	9.204	84.78	74.77	70.31	42	37	42	37	42	37
F2	Aakruthi Sushine Apartment	RES	9.204	84.78	74.77	70.31	41.5	36.5	41.7	36.7	41.7	36.7
F3	Aakruthi Sushine Apartment	RES	9.204	84.78	74.77	70.31	41.5	36.5	42.1	37.1	42.1	37.1
F4	Aakruthi Sushine Apartment	RES	9.204	84.78	74.77	70.31	44.7	39.8	45.6	40.6	45.6	40.6
F5	Aakruthi Sushine Apartment	RES	9.204	84.78	74.77	70.31	46.5	41.5	47.5	42.5	47.5	42.5
F6	Aakruthi Sushine Apartment	RES	9.204	84.78	74.77	70.31	49.1	44.1	50.1	45.1	50.1	45.1
G	VR Chambers	COM	9.27	1.91	74.77	70.31	48.1	43.1	49.1	44.1	49.1	44.1
F2	VR Chambers	COM	9.27	1.91	74.77	70.31	48.4	43.5	49.6	44.6	49.6	44.6
F3	VR Chambers	COM	9.27	1.91	74.77	70.31	49.6	44.7	50.9	45.9	50.9	45.9
F4	VR Chambers	COM	9.27	1.91	74.77	70.31	20.7	15.7	23.2	18.2	23.2	18.2
G	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	47.3	42.3	48	43	48	43
F2	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	47.5	42.5	48.3	43.3	48.3	43.3
F3	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	47.4	42.4	48.3	43.3	48.3	43.3
F4	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	47.6	42.6	48.6	43.6	48.6	43.6
F5	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	52.2	47.2	53.1	48.1	53.1	48.1
F6	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	63.7	58.7	64.7	59.7	64.7	59.7
F7	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	64.3	59.3	65.3	60.3	65.3	60.3
F8	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	64.3	59.3	65.3	60.3	65.3	60.3
F9	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	63.7	58.7	64.7	59.7	64.7	59.7

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F10	Oracle Tech Hub	COM	9.519	9.67	74.77	70.31	63	58	64	59	64	59
G	SLS Serenity Apartments	RES	9.53	67.71	72.71	70.49	43.4	38.5	43.5	38.5	43.5	38.5
F2	SLS Serenity Apartments	RES	9.53	67.71	72.71	70.49	42.8	37.9	43.1	38.1	43.1	38.1
F3	SLS Serenity Apartments	RES	9.53	67.71	72.71	70.49	42.3	37.3	42.9	37.9	42.9	37.9
F4	SLS Serenity Apartments	RES	9.53	67.71	72.71	70.49	41.9	36.9	42.7	37.7	42.7	37.7
F5	SLS Serenity Apartments	RES	9.53	67.71	72.71	70.49	45.9	40.9	46.8	41.8	46.8	41.8
G	IndiQube Gamma	COM	9.605	47.48	72.71	70.49	44.1	39.1	44.3	39.3	44.3	39.3
F2	IndiQube Gamma	COM	9.605	47.48	72.71	70.49	43.5	38.5	43.9	38.9	43.9	38.9
F3	IndiQube Gamma	COM	9.605	47.48	72.71	70.49	43.3	38.3	44	39	44	39
F4	IndiQube Gamma	COM	9.605	47.48	72.71	70.49	43.9	38.9	44.8	39.8	44.8	39.8
G	JP Morgan	COM	9.654	39.75	72.71	70.49	44.2	39.2	44.6	39.6	44.6	39.6
F2	JP Morgan	COM	9.654	39.75	72.71	70.49	43.8	38.8	44.4	39.4	44.4	39.4
F3	JP Morgan	COM	9.654	39.75	72.71	70.49	44.1	39.1	44.9	39.9	44.9	39.9
F4	JP Morgan	COM	9.654	39.75	72.71	70.49	45	40	46	41	46	41
F5	JP Morgan	COM	9.654	39.75	72.71	70.49	47.2	42.2	48.1	43.2	48.1	43.2
G	High Sky Hotels	RES	9.713	98.79	72.71	70.49	41.9	36.9	42	37	42	37
F2	High Sky Hotels	RES	9.713	98.79	72.71	70.49	41.6	36.6	42	37	42	37
F3	High Sky Hotels	RES	9.713	98.79	72.71	70.49	41.8	36.8	42.5	37.5	42.5	37.5
F4	High Sky Hotels	RES	9.713	98.79	72.71	70.49	42.3	37.3	43.2	38.2	43.2	38.2
F5	High Sky Hotels	RES	9.713	98.79	72.71	70.49	43.2	38.2	44.2	39.2	44.2	39.2
F6	High Sky Hotels	RES	9.713	98.79	72.71	70.49	44.8	39.8	45.8	40.8	45.8	40.8
F7	High Sky Hotels	RES	9.713	98.79	72.71	70.49	46.6	41.6	47.6	42.6	47.6	42.6
G	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	44.5	39.5	45	40	45	40
F2	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	44.2	39.2	44.9	39.9	44.9	39.9
F3	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	44	39.1	44.9	39.9	44.9	39.9
F4	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	45.1	40.1	46	41	46	41

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F5	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	47.3	42.3	48.3	43.3	48.3	43.3
F6	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	51.1	46.1	52	47	52	47
F7	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	57.1	52.1	58.1	53.1	58.1	53.1
F8	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	59.4	54.4	60.4	55.4	60.4	55.4
F9	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	60.2	55.2	61.2	56.2	61.2	56.2
F10	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	59.9	54.9	60.8	55.8	60.8	55.8
F11	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	59.4	54.5	60.4	55.4	60.4	55.4
F12	Adobe Tower Blk A	COM	9.778	30.35	72.71	70.49	59.5	54.6	60.5	55.5	60.5	55.5
G	Kadubeesannahali Cricket Ground	SF	9.808	106.4	72.71	70.49	41.2	36.2	41.4	36.4	41.4	36.4
F2	Kadubeesannahali Cricket Ground	SF	9.808	106.4	72.71	70.49	40.8	35.8	41.3	36.3	41.3	36.3
F3	Kadubeesannahali Cricket Ground	SF	9.808	106.4	72.71	70.49	40.5	35.6	41.4	36.4	41.4	36.4
F4	Kadubeesannahali Cricket Ground	SF	9.808	106.4	72.71	70.49	40.8	35.8	41.7	36.7	41.7	36.7
F5	Kadubeesannahali Cricket Ground	SF	9.808	106.4	72.71	70.49	41.7	36.7	42.6	37.6	42.6	37.6
F6	Kadubeesannahali Cricket Ground	SF	9.808	106.4	72.71	70.49	43	38	43.9	38.9	43.9	38.9
F7	Kadubeesannahali Cricket Ground	SF	9.808	106.4	72.71	70.49	44.5	39.5	45.4	40.4	45.4	40.4
G	Fujitsu India	COM	9.851	69.95	72.71	70.49	42.8	37.8	43.1	38.1	43.1	38.1
F2	Fujitsu India	COM	9.851	69.95	72.71	70.49	42.8	37.8	43.4	38.4	43.4	38.4
F3	Fujitsu India	COM	9.851	69.95	72.71	70.49	43.1	38.1	43.9	38.9	43.9	38.9
F4	Fujitsu India	COM	9.851	69.95	72.71	70.49	43.9	38.9	44.8	39.8	44.8	39.8
F5	Fujitsu India	COM	9.851	69.95	72.71	70.49	45.3	40.3	46.2	41.2	46.2	41.2

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F6	Fujitsu India	COM	9.851	69.95	72.71	70.49	47.2	42.2	48.2	43.2	48.2	43.2
F7	Fujitsu India	COM	9.851	69.95	72.71	70.49	49.8	44.8	50.7	45.7	50.7	45.7
F8	Fujitsu India	COM	9.851	69.95	72.71	70.49	52.9	47.9	53.9	48.9	53.9	48.9
F9	Fujitsu India	COM	9.851	69.95	72.71	70.49	55.1	50.1	56.1	51.1	56.1	51.1
F10	Fujitsu India	COM	9.851	69.95	72.71	70.49	56.1	51.1	57	52	57	52
G	Little Karthik Nagar School	SCH	9.852	2827.7	72.71	70.49	0	0	0	0	0	0
F2	Little Karthik Nagar School	SCH	9.852	2827.7	72.71	70.49	0	0	0	0	0	0
G	Radisson Blue Bengaluru	RES	10.539	33.87	72.71	70.49	45.8	40.8	46	41	46	41
F2	Radisson Blue Bengaluru	RES	10.539	33.87	72.71	70.49	45.3	40.4	45.8	40.8	45.8	40.8
F3	Radisson Blue Bengaluru	RES	10.539	33.87	72.71	70.49	45.7	40.8	46.4	41.4	46.4	41.4
F4	Radisson Blue Bengaluru	RES	10.539	33.87	72.71	70.49	47.2	42.3	48.1	43.1	48.1	43.1
F5	Radisson Blue Bengaluru	RES	10.539	33.87	72.71	70.49	50.7	45.7	51.7	46.7	51.7	46.7
F6	Radisson Blue Bengaluru	RES	10.539	33.87	72.71	70.49	56.7	51.7	57.6	52.6	57.6	52.6
F7	Radisson Blue Bengaluru	RES	10.539	33.87	72.71	70.49	58.8	53.8	59.7	54.7	59.7	54.7
G	SNS Pg for Women	RES	10.553	71.86	72.71	70.49	43.9	38.9	43.8	38.8	43.8	38.8
F2	SNS Pg for Women	RES	10.553	71.86	72.71	70.49	43.2	38.2	43.4	38.4	43.4	38.4
F3	SNS Pg for Women	RES	10.553	71.86	72.71	70.49	42.5	37.6	43	38	43	38
F4	SNS Pg for Women	RES	10.553	71.86	72.71	70.49	41.9	36.9	42.6	37.6	42.6	37.6
F5	SNS Pg for Women	RES	10.553	71.86	72.71	70.49	45.2	40.2	46.1	41.1	46.1	41.1
F6	SNS Pg for Women	RES	10.553	71.86	72.71	70.49	47.1	42.1	48.1	43.1	48.1	43.1
G	Ashray Pg for Women	RES	10.629	67.45	72.82	71.09	43.8	38.8	44	39	44	39
F2	Ashray Pg for Women	RES	10.629	67.45	72.82	71.09	43.1	38.2	43.6	38.6	43.6	38.6
F3	Ashray Pg for Women	RES	10.629	67.45	72.82	71.09	42.6	37.6	43.3	38.3	43.3	38.3
G	The Orange Hotel	RES	10.679	24.38	72.82	71.09	45.2	40.3	45.7	40.8	45.7	40.8
F2	The Orange Hotel	RES	10.679	24.38	72.82	71.09	45	40	45.7	40.7	45.7	40.7
G	Neha Pg for Ladies	RES	10.873	124.05	68.5	70.3	41	36	41.2	36.2	41.2	36.2

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F2	Neha Pg for Ladies	RES	10.873	124.05	68.5	70.3	40.2	35.3	40.7	35.8	40.7	35.8
F3	Neha Pg for Ladies	RES	10.873	124.05	68.5	70.3	39.8	34.8	40.5	35.5	40.5	35.5
F4	Neha Pg for Ladies	RES	10.873	124.05	68.5	70.3	39.8	34.8	40.7	35.7	40.7	35.7
F5	Neha Pg for Ladies	RES	10.873	124.05	68.5	70.3	40.8	35.8	41.7	36.7	41.7	36.7
F6	Neha Pg for Ladies	RES	10.873	124.05	68.5	70.3	42.2	37.2	43.1	38.1	43.1	38.1
G	VCare Health Center	COM	10.873	140.25	68.5	70.3	39.8	34.8	39.9	34.9	39.9	34.9
F2	VCare Health Center	COM	10.873	140.25	68.5	70.3	39.1	34.1	39.5	34.5	39.5	34.5
F3	VCare Health Center	COM	10.873	140.25	68.5	70.3	38.7	33.7	39.4	34.4	39.4	34.4
F4	VCare Health Center	COM	10.873	140.25	68.5	70.3	38.6	33.6	39.4	34.4	39.4	34.4
F5	VCare Health Center	COM	10.873	140.25	68.5	70.3	39.9	34.9	40.8	35.8	40.8	35.8
F6	VCare Health Center	COM	10.873	140.25	68.5	70.3	40.8	35.9	41.8	36.8	41.8	36.8
F7	VCare Health Center	COM	10.873	140.25	68.5	70.3	41.8	36.8	42.8	37.8	42.8	37.8
G	Aishwarya Opulance Apartements	RES	10.986	16.03	68.5	70.3	45.2	40.3	46.1	41.1	46.1	41.1
F2	Aishwarya Opulance Apartements	RES	10.986	16.03	68.5	70.3	45.2	40.2	46.1	41.1	46.1	41.1
F3	Aishwarya Opulance Apartements	RES	10.986	16.03	68.5	70.3	45.3	40.3	46.2	41.2	46.2	41.2
F4	Aishwarya Opulance Apartements	RES	10.986	16.03	68.5	70.3	45.5	40.5	46.5	41.5	46.5	41.5
F5	Aishwarya Opulance Apartements	RES	10.986	16.03	68.5	70.3	45.7	40.8	46.7	41.7	46.7	41.7
F6	Aishwarya Opulance Apartements	RES	10.986	16.03	68.5	70.3	46.2	41.2	47.1	42.1	47.1	42.1
G	Sri Chaitanya School	SCH	11.235	30.52	68.91	64.07	43.8	38.8	44.4	39.4	44.4	39.4
F2	Sri Chaitanya School	SCH	11.235	30.52	68.91	64.07	43.5	38.5	44.3	39.3	44.3	39.3
F3	Sri Chaitanya School	SCH	11.235	30.52	68.91	64.07	43.5	38.5	44.4	39.4	44.4	39.4

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F4	Sri Chaitanya School	SCH	11.235	30.52	68.91	64.07	43.5	38.5	44.4	39.4	44.4	39.4
F5	Sri Chaitanya School	SCH	11.235	30.52	68.91	64.07	43.6	38.6	44.6	39.6	44.6	39.6
G	Govt RESimary School	SCH	11.713	151.99	68.91	64.07	42.7	37.7	42	37	42	37
G	Redemptorist Mater College	SCH	12.157	70.9	68.91	64.07	44	39	43.9	38.9	43.9	38.9
F2	Redemptorist Mater College	SCH	12.157	70.9	68.91	64.07	43.9	38.9	44.1	39.1	44.1	39.1
F3	Redemptorist Mater College	SCH	12.157	70.9	68.91	64.07	44.1	39.1	44.6	39.6	44.6	39.6
G	FabHotel Lotus Park	RES	12.258	37.16	74.72	70.38	45	40	45.2	40.2	45.2	40.2
F2	FabHotel Lotus Park	RES	12.258	37.16	74.72	70.38	44.4	39.4	44.9	39.9	44.9	39.9
F3	FabHotel Lotus Park	RES	12.258	37.16	74.72	70.38	44.3	39.3	45	40	45	40
F4	FabHotel Lotus Park	RES	12.258	37.16	74.72	70.38	45.5	40.5	46.3	41.3	46.3	41.3
F5	FabHotel Lotus Park	RES	12.258	37.16	74.72	70.38	47.6	42.7	48.6	43.6	48.6	43.6
G	Jeevika Hospital	HSP	12.39	42.5	74.72	70.38	44.4	39.4	44.8	39.8	44.8	39.8
F2	Jeevika Hospital	HSP	12.39	42.5	74.72	70.38	44	39	44.5	39.5	44.5	39.5
F3	Jeevika Hospital	HSP	12.39	42.5	74.72	70.38	43.9	39	44.7	39.7	44.7	39.7
F4	Jeevika Hospital	HSP	12.39	42.5	74.72	70.38	44.5	39.6	45.5	40.5	45.5	40.5
F5	Jeevika Hospital	HSP	12.39	42.5	74.72	70.38	46.5	41.5	47.4	42.4	47.4	42.4
G	Hindustan Academy Boys Hostel	SCH	12.566	82.71	74.72	70.38	41.5	36.5	41.8	36.8	41.8	36.8
F2	Hindustan Academy Boys Hostel	SCH	12.566	82.71	74.72	70.38	41.3	36.4	41.9	36.9	41.9	36.9
F3	Hindustan Academy Boys Hostel	SCH	12.566	82.71	74.72	70.38	41.5	36.5	42.3	37.3	42.3	37.3
F4	Hindustan Academy Boys Hostel	SCH	12.566	82.71	74.72	70.38	42.2	37.2	43.2	38.2	43.2	38.2
G	REGIONAL REMOTE SENSING INSTITUTE	COM	12.632	77.93	74.72	70.38	42.5	37.5	42.8	37.8	42.8	37.8

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F2	REGIONAL REMOTE SENSING INSTITUTE	COM	12.632	77.93	74.72	70.38	42.1	37.2	42.8	37.8	42.8	37.8
G	Karthik Nagar Park	RESK	12.72	73.22	74.72	70.38	42	37.1	42.4	37.4	42.4	37.4
G	Little Karthik Nagar School	SCH	12.756	37.75	74.72	70.38	43.1	38.1	43.9	38.9	43.9	38.9
F2	Little Karthik Nagar School	SCH	12.756	37.75	74.72	70.38	43	38	43.8	38.9	43.8	38.9
G	Serra International RESeschool - Marathah	SCH	12.819	35.98	74.72	70.38	43.4	38.4	44.2	39.2	44.2	39.2
F2	Serra International RESeschool - Marathah	SCH	12.819	35.98	74.72	70.38	43.4	38.4	44.2	39.2	44.2	39.2
F3	Serra International RESeschool - Marathah	SCH	12.819	35.98	74.72	70.38	43.4	38.4	44.3	39.3	44.3	39.3
G	DVL Residency	RES	12.9	23.65	74.72	70.38	43.9	39	44.8	39.8	44.8	39.8
F2	DVL Residency	RES	12.9	23.65	74.72	70.38	44.1	39.1	45	40	45	40
F3	DVL Residency	RES	12.9	23.65	74.72	70.38	44.2	39.2	45.1	40.1	45.1	40.1
F4	DVL Residency	RES	12.9	23.65	74.72	70.38	44.4	39.4	45.3	40.3	45.3	40.3
G	DVL Residency	RES	12.991	23.16	74.72	70.38	44	39	44.8	39.8	44.8	39.8
F2	DVL Residency	RES	12.991	23.16	74.72	70.38	44.2	39.2	45	40	45	40
F3	DVL Residency	RES	12.991	23.16	74.72	70.38	44.4	39.4	45.3	40.3	45.3	40.3
F4	DVL Residency	RES	12.991	23.16	74.72	70.38	44.6	39.6	45.5	40.5	45.5	40.5
F5	DVL Residency	RES	12.991	23.16	74.72	70.38	44.8	39.8	45.8	40.8	45.8	40.8
G	Pleasant Villa	GR	13.091	45.35	68.82	69.39	42.8	37.8	43.5	38.6	43.5	38.6
F2	Pleasant Villa	GR	13.091	45.35	68.82	69.39	42.3	37.3	43.2	38.2	43.2	38.2
F3	Pleasant Villa	GR	13.091	45.35	68.82	69.39	42.3	37.3	43.2	38.2	43.2	38.2
F4	Pleasant Villa	GR	13.091	45.35	68.82	69.39	42.3	37.3	43.2	38.2	43.2	38.2
F5	Pleasant Villa	GR	13.091	45.35	68.82	69.39	42.6	37.6	43.6	38.6	43.6	38.6
F6	Pleasant Villa	GR	13.091	45.35	68.82	69.39	43.5	38.5	44.5	39.5	44.5	39.5

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
G	Ring View Residency	RES	13.155	36.93	68.82	69.39	43.4	38.4	44	39	44	39
F2	Ring View Residency	RES	13.155	36.93	68.82	69.39	43.1	38.1	43.9	38.9	43.9	38.9
F3	Ring View Residency	RES	13.155	36.93	68.82	69.39	42.9	37.9	43.8	38.8	43.8	38.8
F4	Ring View Residency	RES	13.155	36.93	68.82	69.39	43.1	38.1	44	39	44	39
F5	Ring View Residency	RES	13.155	36.93	68.82	69.39	44.1	39.1	45	40	45	40
F6	Ring View Residency	RES	13.155	36.93	68.82	69.39	45.9	40.9	46.8	41.8	46.8	41.8
G	KTR Residency	GR	13.237	56.06	68.82	69.39	42.5	37.5	42.9	37.9	42.9	37.9
F2	KTR Residency	GR	13.237	56.06	68.82	69.39	41.9	37	42.6	37.6	42.6	37.6
F3	KTR Residency	GR	13.237	56.06	68.82	69.39	41.5	36.6	42.4	37.4	42.4	37.4
F4	KTR Residency	GR	13.237	56.06	68.82	69.39	43	38	43.9	38.9	43.9	38.9
F5	KTR Residency	GR	13.237	56.06	68.82	69.39	44.1	39.1	45.1	40.1	45.1	40.1
F6	KTR Residency	GR	13.237	56.06	68.82	69.39	46.6	41.6	47.5	42.5	47.5	42.5
G	Laymen's Evangelical Fellowship Church	REL	13.442	124.81	68.82	69.39	41.2	36.2	41.5	36.5	41.5	36.5
G	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	43.7	38.7	43.4	38.4	43.4	38.4
F2	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	43.6	38.6	43.6	38.6	43.6	38.6
F3	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	43.6	38.6	43.9	38.9	43.9	38.9
F4	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	43.8	38.8	44.5	39.5	44.5	39.5
F5	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	44.4	39.4	45.3	40.3	45.3	40.3
F6	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	45.7	40.7	46.7	41.7	46.7	41.7
F7	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	47.6	42.6	48.6	43.6	48.6	43.6
F8	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	49.4	44.4	50.4	45.4	50.4	45.4
F9	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	51.1	46.1	52.1	47.1	52.1	47.1
F10	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	52.3	47.3	53.2	48.2	53.2	48.2
F11	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	53	48	54	49	54	49
F12	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	53.5	48.5	54.5	49.5	54.5	49.5

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F13	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	53.8	48.8	54.8	49.8	54.8	49.8
F14	Durga Petals F Block	RES	13.607	123.1	68.82	69.39	54.2	49.2	55.1	50.1	55.1	50.1
G	Lore RESide Apartment	RES	13.742	144.11	68.82	69.39	44.3	39.4	43.8	38.8	43.8	38.8
F2	Lore RESide Apartment	RES	13.742	144.11	68.82	69.39	44.2	39.2	44	39	44	39
F3	Lore RESide Apartment	RES	13.742	144.11	68.82	69.39	44.2	39.2	44.4	39.4	44.4	39.4
F4	Lore RESide Apartment	RES	13.742	144.11	68.82	69.39	44.4	39.4	44.9	39.9	44.9	39.9
F5	Lore RESide Apartment	RES	13.742	144.11	68.82	69.39	45	40	45.8	40.8	45.8	40.8
G	Darovar Portico ORR Hotel	RES	14.008	16.18	68.82	69.39	46.9	41.9	47.3	42.3	47.3	42.3
F2	Darovar Portico ORR Hotel	RES	14.008	16.18	68.82	69.39	46.7	41.8	47.3	42.3	47.3	42.3
F3	Darovar Portico ORR Hotel	RES	14.008	16.18	68.82	69.39	46.6	41.6	47.3	42.3	47.3	42.3
F4	Darovar Portico ORR Hotel	RES	14.008	16.18	68.82	69.39	48.5	43.6	49.4	44.4	49.4	44.4
F5	Darovar Portico ORR Hotel	RES	14.008	16.18	68.82	69.39	55.4	50.4	56.4	51.4	56.4	51.4
G	Lenovo India	COM	14.025	76.26	68.82	69.39	43.5	38.5	43.3	38.3	43.3	38.3
F2	Lenovo India	COM	14.025	76.26	68.82	69.39	43.1	38.2	43.3	38.3	43.3	38.3
F3	Lenovo India	COM	14.025	76.26	68.82	69.39	43	38	43.5	38.5	43.5	38.5
F4	Lenovo India	COM	14.025	76.26	68.82	69.39	43.3	38.3	44	39	44	39
F5	Lenovo India	COM	14.025	76.26	68.82	69.39	44.4	39.4	45.4	40.4	45.4	40.4
F6	Lenovo India	COM	14.025	76.26	68.82	69.39	47	42	47.9	42.9	47.9	42.9
G	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	44.5	39.5	44.3	39.3	44.3	39.3
F2	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	44.2	39.2	44.3	39.3	44.3	39.3
F3	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	44.6	39.6	45	40	45	40
F4	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	45.1	40.1	45.8	40.8	45.8	40.8

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F5	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	46.1	41.1	47	42	47	42
F6	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	47.9	42.9	48.9	43.9	48.9	43.9
F7	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	50.2	45.2	51.1	46.2	51.1	46.2
F8	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	51.8	46.8	52.8	47.8	52.8	47.8
F9	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	52.8	47.8	53.7	48.7	53.7	48.7
F10	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	53.6	48.6	54.5	49.5	54.5	49.5
F11	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	54.3	49.3	55.2	50.2	55.2	50.2
F12	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	54.8	49.8	55.7	50.8	55.7	50.8
F13	Bagmane Constellation Business Park	COM	14.51	99.82	66.62	53.87	55.1	50.2	56.1	51.1	56.1	51.1
G	Soul Space Arena Mall	COM	14.543	19.18	66.62	53.87	46.1	41.1	46.5	41.5	46.5	41.5
F2	Soul Space Arena Mall	COM	14.543	19.18	66.62	53.87	45.9	41	46.6	41.6	46.6	41.6
F3	Soul Space Arena Mall	COM	14.543	19.18	66.62	53.87	45.8	40.8	46.6	41.6	46.6	41.6
F4	Soul Space Arena Mall	COM	14.543	19.18	66.62	53.87	47.3	42.4	48.2	43.3	48.2	43.3
F5	Soul Space Arena Mall	COM	14.543	19.18	66.62	53.87	51.8	46.8	52.8	47.8	52.8	47.8
G	IndiQube ETA	COM	14.662	55.71	66.62	53.87	44.2	39.2	44.4	39.4	44.4	39.4
F2	IndiQube ETA	COM	14.662	55.71	66.62	53.87	44.3	39.3	44.8	39.8	44.8	39.8
F3	IndiQube ETA	COM	14.662	55.71	66.62	53.87	44.9	39.9	45.6	40.6	45.6	40.6
F4	IndiQube ETA	COM	14.662	55.71	66.62	53.87	46	41	46.9	41.9	46.9	41.9
F5	IndiQube ETA	COM	14.662	55.71	66.62	53.87	48.2	43.2	49.1	44.1	49.1	44.1

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F6	IndiQube ETA	COM	14.662	55.71	66.62	53.87	51.5	46.6	52.5	47.5	52.5	47.5
F7	IndiQube ETA	COM	14.662	55.71	66.62	53.87	55.2	50.2	56.2	51.2	56.2	51.2
G	DEll EMC Tower B	COM	14.755	62.77	66.62	53.87	43.3	38.3	43.7	38.7	43.7	38.7
F2	DEll EMC Tower B	COM	14.755	62.77	66.62	53.87	43.5	38.5	44.1	39.1	44.1	39.1
F3	DEll EMC Tower B	COM	14.755	62.77	66.62	53.87	44	39	44.9	39.9	44.9	39.9
F4	DEll EMC Tower B	COM	14.755	62.77	66.62	53.87	45.3	40.3	46.2	41.2	46.2	41.2
F5	DEll EMC Tower B	COM	14.755	62.77	66.62	53.87	47.2	42.2	48.1	43.1	48.1	43.1
F6	DEll EMC Tower B	COM	14.755	62.77	66.62	53.87	49.9	44.9	50.9	45.9	50.9	45.9
F7	DEll EMC Tower B	COM	14.755	62.77	66.62	53.87	53.5	48.5	54.4	49.4	54.4	49.4
F8	DEll EMC Tower B	COM	14.755	62.77	66.62	53.87	55.6	50.6	56.5	51.5	56.5	51.5
F9	DEll EMC Tower B	COM	14.755	62.77	66.62	53.87	56.5	51.5	57.5	52.5	57.5	52.5
G	DELL EMC Tower A	COM	14.856	62.35	66.62	53.87	42.6	37.7	43.2	38.2	43.2	38.2
F2	DELL EMC Tower A	COM	14.856	62.35	66.62	53.87	42.6	37.7	43.4	38.4	43.4	38.4
F3	DELL EMC Tower A	COM	14.856	62.35	66.62	53.87	43.3	38.3	44.2	39.2	44.2	39.2
F4	DELL EMC Tower A	COM	14.856	62.35	66.62	53.87	44.6	39.6	45.5	40.5	45.5	40.5
F5	DELL EMC Tower A	COM	14.856	62.35	66.62	53.87	46.3	41.4	47.3	42.3	47.3	42.3
F6	DELL EMC Tower A	COM	14.856	62.35	66.62	53.87	48.8	43.9	49.8	44.8	49.8	44.8
F7	DELL EMC Tower A	COM	14.856	62.35	66.62	53.87	52.3	47.3	53.3	48.3	53.3	48.3
F8	DELL EMC Tower A	COM	14.856	62.35	66.62	53.87	55.1	50.1	56	51	56	51
F9	DELL EMC Tower A	COM	14.856	62.35	66.62	53.87	56.3	51.4	57.3	52.3	57.3	52.3
G	VTB Shenhameru Convention Hall	COM	14.947	55.21	66.62	53.87	42.6	37.7	42.9	37.9	42.9	37.9
F2	VTB Shenhameru Convention Hall	COM	14.947	55.21	66.62	53.87	41.9	36.9	42.5	37.5	42.5	37.5
F3	VTB Shenhameru Convention Hall	COM	14.947	55.21	66.62	53.87	41.6	36.7	42.5	37.5	42.5	37.5

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
G	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	42.5	37.5	43.1	38.1	43.1	38.1
F2	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	42.3	37.3	43.1	38.1	43.1	38.1
F3	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	42.9	37.9	43.8	38.8	43.8	38.8
F4	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	44.1	39.1	45	40	45	40
F5	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	45.7	40.8	46.7	41.7	46.7	41.7
F6	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	48	43	49	44	49	44
F7	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	51.3	46.4	52.3	47.3	52.3	47.3
F8	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	55.1	50.1	56.1	51.1	56.1	51.1
F9	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	56.8	51.8	57.7	52.8	57.7	52.8
F10	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	57.5	52.6	58.5	53.5	58.5	53.5
F11	Bagmane World Technology Center	COM	14.977	54.9	70.83	70.48	58.2	53.2	59.1	54.1	59.1	54.1
G	The Iris Inn	RES	15.965	54.51	70.83	70.48	44	39	44.2	39.2	44.2	39.2
F2	The Iris Inn	RES	15.965	54.51	70.83	70.48	43.6	38.7	44.1	39.1	44.1	39.1
F3	The Iris Inn	RES	15.965	54.51	70.83	70.48	43.5	38.5	44.2	39.2	44.2	39.2
F4	The Iris Inn	RES	15.965	54.51	70.83	70.48	44	39	44.9	39.9	44.9	39.9
F5	The Iris Inn	RES	15.965	54.51	70.83	70.48	45.5	40.5	46.4	41.4	46.4	41.4
G	Anjaneva Temple	RES	16.318	103.89	67.83	62.02	45.2	40.2	45.3	40.3	45.3	40.3

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
G	Kempegoda Playground	PRK	16.38	70.45	67.83	62.02	0	0	0	0	0	0
G	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	44.8	39.9	45.1	40.1	45.1	40.1
F2	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	44.4	39.5	45	40	45	40
F3	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	44.8	39.9	45.6	40.6	45.6	40.6
F4	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	46.2	41.2	47.2	42.2	47.2	42.2
F5	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	49	44	50	45	50	45
F6	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	53.8	48.8	54.8	49.8	54.8	49.8
F7	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	57.9	53	58.9	53.9	58.9	53.9
F8	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	59.2	54.3	60.2	55.2	60.2	55.2
F9	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	59.6	54.6	60.5	55.5	60.5	55.5
F10	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	59	54	60	55	60	55
F11	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	58.7	53.7	59.7	54.7	59.7	54.7
F12	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	58.7	53.8	59.7	54.7	59.7	54.7
F13	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	59	54	60	55	60	55
F14	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	59.4	54.4	60.4	55.4	60.4	55.4
F15	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	59.4	54.4	60.4	55.4	60.4	55.4
F16	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	59.2	54.2	60.2	55.2	60.2	55.2
F17	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	59	54	59.9	54.9	59.9	54.9
F18	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	58.6	53.6	59.5	54.5	59.5	54.5
F19	NCC Ivory Heights	RES	16.438	35.03	70.83	70.48	58.1	53.1	59.1	54.1	59.1	54.1
G	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	43.7	38.7	43.6	38.6	43.6	38.6
F2	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	43.6	38.6	43.9	38.9	43.9	38.9
F3	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	43.7	38.8	44.3	39.3	44.3	39.3
F4	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	44.1	39.1	45	40	45	40
F5	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	45.1	40.1	46.1	41.1	46.1	41.1
F6	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	46.7	41.7	47.7	42.7	47.7	42.7

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F7	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	48.7	43.7	49.7	44.7	49.7	44.7
F8	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	50.8	45.8	51.8	46.8	51.8	46.8
F9	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	52.3	47.3	53.3	48.3	53.3	48.3
F10	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	53.2	48.2	54.2	49.2	54.2	49.2
F11	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	53.7	48.7	54.7	49.7	54.7	49.7
F12	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	54.1	49.1	55.1	50.1	55.1	50.1
F13	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	54.5	49.6	55.5	50.5	55.5	50.5
F14	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	54.9	49.9	55.9	50.9	55.9	50.9
F15	Mapple Heights Apartments	RES	16.523	101.58	67.83	62.02	54.9	50	55.9	50.9	55.9	50.9
G	Lowry Memorial Educational Institutions	SCH	16.682	117.37	67.83	62.02	46.9	41.9	46.7	41.7	46.7	41.7
F2	Lowry Memorial Educational Institutions	SCH	16.682	117.37	67.83	62.02	47.1	42.1	47.2	42.2	47.2	42.2
F3	Lowry Memorial Educational Institutions	SCH	16.682	117.37	67.83	62.02	47.5	42.5	47.9	42.9	47.9	42.9
F4	Lowry Memorial Educational Institutions	SCH	16.682	117.37	67.83	62.02	48.1	43.1	48.7	43.8	48.7	43.8
G	Lowry Memorial High School	SCH	16.855	55.84	67.83	62.02	45.6	40.7	45.6	40.6	45.6	40.6
F2	Lowry Memorial High School	SCH	16.855	55.84	67.83	62.02	46	41	46.2	41.2	46.2	41.2
F3	Lowry Memorial High School	SCH	16.855	55.84	67.83	62.02	46.7	41.7	47.2	42.2	47.2	42.2
F4	Lowry Memorial High School	SCH	16.855	55.84	67.83	62.02	47.9	43	48.7	43.7	48.7	43.7
G	Lowry Adventist College	SCH	17.038	39.12	78.56	63.84	45.8	40.8	45.9	40.9	45.9	40.9
F2	Lowry Adventist College	SCH	17.038	39.12	78.56	63.84	45.7	40.7	46	41	46	41
G	Lowry Adventist College 2	SCH	17.04	58.33	78.56	63.84	44.5	39.5	44.4	39.4	44.4	39.4
F2	Lowry Adventist College 2	SCH	17.04	58.33	78.56	63.84	43.9	38.9	44.1	39.1	44.1	39.1
F3	Lowry Adventist College 2	SCH	17.04	58.33	78.56	63.84	45.7	40.7	46.2	41.2	46.2	41.2
F4	Lowry Adventist College 2	SCH	17.04	58.33	78.56	63.84	46.6	41.7	47.4	42.4	47.4	42.4

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
G	Lowry Guest Rooms	RES	17.093	90.56	78.56	63.84	44.4	39.4	44.1	39.1	44.1	39.1
F2	Lowry Guest Rooms	RES	17.093	90.56	78.56	63.84	44.1	39.1	44.2	39.2	44.2	39.2
F3	Lowry Guest Rooms	RES	17.093	90.56	78.56	63.84	44	39	44.4	39.4	44.4	39.4
F4	Lowry Guest Rooms	RES	17.093	90.56	78.56	63.84	44.1	39.1	44.9	39.9	44.9	39.9
G	Gentry Mens Hotel	RES	17.143	53.72	78.56	63.84	44.4	39.5	44.5	39.5	44.5	39.5
F2	Gentry Mens Hotel	RES	17.143	53.72	78.56	63.84	44.4	39.4	44.8	39.8	44.8	39.8
F3	Gentry Mens Hotel	RES	17.143	53.72	78.56	63.84	44.8	39.8	45.4	40.4	45.4	40.4
F4	Gentry Mens Hotel	RES	17.143	53.72	78.56	63.84	45.6	40.6	46.5	41.5	46.5	41.5
F5	Gentry Mens Hotel	RES	17.143	53.72	78.56	63.84	47.5	42.5	48.5	43.5	48.5	43.5
G	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	42.9	37.9	43	38	43	38
F2	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	42.6	37.6	43	38	43	38
F3	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	42.7	37.7	43.4	38.4	43.4	38.4
F4	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	43	38	43.9	38.9	43.9	38.9
F5	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	44	39	44.9	39.9	44.9	39.9
F6	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	45.5	40.5	46.5	41.5	46.5	41.5
F7	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	47.2	42.2	48.1	43.1	48.1	43.1
F8	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	49.1	44.1	50	45	50	45
F9	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	51	46	52	47	52	47

Floor	Name	Usage	Chainage	Distance	Existing Noise		2024 2A with Parapet Wall		2031 2A with Parapet Wall		2041 2A with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	dB(A)							
F10	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	52.4	47.4	53.4	48.4	53.4	48.4
F11	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	53.3	48.3	54.3	49.3	54.3	49.3
F12	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	53.8	48.8	54.8	49.8	54.8	49.8
F13	Aisshwarya Excellency Apartment	RES	17.929	111.1	62.87	55.15	54.1	49.1	55.1	50.1	55.1	50.1

Table 25: Summary of Single Point Noise Calculation During Train Operation for Years 2024, 2031, 2041, Phase 2B

Floor	Name	Usage	Station	Distance	Existing Noise		2024 2B with Parapet Wall		2031 2B with Parapet Wall		2041 2B with Parapet Wall	
					Day	Night	Leq,d	Leq,n	Leq,d	Leq,n	Leq,d	Leq,n
			[km]	[m]	[dB(A)]							
G	Kasturinagar Park	PRK	0.478	14.65	72.05	61.94	43.4	38.4	44.4	39.4	46.7	41.7
F2	Adjeter Media	COM	0.836	4.84	65.17	59.2	45.3	40.3	46.3	41.3	48.3	43.3
F3	Adjeter Media	COM	0.836	4.84	65.17	59.2	46.2	41.2	47.2	42.2	49.2	44.2
F4	Adjeter Media	COM	0.836	4.84	65.17	59.2	47.3	42.3	48.3	43.3	50.3	45.3
F5	Adjeter Media	COM	0.836	4.84	65.17	59.2	48.4	43.5	49.4	44.4	51.5	46.5
F6	Adjeter Media	COM	0.836	4.84	65.17	59.2	52.7	47.7	53.7	48.7	55.7	50.7
G	Shrivaram Karanth Park	PRK	0.987	136.25	65.17	59.2	39.3	34.3	40.3	35.3	43.4	38.4
G	Presidency School	SCH	1.285	158.64	63.94	62.96	36.8	31.8	37.8	32.8	40.7	35.7
F2	Presidency School	SCH	1.285	158.64	63.94	62.96	37.2	32.2	38.2	33.2	40.6	35.6
F3	Presidency School	SCH	1.285	158.64	63.94	62.96	37.1	32.1	38	33	40.2	35.2
F4	Presidency School	SCH	1.285	158.64	63.94	62.96	37.4	32.4	38.4	33.4	40.4	35.4

F5	Presidency School	SCH	1.285	158.64	63.94	62.96	37.8	32.8	38.7	33.7	40.8	35.8
G	New Horizon PU College	SCH	1.302	191.39	63.94	62.96	36.9	31.9	37.9	32.9	40.8	35.8
F2	New Horizon PU College	SCH	1.302	191.39	63.94	62.96	36.5	31.5	37.5	32.5	39.9	34.9
F3	New Horizon PU College	SCH	1.302	191.39	63.94	62.96	36.4	31.4	37.3	32.3	39.5	34.5
F4	New Horizon PU College	SCH	1.302	191.39	63.94	62.96	36.6	31.6	37.6	32.6	39.6	34.6
G	Naranaya Olympiad School	SCH	1.624	78.35	63.94	62.96	39.4	34.4	40.4	35.4	43.3	38.3
G	Church of Jesus Christ of Latter Day	SCH	2.06	20.28	63.94	62.96	44.2	39.2	45.2	40.2	47.8	42.8
G	Keerthi Royal Apt	RES	2.232	19.08	67.87	65.8	44.3	39.3	45.3	40.3	47.7	42.7
F2	Keerthi Royal Apt	RES	2.232	19.08	67.87	65.8	44.2	39.2	45.2	40.2	47.4	42.4
F3	Keerthi Royal Apt	RES	2.232	19.08	67.87	65.8	44.1	39.1	45.1	40.1	47.1	42.2
F4	Keerthi Royal Apt	RES	2.232	19.08	67.87	65.8	44.8	39.8	45.8	40.8	47.8	42.9
F5	Keerthi Royal Apt	RES	2.232	19.08	67.87	65.8	47.4	42.4	48.4	43.4	50.4	45.4
G	NMR Pearl Bldg	RES	2.47	4.17	67.87	65.8	46.3	41.3	47.3	42.3	49.5	44.5
G	Nandi Toyota	COM	2.538	22	71.57	45.29	43.8	38.8	44.7	39.8	47.2	42.2
G	Vijaya Bank Colony 5th Cross	RES	2.617	88.77	71.57	45.29	40.9	35.9	41.9	36.9	44.8	39.9
G	Ajmera Rista Apts	RES	2.889	44.6	71.57	45.29	41.2	36.2	42.2	37.2	44.9	39.9
G	Curious Caterpillas Motessori House	SCH	2.909	84.76	71.57	45.29	42.5	37.6	43.5	38.5	46.5	41.5
F2	Curious Caterpillas Motessori House	SCH	2.909	84.76	71.57	45.29	42.1	37.1	43.1	38.1	45.7	40.8
G	Vinayaka Heights Apt	RES	2.951	31.48	71.57	45.29	42.6	37.6	43.6	38.6	46.3	41.3
F2	Vinayaka Heights Apt	RES	2.951	31.48	71.57	45.29	42.3	37.3	43.3	38.3	45.7	40.7
F3	Vinayaka Heights Apt	RES	2.951	31.48	71.57	45.29	42	37	42.9	37.9	45.2	40.2
F4	Vinayaka Heights Apt	RES	2.951	31.48	71.57	45.29	41.9	36.9	42.9	37.9	44.9	40

F5	Vinayaka Heights Apt	RES	2.951	31.48	71.57	45.29	42.4	37.4	43.4	38.4	45.4	40.4
G	Coconut Grove	PRK	2.964	112.58	70.67	46.49	40.1	35.1	41.1	36.1	44.3	39.3
G	FLM Church	REL	3.014	124.03	70.67	46.49	41.3	36.3	42.2	37.2	45.4	40.4
F2	FLM Church	REL	3.014	124.03	70.67	46.49	40.9	35.9	41.9	36.9	44.6	39.7
F3	FLM Church	REL	3.014	124.03	70.67	46.49	40.4	35.5	41.4	36.4	43.8	38.8
G	DSR Sunshine Apts.	RES	3.124	64.3	70.67	46.49	40.5	35.5	41.5	36.5	44.2	39.2
F2	DSR Sunshine Apts.	RES	3.124	64.3	70.67	46.49	40.3	35.3	41.3	36.3	43.7	38.8
F3	DSR Sunshine Apts.	RES	3.124	64.3	70.67	46.49	40.3	35.3	41.2	36.2	43.4	38.5
F4	DSR Sunshine Apts.	RES	3.124	64.3	70.67	46.49	40.8	35.8	41.8	36.8	43.9	38.9
F5	DSR Sunshine Apts.	RES	3.124	64.3	70.67	46.49	41.5	36.5	42.5	37.5	44.6	39.6
G	Living Walls Apt Cmplx	RES	3.199	54.08	70.67	46.49	42	37.1	43	38	45.5	40.5
F2	Living Walls Apt Cmplx	RES	3.199	54.08	70.67	46.49	41.7	36.8	42.7	37.7	45	40
F3	Living Walls Apt Cmplx	RES	3.199	54.08	70.67	46.49	41.7	36.7	42.7	37.7	44.8	39.8
F4	Living Walls Apt Cmplx	RES	3.199	54.08	70.67	46.49	42.2	37.2	43.2	38.2	45.2	40.3
F5	Living Walls Apt Cmplx	RES	3.199	54.08	70.67	46.49	43.7	38.8	44.7	39.7	46.8	41.8
F6	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	45.4	40.4	46.4	41.4	48.4	43.4
F7	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	47.9	42.9	48.8	43.8	50.9	45.9
F8	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	51.6	46.6	52.6	47.6	54.6	49.6
F9	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	55.6	50.6	56.5	51.5	58.6	53.6
F10	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	57	52	57.9	52.9	60	55
F11	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	57.9	52.9	58.9	53.9	60.9	55.9
F12	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	57.9	52.9	58.9	53.9	60.9	55.9

F13	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	57.4	52.4	58.4	53.4	60.4	55.4
F14	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	57	52	58	53	60	55.1
F15	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	56.9	51.9	57.9	52.9	59.9	55
F16	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	57	52	58	53	60	55
F17	Living Walls Apt Cmplx	RES	3.199	54.08	67.87	65.8	57.2	52.2	58.2	53.2	60.2	55.2
G	Dr. Zamindar Microsurgical Eye Ctr	HSP	3.211	121.93	67.87	65.8	36.9	31.9	37.8	32.8	40.6	35.6
F2	Dr. Zamindar Microsurgical Eye Ctr	HSP	3.211	121.93	67.87	65.8	36.5	31.5	37.5	32.5	40	35
G	KR Inn Manyata	RES	3.226	44.05	68.87	65.91	43.1	38.1	44.1	39.1	46.6	41.6
F2	KR Inn Manyata	RES	3.226	44.05	68.87	65.91	42.8	37.8	43.8	38.8	46	41
F3	KR Inn Manyata	RES	3.226	44.05	68.87	65.91	42.7	37.8	43.7	38.7	45.8	40.9
F4	KR Inn Manyata	RES	3.226	44.05	68.87	65.91	42.9	38	43.9	38.9	46	41
G	King Lounge PG for Men	RES	3.378	77.95	68.87	65.91	42	37.1	43	38	45.9	40.9
F2	King Lounge PG for Men	RES	3.378	77.95	68.87	65.91	41.9	36.9	42.9	37.9	45.4	40.4
F3	King Lounge PG for Men	RES	3.378	77.95	68.87	65.91	42	37.1	43	38	45.3	40.3
F4	King Lounge PG for Men	RES	3.378	77.95	68.87	65.91	42.6	37.6	43.6	38.6	45.7	40.7
F5	King Lounge PG for Men	RES	3.378	77.95	68.87	65.91	43.7	38.7	44.7	39.7	46.7	41.7
F6	King Lounge PG for Men	RES	3.378	77.95	68.87	65.91	45.2	40.3	46.2	41.2	48.3	43.3
G	IMax Clinic	HSP	3.412	109.82	68.87	65.91	39.6	34.6	40.6	35.6	43.6	38.6
F2	IMax Clinic	HSP	3.412	109.82	68.87	65.91	39.1	34.1	40	35	42.7	37.7
G	BWSSNB Office	COM	3.807	64.36	68.87	65.91	40.7	35.7	41.7	36.7	44.7	39.7
G	BDA Office	COM	3.962	65.3	65.18	64.41	40.3	35.3	41.2	36.2	44.3	39.3

G	Sri Surabharathi Sanskrit Foundation	COM	3.966	48.73	65.18	64.41	41.1	36.1	42	37	45	40
G	Bangalore One Mini-HRRR	COM	4.012	47.27	65.18	64.41	42.5	37.5	43.5	38.5	46.4	41.5
F2	Bangalore One Mini-HRRR	COM	4.012	47.27	65.18	64.41	41.9	37	42.9	37.9	45.6	40.6
G	Chethana Super Specialty Child Clinic	HSP	4.16	55.53	65.18	64.41	41.1	36.1	42.1	37.1	44.9	39.9
F2	Chethana Super Specialty Child Clinic	HSP	4.16	55.53	65.18	64.41	41.2	36.2	42.2	37.2	44.7	39.7
G	Sri Anjaneya Swamy Temple	HSP	4.235	50.83	65.18	64.41	42.7	37.8	43.7	38.7	46.4	41.4
G	Hennur Police Station	COM	4.391	76.88	69.82	61.72	40.6	35.7	41.6	36.6	44.1	39.1
G	Treebo Mafoosta Corporate Suites	RES	4.506	112.93	69.82	61.72	37.9	32.9	38.9	33.9	41.4	36.4
F2	Treebo Mafoosta Corporate Suites	RES	4.506	112.93	69.82	61.72	37.5	32.5	38.4	33.4	40.6	35.7
F3	Treebo Mafoosta Corporate Suites	RES	4.506	112.93	69.82	61.72	37.3	32.3	38.3	33.3	40.3	35.4
G	The Pommels Business Hotell	RES	4.745	31.45	69.82	61.72	41.9	36.9	42.8	37.8	45.2	40.2
F2	The Pommels Business Hotell	RES	4.745	31.45	69.82	61.72	41.7	36.7	42.7	37.7	44.8	39.8
G	Royal Concorde Interational School	SCH	4.763	83.96	69.82	61.72	40.6	35.7	41.6	36.6	44.1	39.1
F2	Royal Concorde Interational School	SCH	4.763	83.96	69.82	61.72	40.6	35.6	41.6	36.6	43.8	38.8
F3	Royal Concorde Interational School	SCH	4.763	83.96	69.82	61.72	41.1	36.2	42.1	37.1	44.2	39.2
F4	Royal Concorde Interational School	SCH	4.763	83.96	69.82	61.72	42.1	37.1	43.1	38.1	45.1	40.1
F5	Royal Concorde Interational School	SCH	4.763	83.96	69.82	61.72	43.4	38.4	44.4	39.4	46.4	41.5
F6	Royal Concorde Interational School	SCH	4.763	83.96	69.82	61.72	44.9	39.9	45.9	40.9	47.9	42.9

G	Millenial Inn Premier Apt Hotel	RES	4.863	52.98	69.82	61.72	40.6	35.6	41.6	36.6	44.2	39.2
F2	Millenial Inn Premier Apt Hotel	RES	4.863	52.98	69.82	61.72	40.3	35.3	41.2	36.2	43.5	38.5
F3	Millenial Inn Premier Apt Hotel	RES	4.863	52.98	69.82	61.72	40.1	35.1	41.1	36.1	43.2	38.2
F4	Millenial Inn Premier Apt Hotel	RES	4.863	52.98	69.82	61.72	40.4	35.4	41.4	36.4	43.4	38.4
G	Oyo 13670 Skylark Service Apt	RES	4.907	83.21	69.82	61.72	41.3	36.3	42.3	37.3	44.9	40
F2	Oyo 13670 Skylark Service Apt	RES	4.907	83.21	69.82	61.72	41	36	42	37	44.4	39.4
F3	Oyo 13670 Skylark Service Apt	RES	4.907	83.21	69.82	61.72	40.9	35.9	41.9	36.9	44	39
F4	Oyo 13670 Skylark Service Apt	RES	4.907	83.21	69.82	61.72	41.8	36.9	42.8	37.8	44.9	39.9
F5	Oyo 13670 Skylark Service Apt	RES	4.907	83.21	69.82	61.72	42.7	37.7	43.7	38.7	45.7	40.8
G	VJR High School	SCH	4.911	94.28	69.82	61.72	41	36	41.9	36.9	44.6	39.7
F2	VJR High School	SCH	4.911	94.28	69.82	61.72	40.7	35.7	41.6	36.6	44	39.1
F3	VJR High School	SCH	4.911	94.28	69.82	61.72	40.5	35.6	41.5	36.5	43.6	38.7
F4	VJR High School	SCH	4.911	94.28	69.82	61.72	41.4	36.4	42.4	37.4	44.5	39.5
F5	VJR High School	SCH	4.911	94.28	69.82	61.72	42.4	37.4	43.3	38.3	45.4	40.4
G	Ventakeshwara PG Hostel for Men	RES	5.014	87.26	69.82	61.72	41.1	36.1	42	37	44.8	39.8
G	Building 73530	RES	5.054	124.36	82.4	70.5	39.5	34.5	40.5	35.5	43.5	38.5
G	Sail Leela Palace Apts	RES	5.068	159.26	82.4	70.5	38.4	33.4	39.3	34.3	42.3	37.4
F2	Sail Leela Palace Apts	RES	5.068	159.26	82.4	70.5	37.9	32.9	38.9	33.9	41.6	36.6
F3	Sail Leela Palace Apts	RES	5.068	159.26	82.4	70.5	37.5	32.5	38.5	33.5	40.8	35.8
F4	Sail Leela Palace Apts	RES	5.068	159.26	82.4	70.5	37.8	32.8	38.7	33.8	41	36
F5	Sail Leela Palace Apts	RES	5.068	159.26	82.4	70.5	38.3	33.3	39.3	34.3	41.4	36.5
G	Hotel Jamayca	RES	5.084	53.71	82.4	70.5	42.1	37.2	43.1	38.1	45.6	40.7

F2	Hotel Jamayca	RES	5.084	53.71	82.4	70.5	41.9	36.9	42.9	37.9	45.1	40.2
F3	Hotel Jamayca	RES	5.084	53.71	82.4	70.5	42	37	43	38	45.1	40.1
F4	Hotel Jamayca	RES	5.084	53.71	82.4	70.5	42.8	37.8	43.8	38.8	45.9	40.9
F5	Hotel Jamayca	RES	5.084	53.71	82.4	70.5	44.4	39.4	45.3	40.3	47.4	42.4
G	SLV PG for Ladies	RES	5.105	98.31	82.4	70.5	40.7	35.7	41.7	36.7	44.5	39.5
F2	SLV PG for Ladies	RES	5.105	98.31	82.4	70.5	40.6	35.6	41.6	36.6	44	39
F3	SLV PG for Ladies	RES	5.105	98.31	82.4	70.5	40.6	35.6	41.6	36.6	43.7	38.7
F4	SLV PG for Ladies	RES	5.105	98.31	82.4	70.5	41.2	36.2	42.2	37.2	44.2	39.3
F5	SLV PG for Ladies	RES	5.105	98.31	82.4	70.5	42	37	43	38	45.1	40.1
G	North Bangalore Hospital	HSP	5.125	110.14	82.4	70.5	40	35	41	36	43.8	38.8
F2	North Bangalore Hospital	HSP	5.125	110.14	82.4	70.5	39.5	34.5	40.5	35.5	43	38
F3	North Bangalore Hospital	HSP	5.125	110.14	82.4	70.5	39.1	34.1	40.1	35.1	42.3	37.3
F4	North Bangalore Hospital	HSP	5.125	110.14	82.4	70.5	39.1	34.1	40	35	42.2	37.2
G	First Assemply of Zion	REL	5.143	32.52	82.4	70.5	41.4	36.4	42.3	37.4	44.8	39.8
F2	First Assemply of Zion	SCH	5.143	32.52	82.4	70.5	41.2	36.3	42.2	37.2	44.5	39.5
F3	First Assemply of Zion	SCH	5.143	32.52	82.4	70.5	41.2	36.2	42.1	37.1	44.2	39.3
F4	First Assemply of Zion	SCH	5.143	32.52	82.4	70.5	41.3	36.3	42.3	37.3	44.4	39.4
G	Oyo 37916 Paradise Stay In Business Hote	RES	5.3	31.94	82.4	70.5	41.4	36.4	42.4	37.4	44.8	39.8
F2	Oyo 37916 Paradise Stay In Business Hote	RES	5.3	31.94	82.4	70.5	41.3	36.3	42.2	37.3	44.5	39.5
F3	Oyo 37916 Paradise Stay In Business Hote	RES	5.3	31.94	82.4	70.5	41.2	36.2	42.2	37.2	44.4	39.4
G	Spectrtum E Kid International	SCH	5.49	107.6	67.34	58.49	41.1	36.1	42.1	37.1	45.2	40.2

G	Shamana Specialty Clinic Endoscopy	HSP	5.496	85.9	67.34	58.49	39.1	34.1	40.1	35.1	43	38
F2	Shamana Specialty Clinic Endoscopy	HSP	5.496	85.9	67.34	58.49	38.7	33.7	39.6	34.6	42.3	37.3
F3	Shamana Specialty Clinic Endoscopy	HSP	5.496	85.9	67.34	58.49	38.4	33.4	39.4	34.4	41.7	36.8
G	Indi Asian Academy Group of Institutions	SCH	5.499	47.85	67.34	58.49	43.2	38.2	44.1	39.2	46.9	41.9
F2	Indi Asian Academy Group of Institutions	SCH	5.499	47.85	67.34	58.49	43	38	44	39	46.5	41.5
F3	Indi Asian Academy Group of Institutions	SCH	5.499	47.85	67.34	58.49	43.5	38.5	44.5	39.5	46.7	41.7
F4	Indi Asian Academy Group of Institutions	SCH	5.499	47.85	67.34	58.49	44.7	39.7	45.7	40.7	47.7	42.7
G	Royal School of Hotel Management	SCH	5.791	54.09	73.76	61.11	43.1	38.2	44.1	39.1	47	42
F2	Royal School of Hotel Management	SCH	5.791	54.09	73.76	61.11	43.5	38.5	44.5	39.5	47	42
F3	Royal School of Hotel Management	SCH	5.791	54.09	73.76	61.11	44.3	39.3	45.3	40.3	47.6	42.6
F4	Royal School of Hotel Management	SCH	5.791	54.09	73.76	61.11	45.7	40.7	46.7	41.7	48.7	43.8
F5	Royal School of Hotel Management	SCH	5.791	54.09	73.76	61.11	48.2	43.3	49.2	44.2	51.3	46.3
G	St Hopkins International College	SCH	5.821	107.17	73.76	61.11	38.5	33.5	39.5	34.5	42.6	37.6
F2	St Hopkins International College	SCH	5.821	107.17	73.76	61.11	38	33	39	34	41.7	36.8
F3	St Hopkins International College	SCH	5.821	107.17	73.76	61.11	37.5	32.5	38.5	33.5	40.9	35.9
G	Daughter of St Camillus Provincialate	SCH	5.88	67.75	73.76	61.11	42.3	37.4	43.3	38.3	46	41
F2	Daughter of St Camillus Provincialate	SCH	5.88	67.75	73.76	61.11	42.4	37.4	43.4	38.4	45.8	40.8
F3	Daughter of St Camillus Provincialate	SCH	5.88	67.75	73.76	61.11	42.9	37.9	43.9	38.9	46	41

F4	Daughter of St Camillus Provincialate	SCH	5.88	67.75	73.76	61.11	43.8	38.9	44.8	39.8	46.9	41.9
F5	Daughter of St Camillus Provincialate	SCH	5.88	67.75	73.76	61.11	45.4	40.4	46.4	41.4	48.4	43.5
G	Chris Super Specialty Hospital	HSP	5.923	60.71	73.76	61.11	42.8	37.8	43.8	38.8	46.5	41.5
F2	Chris Super Specialty Hospital	HSP	5.923	60.71	73.76	61.11	42.6	37.6	43.6	38.6	45.9	40.9
F3	Chris Super Specialty Hospital	HSP	5.923	60.71	73.76	61.11	42.8	37.8	43.8	38.8	45.9	40.9
F4	Chris Super Specialty Hospital	HSP	5.923	60.71	73.76	61.11	43.6	38.7	44.6	39.6	46.7	41.7
G	St Mary's Malankara Catholic School	SCH	5.937	54.87	73.76	61.11	39.8	34.8	40.8	35.8	43.5	38.5
F2	St Mary's Malankara Catholic School	SCH	5.937	54.87	73.76	61.11	39.2	34.2	40.2	35.2	42.5	37.6
F3	St Mary's Malankara Catholic School	SCH	5.937	54.87	73.76	61.11	38.5	33.5	39.5	34.5	41.6	36.7
G	God Will Fulfill His Will	REL	5.99	101.2	73.57	65.71	42.4	37.5	43.4	38.4	46.2	41.2
G	Garden City AG International Worship	REL	6.027	87.81	73.57	65.71	42.3	37.4	43.3	38.3	46.1	41.1
F2	Garden City AG International Worship	REL	6.027	87.81	73.57	65.71	42.4	37.4	43.4	38.4	45.8	40.8
G	Teachers Academy Degree College	SCH	6.035	104.47	73.57	65.71	37.4	32.4	38.4	33.4	41.2	36.2
F2	Teachers Academy Degree College	SCH	6.035	104.47	73.57	65.71	36.9	31.9	37.8	32.9	40.4	35.4
F3	Teachers Academy Degree College	SCH	6.035	104.47	73.57	65.71	37.2	32.3	38.2	33.2	40.4	35.4
F4	Teachers Academy Degree College	SCH	6.035	104.47	73.57	65.71	36.7	31.7	37.7	32.7	39.7	34.8
F5	Teachers Academy Degree College	SCH	6.035	104.47	73.57	65.71	37.1	32.1	38.1	33.1	40.1	35.1
G	New Life College	SCH	6.132	52.49	73.57	65.71	43.1	38.1	44.1	39.1	46.9	41.9

F2	New Life College	SCH	6.132	52.49	73.57	65.71	42.8	37.8	43.7	38.7	46.2	41.2
F3	New Life College	SCH	6.132	52.49	73.57	65.71	42.9	37.9	43.9	38.9	46.1	41.1
F4	New Life College	SCH	6.132	52.49	73.57	65.71	43.8	38.9	44.8	39.8	46.9	41.9
G	Nandhi Royale Apt	RES	6.286	57.86	73.57	65.71	43.4	38.4	44.4	39.4	47.3	42.3
G	Capital O 1078 Royal Serenity Hotel	RES	6.539	57.45	73.57	65.71	43.4	38.4	44.4	39.4	47.3	42.3
F2	Capital O 1078 Royal Serenity Hotel	RES	6.539	57.45	73.57	65.71	43.4	38.4	44.3	39.3	46.9	41.9
F3	Capital O 1078 Royal Serenity Hotel	RES	6.539	57.45	73.57	65.71	43.7	38.7	44.7	39.7	46.9	42
F4	Capital O 1078 Royal Serenity Hotel	RES	6.539	57.45	73.57	65.71	44.7	39.7	45.7	40.7	47.7	42.8
F5	Capital O 1078 Royal Serenity Hotel	RES	6.539	57.45	73.57	65.71	47.2	42.2	48.2	43.2	50.2	45.2
G	Podar Jumbo Kids Plus	SCH	6.627	89.3	73.57	65.71	40.2	35.2	41.2	36.2	44.2	39.2
F2	Podar Jumbo Kids Plus	SCH	6.627	89.3	73.57	65.71	39.5	34.5	40.5	35.5	43.1	38.2
G	Parijma Medical Cener	HSP	6.629	34.79	71.01	65.84	44.3	39.4	45.3	40.3	47.9	42.9
F2	Parijma Medical Cener	HSP	6.629	34.79	71.01	65.84	44.2	39.2	45.1	40.1	47.5	42.5
F3	Parijma Medical Cener	HSP	6.629	34.79	71.01	65.84	44	39.1	45	40	47.2	42.2
F4	Parijma Medical Cener	HSP	6.629	34.79	71.01	65.84	44.7	39.7	45.6	40.6	47.7	42.7
F5	Parijma Medical Cener	HSP	6.629	34.79	71.01	65.84	46.5	41.5	47.5	42.5	49.5	44.5
G	VPR PU College	SCH	6.644	98.33	71.01	65.84	41.1	36.1	42.1	37.1	45	40
F2	VPR PU College	SCH	6.644	98.33	71.01	65.84	40.7	35.8	41.7	36.7	44.3	39.3
F3	VPR PU College	SCH	6.644	98.33	71.01	65.84	40.7	35.7	41.7	36.7	43.9	38.9
F4	VPR PU College	SCH	6.644	98.33	71.01	65.84	41.3	36.3	42.3	37.3	44.3	39.4
F5	VPR PU College	SCH	6.644	98.33	71.01	65.84	43.6	38.7	44.6	39.6	46.6	41.7
F6	VPR PU College	SCH	6.644	98.33	71.01	65.84	45.4	40.4	46.4	41.4	48.4	43.4
F7	VPR PU College	SCH	6.644	98.33	71.01	65.84	48.4	43.4	49.4	44.4	51.4	46.4
G	TRi Star Orchids Apt	RES	6.71	97.08	71.01	65.84	40.8	35.8	41.8	36.8	44.7	39.7

F2	TRi Star Orchids Apt	RES	6.71	97.08	71.01	65.84	40.4	35.4	41.4	36.4	43.9	39
F3	TRi Star Orchids Apt	RES	6.71	97.08	71.01	65.84	40.8	35.8	41.7	36.8	43.9	38.9
F4	TRi Star Orchids Apt	RES	6.71	97.08	71.01	65.84	41.4	36.4	42.4	37.4	44.4	39.4
G	Lake Hennur Biodiversity Park	PRK	6.812	159.96	71.01	65.84	38.2	33.2	39.2	34.2	42.3	37.4
G	Visishta the Unique Playschool	SCH	7.036	69.72	71.01	65.84	43.3	38.3	44.3	39.3	47.3	42.3
F2	Visishta the Unique Playschool	SCH	7.036	69.72	71.01	65.84	43.4	38.5	44.4	39.4	47.1	42.1
G	Oyo 10295 Dvarka Inn	RES	7.151	48.04	71.01	65.84	44.3	39.3	45.3	40.3	48.1	43.1
F2	Oyo 10295 Dvarka Inn	RES	7.151	48.04	71.01	65.84	44.4	39.4	45.4	40.4	47.9	43
F3	Oyo 10295 Dvarka Inn	RES	7.151	48.04	71.01	65.84	45.3	40.3	46.2	41.2	48.6	43.6
F4	Oyo 10295 Dvarka Inn	RES	7.151	48.04	71.01	65.84	46.8	41.8	47.8	42.8	49.9	44.9
F5	Oyo 10295 Dvarka Inn	RES	7.151	48.04	71.01	65.84	49	44	50	45	52	47
G	Dr BR Ambedkar Play Ground	PRK	7.279	36.2	71.01	65.84	12.4	7.5	13.4	8.4	15.4	10.4
G	Asangi Maruthi High School	SCH	7.31	59.74	64.3	64.13	40.7	35.8	41.7	36.7	44.6	39.6
G	Hotel Raj Elegance	RES	7.392	12.81	64.3	64.13	43.8	38.8	44.7	39.7	47	42
F2	Hotel Raj Elegance	RES	7.392	12.81	64.3	64.13	44	39	45	40	47.1	42.1
F3	Hotel Raj Elegance	RES	7.392	12.81	64.3	64.13	44.3	39.3	45.3	40.3	47.3	42.4
F4	Hotel Raj Elegance	RES	7.392	12.81	64.3	64.13	44.6	39.6	45.6	40.6	47.6	42.6
F5	Hotel Raj Elegance	RES	7.392	12.81	64.3	64.13	44.8	39.9	45.8	40.8	47.9	42.9
G	Oyo Flagship 45502 Sree Banashankar	RES	7.438	70.29	64.3	64.13	41.7	36.8	42.7	37.7	45.5	40.5
F2	Oyo Flagship 45502 Sree Banashankar	RES	7.438	70.29	64.3	64.13	41.5	36.5	42.5	37.5	44.9	39.9
F3	Oyo Flagship 45502 Sree Banashankar	RES	7.438	70.29	64.3	64.13	41.5	36.6	42.5	37.5	44.7	39.7
F4	Oyo Flagship 45502 Sree Banashankar	RES	7.438	70.29	64.3	64.13	41.9	36.9	42.9	37.9	44.9	40

G	Akshaya Residency	RES	7.546	79.38	64.3	64.13	41.3	36.3	42.3	37.3	45	40
F2	Akshaya Residency	RES	7.546	79.38	64.3	64.13	40.9	35.9	41.9	36.9	44.2	39.2
F3	Akshaya Residency	RES	7.546	79.38	64.3	64.13	40.7	35.8	41.7	36.7	43.9	38.9
F4	Akshaya Residency	RES	7.546	79.38	64.3	64.13	41.2	36.2	42.2	37.2	44.2	39.2
G	Zolo Sagan Youth Hostel	RES	7.596	71.86	64.3	64.13	40.7	35.7	41.7	36.7	44.3	39.3
F2	Zolo Sagan Youth Hostel	RES	7.596	71.86	64.3	64.13	40.1	35.1	41.1	36.1	43.4	38.4
F3	Zolo Sagan Youth Hostel	RES	7.596	71.86	64.3	64.13	40.2	35.2	41.2	36.2	43.3	38.3
F4	Zolo Sagan Youth Hostel	RES	7.596	71.86	64.3	64.13	40.7	35.7	41.7	36.7	43.7	38.7
F5	Zolo Sagan Youth Hostel	RES	7.596	71.86	64.3	64.13	41.4	36.4	42.4	37.4	44.4	39.4
G	JMJ Hospital	HSP	7.627	115.33	64.3	64.13	39.1	34.1	40	35	42.8	37.8
F2	JMJ Hospital	HSP	7.627	115.33	64.3	64.13	38.5	33.5	39.5	34.5	41.8	36.8
F3	JMJ Hospital	HSP	7.627	115.33	64.3	64.13	39.1	34.1	40.1	35.1	42.2	37.2
F4	JMJ Hospital	HSP	7.627	115.33	64.3	64.13	39.7	34.7	40.7	35.7	42.7	37.7
F5	JMJ Hospital	HSP	7.627	115.33	64.3	64.13	40.4	35.4	41.4	36.4	43.4	38.5
G	Sri Lakshmi Narisma Swamy PG for Ladies	RES	7.784	90.34	64.3	64.13	41	36	42	37	44.8	39.8
F2	Sri Lakshmi Narisma Swamy PG for Ladies	RES	7.784	90.34	64.3	64.13	40.3	35.3	41.3	36.3	43.8	38.8
F3	Sri Lakshmi Narisma Swamy PG for Ladies	RES	7.784	90.34	64.3	64.13	40.1	35.1	41.1	36.1	43.2	38.2
F4	Sri Lakshmi Narisma Swamy PG for Ladies	RES	7.784	90.34	64.3	64.13	40.3	35.3	41.3	36.3	43.4	38.4
F5	Sri Lakshmi Narisma Swamy PG for Ladies	RES	7.784	90.34	64.3	64.13	41.5	36.5	42.5	37.5	44.5	39.5
G	Shri Shakthi Balaji Pg for Ladies	RES	7.805	21.93	74.7	64.6	43	38	44	39	46.4	41.4

F2	Shri Shakthi Balaji Pg for Ladies	RES	7.805	21.93	74.7	64.6	42.9	37.9	43.9	38.9	46.1	41.1
F3	Shri Shakthi Balaji Pg for Ladies	RES	7.805	21.93	74.7	64.6	42.9	37.9	43.8	38.8	45.9	40.9
F4	Shri Shakthi Balaji Pg for Ladies	RES	7.805	21.93	74.7	64.6	42.9	38	43.9	38.9	46	41
F5	Shri Shakthi Balaji Pg for Ladies	RES	7.805	21.93	74.7	64.6	42.9	37.9	43.9	38.9	45.9	41
F6	Shri Shakthi Balaji Pg for Ladies	RES	7.805	21.93	74.7	64.6	43.3	38.3	44.3	39.3	46.3	41.3
F7	Shri Shakthi Balaji Pg for Ladies	RES	7.805	21.93	74.7	64.6	45	40	46	41	48	43
G	Lakshmi Narasimha PG fof Gents	RES	7.889	56.28	74.7	64.6	42.4	37.4	43.4	38.4	46.3	41.3
F2	Lakshmi Narasimha PG fof Gents	RES	7.889	56.28	74.7	64.6	42.1	37.2	43.1	38.1	45.7	40.7
F3	Lakshmi Narasimha PG fof Gents	RES	7.889	56.28	74.7	64.6	41.9	36.9	42.9	37.9	45.2	40.2
F4	Lakshmi Narasimha PG fof Gents	RES	7.889	56.28	74.7	64.6	42.2	37.3	43.2	38.2	45.3	40.3
F5	Lakshmi Narasimha PG fof Gents	RES	7.889	56.28	74.7	64.6	43.2	38.2	44.2	39.2	46.2	41.2
G	MTPK Block	COM	7.9	62.51	74.7	64.6	42.7	37.7	43.7	38.7	46.6	41.6
F2	MTPK Block	COM	7.9	62.51	74.7	64.6	42.6	37.6	43.6	38.6	46.1	41.1
F3	MTPK Block	COM	7.9	62.51	74.7	64.6	42.7	37.7	43.7	38.7	46	41
F4	MTPK Block	COM	7.9	62.51	74.7	64.6	43.3	38.3	44.3	39.3	46.4	41.4
F5	MTPK Block	COM	7.9	62.51	74.7	64.6	44.6	39.6	45.6	40.6	47.6	42.6
G	Shree Shree Amruta Muneshwara Swamy	SCH	8.577	17	73.95	70.28	43.3	38.3	44.3	39.3	46.6	41.6
G	RS Valshnavi Reddy Gents PG	RES	8.648	36.37	73.95	70.28	41.5	36.5	42.5	37.5	45.1	40.1
F2	RS Valshnavi Reddy Gents PG	RES	8.648	36.37	73.95	70.28	41.2	36.3	42.2	37.2	44.6	39.6
F3	RS Valshnavi Reddy Gents PG	RES	8.648	36.37	73.95	70.28	41	36.1	42	37	44.1	39.1
F4	RS Valshnavi Reddy Gents PG	RES	8.648	36.37	73.95	70.28	41.4	36.4	42.4	37.4	44.4	39.4

F5	RS Valshnavi Reddy Gents PG	RES	8.648	36.37	73.95	70.28	42.5	37.5	43.4	38.4	45.5	40.5
G	Sri Gangamma Devi	PRK	8.656	154.52	73.95	70.28	40.4	35.5	41.4	36.4	44.5	39.5
G	Mind Space Apartments	RES	8.763	74.34	73.95	70.28	39.6	34.6	40.6	35.6	43.3	38.4
F2	Mind Space Apartments	RES	8.763	74.34	73.95	70.28	39.2	34.2	40.2	35.2	42.6	37.6
F3	Mind Space Apartments	RES	8.763	74.34	73.95	70.28	38.8	33.8	39.7	34.7	41.8	36.8
F4	Mind Space Apartments	RES	8.763	74.34	73.95	70.28	38.7	33.8	39.7	34.7	41.8	36.8
F5	Mind Space Apartments	RES	8.763	74.34	73.95	70.28	38.8	33.8	39.8	34.8	41.8	36.8
G	BVR Lakefront	COM	8.781	37.75	69.38	66.87	42.7	37.7	43.7	38.7	46.3	41.3
F2	BVR Lakefront	COM	8.781	37.75	69.38	66.87	42.3	37.4	43.3	38.3	45.6	40.7
F3	BVR Lakefront	COM	8.781	37.75	69.38	66.87	42	37.1	43	38	45.1	40.1
F4	BVR Lakefront	COM	8.781	37.75	69.38	66.87	42.1	37.1	43	38	45.1	40.1
G	Country Inn and Suites Radisson	RES	8.801	22.71	69.38	66.87	42.7	37.7	43.6	38.6	46.1	41.1
F2	Country Inn and Suites Radisson	RES	8.801	22.71	69.38	66.87	42.7	37.7	43.6	38.6	45.9	40.9
F3	Country Inn and Suites Radisson	RES	8.801	22.71	69.38	66.87	42.6	37.7	43.6	38.6	45.7	40.7
F4	Country Inn and Suites Radisson	RES	8.801	22.71	69.38	66.87	42.8	37.8	43.8	38.8	45.8	40.8
F5	Country Inn and Suites Radisson	RES	8.801	22.71	69.38	66.87	43.4	38.4	44.4	39.4	46.4	41.4
G	Lumbini Gardens	GDN	9.13	43.21	69.38	66.87	43.5	38.5	44.5	39.5	47.3	42.3
G	C2	RES	9.22	15.94	69.38	66.87	44	39	45	40	47.4	42.4
F3	C2	RES	9.22	15.94	69.38	66.87	44.2	39.2	45.2	40.2	47.3	42.4
F4	C2	RES	9.22	15.94	69.38	66.87	45.7	40.7	46.7	41.7	48.8	43.8
F5	C2	RES	9.22	15.94	69.38	66.87	50.9	45.9	51.9	46.9	53.9	48.9
F6	C2	RES	9.22	15.94	69.38	66.87	59	54	60	55	62	57
F7	C2	RES	9.22	15.94	69.38	66.87	59.6	54.6	60.6	55.6	62.6	57.6
F8	C2	RES	9.22	15.94	69.38	66.87	61.1	56.1	62.1	57.1	64.1	59.1

G	Temple of God	REL	10.67	49.11	66.63	64.33	43.4	38.4	44.3	39.3	46.8	41.9
G	Bethel AG Church	REL	10.798	89.19	58.05	55.57	41.9	37	42.9	37.9	45.6	40.6
F2	Bethel AG Church	REL	10.798	89.19	58.05	55.57	41.7	36.7	42.6	37.6	44.9	39.9
F3	Bethel AG Church	REL	10.798	89.19	58.05	55.57	41.7	36.7	42.7	37.7	44.7	39.8
G	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	43.5	38.5	44.5	39.5	47.3	42.3
F2	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	43.9	38.9	44.9	39.9	47.5	42.5
F3	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	45.1	40.1	46	41	48.4	43.4
F4	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	47.2	42.2	48.2	43.2	50.3	45.3
F5	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	51.1	46.1	52	47.1	54.1	49.1
F6	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	56.1	51.1	57.1	52.1	59.1	54.1
F7	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	57.9	52.9	58.9	53.9	60.9	55.9
F8	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	58.8	53.8	59.8	54.8	61.8	56.8
F9	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	58.7	53.7	59.6	54.6	61.7	56.7
F10	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	58.1	53.1	59.1	54.1	61.1	56.1
F11	Embassy Lake Terraces Main Bldg	RES	11.885	41.59	58.05	55.57	57.9	52.9	58.9	53.9	60.9	55.9
F12	ELT Tower 5	RES	11.885	41.59	58.05	55.57	58	53	59	54	61	56
F13	ELT Tower 5	RES	11.885	41.59	58.05	55.57	58.2	53.2	59.2	54.2	61.2	56.2
F14	ELT Tower 5	RES	11.885	41.59	58.05	55.57	58.5	53.5	59.5	54.5	61.5	56.5
F15	ELT Tower 5	RES	11.885	41.59	58.05	55.57	58.7	53.7	59.7	54.7	61.7	56.8
F16	ELT Tower 5	RES	11.885	41.59	58.05	55.57	58.6	53.6	59.6	54.6	61.6	56.6
F17	ELT Tower 5	RES	11.885	41.59	58.05	55.57	58.4	53.4	59.4	54.4	61.4	56.4
F18	ELT Tower 5	RES	11.885	41.59	58.05	55.57	58.1	53.2	59.1	54.1	61.1	56.2
F19	ELT Tower 5	RES	11.885	41.59	58.05	55.57	57.7	52.8	58.7	53.7	60.7	55.8
F20	ELT Tower 5	RES	11.885	41.59	58.05	55.57	57.3	52.4	58.3	53.3	60.3	55.4

F21	ELT Tower 5	RES	11.885	41.59	58.05	55.57	57	52	58	53	60	55
G	Columbia Asia Hospital Hebbal	RES	12.028	51.48	73.16	69.25	43.5	38.5	44.5	39.5	47.4	42.4
F2	Columbia Asia Hospital Hebbal	RES	12.028	51.48	73.16	69.25	43.9	38.9	44.9	39.9	47.6	42.6
F2	Columbia Asia Hospital Hebbal	RES	12.028	51.48	73.16	69.25	43.9	38.9	44.9	39.9	47.6	42.6
G	The Parsee Tower of Silence Cemetery	RES	12.364	20.95	73.16	69.25	45.9	40.9	46.9	41.9	49.5	44.5
G	The Parsee Tower of Silence Cemetery	PRK	12.364	20.95	73.16	69.25	45.9	40.9	46.9	41.9	49.5	44.5
G	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	45.5	40.6	46.5	41.5	49.2	44.2
F2	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	45.5	40.5	46.5	41.5	49	44
F3	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	45.7	40.7	46.7	41.7	49	44
F4	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	48.2	43.2	49.2	44.2	51.4	46.4
F5	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	54.6	49.6	55.6	50.6	57.6	52.6
F6	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	60.7	55.7	61.7	56.7	63.7	58.7
F7	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	61.5	56.5	62.5	57.5	64.5	59.5
F8	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	61	56	62	57	64	59
F9	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	61.4	56.4	62.4	57.4	64.4	59.4
F10	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	61.6	56.7	62.6	57.6	64.7	59.7
F11	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	61.4	56.4	62.3	57.3	64.4	59.4
F12	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	61	56	62	57	64	59
F13	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	60.4	55.4	61.3	56.3	63.4	58.4
F14	Godrej Platinum Bangalore Condo	RES	12.503	25.08	70.98	63.26	59.7	54.7	60.7	55.7	62.7	57.8

G	Citizen Cars	COM	12.694	9.29	70.98	63.26	47.4	42.4	48.3	43.3	50.5	45.5
G	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	39.6	34.6	40.6	35.6	43.5	38.5
F2	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	39.8	34.8	40.8	35.8	43.4	38.4
F3	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	40.3	35.3	41.3	36.3	43.6	38.7
F4	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	40.7	35.7	41.7	36.7	43.8	38.8
F5	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	41.5	36.5	42.5	37.5	44.6	39.6
F6	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	42.6	37.6	43.6	38.6	45.6	40.6
F7	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	43.9	38.9	44.9	39.9	46.9	41.9
F8	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	45.4	40.4	46.4	41.4	48.4	43.4
F9	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	47.1	42.1	48	43.1	50.1	45.1
F10	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	48.8	43.8	49.7	44.8	51.8	46.8
F11	Digicall Teleservices	COM	12.707	99.56	70.98	63.26	50.4	45.4	51.4	46.4	53.4	48.4
G	Brigade Magnum	COM	12.798	24.53	73	64.5	44.8	39.8	45.8	40.8	48.1	43.2
F2	Brigade Magnum	COM	12.798	24.53	73	64.5	44.9	40	45.9	40.9	48.1	43.2
F3	Brigade Magnum	COM	12.798	24.53	73	64.5	45	40	45.9	40.9	48	43.1
F4	Brigade Magnum	COM	12.798	24.53	73	64.5	45	40	46	41	48.1	43.1
F5	Brigade Magnum	COM	12.798	24.53	73	64.5	46.4	41.4	47.4	42.4	49.4	44.4
F6	Brigade Magnum	COM	12.798	24.53	73	64.5	50.8	45.8	51.8	46.8	53.8	48.8
F7	Brigade Magnum	COM	12.798	24.53	73	64.5	59.4	54.4	60.3	55.3	62.4	57.4
F8	Brigade Magnum	COM	12.798	24.53	73	64.5	61.3	56.4	62.3	57.3	64.3	59.4
F9	Brigade Magnum	COM	12.798	24.53	73	64.5	61	56	62	57	64	59
F10	Brigade Magnum	COM	12.798	24.53	73	64.5	61	56	62	57	64	59
G	Salarapuria Galleria	RES	13.387	25.54	73	64.5	45.4	40.4	46.4	41.4	48.9	43.9
F2	Salarapuria Galleria	RES	13.387	25.54	73	64.5	45.1	40.1	46.1	41.1	48.5	43.5
F3	Salarapuria Galleria	RES	13.387	25.54	73	64.5	45.1	40.2	46.1	41.1	48.3	43.4
F4	Salarapuria Galleria	RES	13.387	25.54	73	64.5	47	42.1	48	43	50.1	45.1
F5	Salarapuria Galleria	RES	13.387	25.54	73	64.5	51.9	47	52.9	47.9	55	50
F6	Salarapuria Galleria	RES	13.387	25.54	73	64.5	59.6	54.7	60.6	55.6	62.6	57.7
F7	Salarapuria Galleria	RES	13.387	25.54	73	64.5	61.4	56.4	62.4	57.4	64.4	59.4
F8	Salarapuria Galleria	RES	13.387	25.54	73	64.5	61	56	62	57	64	59.1

F9	Salarapuria Galleria	RES	13.387	25.54	73	64.5	61	56	62	57	64	59
F10	Salarapuria Galleria	RES	13.387	25.54	73	64.5	61.6	56.6	62.6	57.6	64.6	59.7
G	Renaissance Prospero Apt	RES	13.542	36.56	73	64.5	44.2	39.2	45.2	40.2	47.8	42.8
F2	Renaissance Prospero Apt	RES	13.542	36.56	73	64.5	44	39.1	45	40	47.4	42.4
F3	Renaissance Prospero Apt	RES	13.542	36.56	73	64.5	44.1	39.2	45.1	40.1	47.3	42.3
F4	Renaissance Prospero Apt	RES	13.542	36.56	73	64.5	45.3	40.3	46.3	41.3	48.3	43.4
F5	Renaissance Prospero Apt	RES	13.542	36.56	73	64.5	48	43	49	44	51	46
G	Sri Balarmuri Vinayaka Temple	REL	13.896	45.18	73.35	64.8	42.9	38	43.9	38.9	46.4	41.4
F2	Sri Balarmuri Vinayaka Temple	REL	13.896	45.18	73.35	64.8	42.5	37.5	43.5	38.5	45.8	40.8
F3	Sri Balarmuri Vinayaka Temple	REL	13.896	45.18	73.35	64.8	42.2	37.3	43.2	38.2	45.3	40.3
G	ATIC	RES	14.64	90.26	73.35	64.8	40.1	35.1	41.1	36.1	44.4	39.4
G	My flying in-microflight	SF	15.066	47.68	73.35	64.8	43.6	38.6	44.5	39.5	47.6	42.6
F2	My flying in-microflight	SF	15.066	47.68	73.35	64.8	43.3	38.3	44.3	39.3	47.1	42.1
F3	My flying in-microflight	SF	15.066	47.68	73.35	64.8	44.4	39.4	45.4	40.4	47.9	42.9
G	Bangalore Aerosports	SCH	15.16	17.53	73.35	64.8	46.4	41.4	47.4	42.4	49.8	44.8
G	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	40.1	35.1	41	36	44.5	39.5
F2	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	39.6	34.6	40.5	35.5	43.6	38.7
F3	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	39.7	34.7	40.6	35.6	43.3	38.3
F4	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	39.9	34.9	40.9	35.9	43.2	38.3
F5	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	40.3	35.3	41.3	36.3	43.4	38.4
F6	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	41.3	36.3	42.3	37.3	44.3	39.3
F7	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	42.5	37.5	43.4	38.4	45.5	40.5
F8	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	43.7	38.7	44.7	39.7	46.7	41.7
F9	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	45	40	46	41	48	43

F10	NCC Urban Windsor	COM	15.377	102.8	73.35	64.8	46.5	41.5	47.5	42.5	49.5	44.5
G	Silver Key Exec Stays 35627 Hotel	RES	15.689	45.49	71.08	66.18	44	39	45	40	47.9	42.9
F2	Silver Key Exec Stays 35627 Hotel	RES	15.689	45.49	71.08	66.18	44.7	39.7	45.7	40.7	48.4	43.4
F3	Silver Key Exec Stays 35627 Hotel	RES	15.689	45.49	71.08	66.18	46.2	41.2	47.2	42.2	49.6	44.6
F4	Silver Key Exec Stays 35627 Hotel	RES	15.689	45.49	71.08	66.18	48.6	43.6	49.6	44.6	51.8	46.8
F5	Silver Key Exec Stays 35627 Hotel	RES	15.689	45.49	71.08	66.18	52.8	47.8	53.8	48.8	55.8	50.9
G	Capital O 65381 Sln Residency	RES	15.733	94.96	71.08	66.18	42.8	37.9	43.8	38.8	47.3	42.3
F2	Capital O 65381 Sln Residency	RES	15.733	94.96	71.08	66.18	42.5	37.5	43.5	38.5	46.6	41.6
F3	Capital O 65381 Sln Residency	RES	15.733	94.96	71.08	66.18	42.6	37.6	43.6	38.6	46.3	41.3
F4	Capital O 65381 Sln Residency	RES	15.733	94.96	71.08	66.18	42.7	37.8	43.7	38.7	46.1	41.1
G	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	46.7	41.7	47.7	42.7	49.9	44.9
F2	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	47.1	42.1	48	43.1	50.2	45.2
F3	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	47.4	42.4	48.3	43.3	50.4	45.4
F4	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	47.7	42.7	48.7	43.7	50.7	45.7
F5	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	54.9	49.9	55.8	50.8	57.9	52.9
F6	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	64	59	65	60	67	62
F7	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	64.9	59.9	65.9	60.9	67.9	62.9
F8	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	64.2	59.3	65.2	60.2	67.3	62.3
F9	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	63.6	58.7	64.6	59.6	66.6	61.7
F10	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	62.6	57.6	63.5	58.5	65.6	60.6
F11	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	61.7	56.7	62.7	57.7	64.7	59.7
F12	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	61.1	56.1	62.1	57.1	64.1	59.1
F13	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	60.6	55.6	61.6	56.6	63.6	58.6
F14	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	60.1	55.1	61.1	56.1	63.1	58.2
F15	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	59.7	54.7	60.7	55.7	62.7	57.8

F16	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	59.4	54.4	60.3	55.3	62.4	57.4
F17	Lagacy Cirocco Apts	RES	16.199	13.44	71.08	66.18	59	54	60	55	62	57
G	Vidyashilp Academy School	SCH	16.273	137.07	71.08	66.18	42.6	37.6	43.6	38.6	46.7	41.7
F2	Vidyashilp Academy School	SCH	16.273	137.07	71.08	66.18	43	38	44	39	46.8	41.8
F3	Vidyashilp Academy School	SCH	16.273	137.07	71.08	66.18	43.6	38.6	44.5	39.5	46.9	42
F4	Vidyashilp Academy School	SCH	16.273	137.07	71.08	66.18	44.3	39.3	45.3	40.3	47.4	42.4
G	C3	COM	16.508	20.01	71.08	66.18	45.8	40.9	46.8	41.8	49.3	44.3
F2	C3	COM	16.508	20.01	71.08	66.18	45.9	40.9	46.9	41.9	49.2	44.3
F3	C3	COM	16.508	20.01	71.08	66.18	46	41	47	42	49.2	44.2
G	YKS Convention Center	COM	16.529	85.29	0	0	41.2	36.2	42.2	37.2	45.3	40.4
F2	YKS Convention Center	COM	16.529	85.29	68.34	62.86	40.9	36	41.9	36.9	44.8	39.8
F3	YKS Convention Center	COM	16.529	85.29	68.34	62.86	40.8	35.8	41.8	36.8	44.3	39.3
G	Radiant Jasmine Tower	RES	17.058	24.94	68.34	62.86	44.9	40	45.9	40.9	48.4	43.4
F2	Radiant Jasmine Tower	RES	17.058	24.94	68.34	62.86	44.9	39.9	45.9	40.9	48.1	43.2
F3	Radiant Jasmine Tower	RES	17.058	24.94	68.34	62.86	44.9	39.9	45.9	40.9	48	43
F4	Radiant Jasmine Tower	RES	17.058	24.94	68.34	62.86	44.9	39.9	45.9	40.9	47.9	42.9
F5	Radiant Jasmine Tower	RES	17.058	24.94	68.34	62.86	45.2	40.2	46.2	41.2	48.2	43.3
F6	Radiant Jasmine Tower	RES	17.058	24.94	68.34	62.86	47.7	42.7	48.7	43.7	50.7	45.7
F7	Radiant Jasmine Tower	RES	17.058	24.94	68.34	62.86	54	49	55	50	57	52
F8	Radiant Jasmine Tower	RES	17.058	24.94	68.34	62.86	60.5	55.6	61.5	56.5	63.5	58.6
G	Shreyas Residency	RES	17.959	71.69	69.47	60.49	40.6	37.1	41.6	38.1	47.5	42.5
F2	Shreyas Residency	RES	17.959	71.69	69.47	60.49	40.8	37.3	41.8	38.3	47.4	42.4

F3	Shreyas Residency	RES	17.959	71.69	69.47	60.49	41.2	37.7	42.2	38.6	47.5	42.5
F4	Shreyas Residency	RES	17.959	71.69	69.47	60.49	41.9	38.3	42.8	39.3	48.1	43.1
G	Narayana Comforts	RES	17.998	65.84	69.47	60.49	40.4	36.9	41.4	37.8	47.3	42.3
F2	Narayana Comforts	RES	17.998	65.84	69.47	60.49	40.2	36.6	41.1	37.6	46.8	41.8
F3	Narayana Comforts	RES	17.998	65.84	69.47	60.49	40.6	37	41.5	38	46.9	42
F4	Narayana Comforts	RES	17.998	65.84	69.47	60.49	41.3	37.8	42.3	38.7	47.5	42.5
G	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	38.7	35.2	39.7	36.1	46.1	41.1
F2	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	38.6	35.1	39.6	36	45.6	40.6
F3	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	38.5	35	39.5	36	45.2	40.2
F4	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	38.5	35	39.5	36	44.9	39.9
F5	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	39.6	36.1	40.6	37	45.8	40.8
F6	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	40.3	36.8	41.3	37.8	46.6	41.6
F7	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	41.2	37.6	42.1	38.6	47.4	42.4
F8	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	42.1	38.6	43.1	39.6	48.3	43.3
F9	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	43.2	39.7	44.1	40.6	49.4	44.4
F10	Kendriya Vihar Community Center	RES	18.154	131.72	78.2	74.7	44.4	40.9	45.4	41.8	50.6	45.6
G	Batavia Square	RES	18.212	9.67	78.2	74.7	47.3	43.8	48.3	44.8	53.6	48.6
F3	Batavia Square	RES	18.212	9.67	78.2	74.7	48.6	45.1	49.6	46.1	54.8	49.8
F4	Batavia Square	RES	18.212	9.67	78.2	74.7	49.4	45.8	50.4	46.8	55.6	50.6
F5	Batavia Square	RES	18.212	9.67	78.2	74.7	50.9	47.4	51.9	48.4	57.1	52.1
G	Holy Rosary Church	REL	18.601	20.97	68.65	64.25	46.1	42.5	47	43.5	52.7	47.7
F2	Holy Rosary Church	REL	18.601	20.97	68.65	64.25	46.1	42.5	47	43.5	52.6	47.6
F3	Holy Rosary Church	REL	18.601	20.97	68.65	64.25	46	42.5	47	43.4	52.4	47.4
G	Jeevan Hospital	HSP	18.757	109.34	68.65	64.25	40.4	36.9	41.4	37.8	48.1	43.1

G	Bhuvan Polytechnic School	SCH	18.891	23.92	68.65	64.25	46	42.5	47	43.5	52.7	47.8
F2	Bhuvan Polytechnic School	SCH	18.891	23.92	68.65	64.25	46	42.5	47	43.4	52.6	47.6
F3	Bhuvan Polytechnic School	SCH	18.891	23.92	68.65	64.25	46	42.5	47	43.4	52.5	47.5
G	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	39.6	36	40.5	37	47.2	42.2
F2	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	39.5	36	40.5	37	46.8	41.8
F3	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	39.6	36	40.5	37	46.5	41.5
F4	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	39.7	36.2	40.7	37.2	46.3	41.4
F5	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	40	36.5	41	37.5	46.3	41.3
F6	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	40.7	37.2	41.7	38.2	47	42
F7	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	41.6	38.1	42.6	39	47.8	42.8
F8	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	42.6	39.1	43.6	40.1	48.9	43.9
F9	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	43.8	40.3	44.8	41.3	50	45.1
F10	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	45.2	41.7	46.2	42.6	51.4	46.4
F11	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	46.8	43.2	47.7	44.2	53	48
F12	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	48.5	45	49.5	45.9	54.7	49.7
F13	Northgate Office Park Gate 1	COM	19.261	107.04	67.17	65.88	50.3	46.8	51.2	47.7	56.5	51.5
G	Hanuman Temple	REL	19.502	58.49	67.17	65.88	40.5	37	41.5	38	47.8	42.8
G	Capital O 8846 Golden Amulya Hotel	RES	20.083	72.91	67.17	65.88	40.3	36.8	41.3	37.8	47.6	42.6
F2	Capital O 8846 Golden Amulya Hotel	RES	20.083	72.91	67.17	65.88	40.4	36.9	41.4	37.9	47.4	42.5

F3	Capital O 8846 Golden Amulya Hotel	RES	20.083	72.91	67.17	65.88	40.8	37.3	41.8	38.3	47.5	42.5
F4	Capital O 8846 Golden Amulya Hotel	RES	20.083	72.91	67.17	65.88	41.3	37.7	42.2	38.7	47.7	42.7
F5	Capital O 8846 Golden Amulya Hotel	RES	20.083	72.91	67.17	65.88	42.1	38.6	43.1	39.6	48.4	43.4
F6	Capital O 8846 Golden Amulya Hotel	RES	20.083	72.91	67.17	65.88	43.4	39.9	44.4	40.9	49.6	44.7
G	Church of God	REL	20.101	76.33	68.31	64.9	40.1	36.6	41.1	37.6	47.5	42.5
F2	Church of God	REL	20.101	76.33	68.31	64.9	39.9	36.3	40.8	37.3	46.9	41.9
G	Yelhanka AFS Medical	HSP	21.519	46.27	68.31	64.9	46.1	42.6	47.1	43.6	53.1	48.2
G	Passport Inn	RES	22.325	9.91	68.31	64.9	47.4	43.9	48.4	44.8	53.7	48.7
G	Transit In Airport Stay	RES	22.783	79.31	68.31	64.9	43.1	39.6	44.1	40.6	50.5	45.5
F2	Transit In Airport Stay	RES	22.783	79.31	68.31	64.9	43	39.5	44	40.5	50.1	45.1
G	Hunasamaranahalli Government School	SCH	22.894	55.92	67.67	64.3	43.1	39.5	44	40.5	50.3	45.3
F2	Hunasamaranahalli Government School	SCH	22.894	55.92	67.67	64.3	43.2	39.7	44.2	40.7	50.2	45.2
G	LK Royal Gardenia	SF	22.932	17.51	67.67	64.3	46.4	42.9	47.4	43.8	53	48
G	Air Avenue Suites	RES	23.206	99.07	67.67	64.3	41.5	38	42.5	38.9	48.9	43.9
F2	Air Avenue Suites	RES	23.206	99.07	67.67	64.3	41	37.5	42	38.5	48.1	43.2
F3	Air Avenue Suites	RES	23.206	99.07	67.67	64.3	40.6	37	41.5	38	47.3	42.3
G	Oyo 10242 Hotel Shelton Suites	RES	23.243	103.76	67.67	64.3	41.9	38.4	42.9	39.4	49.3	44.3
F2	Oyo 10242 Hotel Shelton Suites	RES	23.243	103.76	67.67	64.3	41.5	37.9	42.4	38.9	48.5	43.5
F3	Oyo 10242 Hotel Shelton Suites	RES	23.243	103.76	67.67	64.3	40.9	37.4	41.9	38.3	47.6	42.6
F4	Oyo 10242 Hotel Shelton Suites	RES	23.243	103.76	67.67	64.3	41.8	38.3	42.8	39.3	48.2	43.2

G	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	39.1	35.6	40	36.5	46.4	41.4
F2	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	38.9	35.4	39.9	36.4	45.9	40.9
F3	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	38.9	35.4	39.8	36.3	45.5	40.5
F4	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	39	35.5	40	36.5	45.3	40.3
F5	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	39.6	36.1	40.6	37.1	45.9	40.9
F6	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	40.3	36.8	41.3	37.8	46.5	41.6
F7	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	41.1	37.5	42	38.5	47.3	42.3
F8	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	41.9	38.3	42.8	39.3	48.1	43.1
F9	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	42.7	39.2	43.7	40.2	49	44
F10	Mahaveer Celesse Yelahanka Apts	RES	23.373	147.31	67.67	64.3	43.7	40.2	44.7	41.1	49.9	44.9
G	Sri Anjaneva Temple, Sonnapanahali	SCH	23.932	7.42	69.68	60.04	47.8	44.3	48.8	45.2	54	49
G	Arna Hotel	RES	24.45	75.73	69.68	60.04	43.1	39.6	44.1	40.5	50.4	45.4
F3	Arna Hotel	RES	24.45	75.73	69.68	60.04	43.8	40.3	44.8	41.3	50.5	45.5
G	Academy Group of Institutions	SCH	24.464	9.99	69.68	60.04	47.7	44.2	48.7	45.2	54	49
G	Lakshmi Hospital	HSP	24.51	55.54	69.68	60.04	44.3	40.7	45.2	41.7	51.4	46.4
F2	Lakshmi Hospital	HSP	24.51	55.54	69.68	60.04	43.7	40.2	44.7	41.1	50.5	45.6
F3	Lakshmi Hospital	HSP	24.51	55.54	69.68	60.04	43.6	40.1	44.6	41.1	50.2	45.2
G	N58: 69.68, 60.04	RES	24.894	7.72	69.68	60.04	48.4	44.9	49.3	45.8	54.6	49.6
G	NRV Hospital	RES	25.239	42	69.68	60.04	43.7	40.2	44.7	41.1	50.5	45.5
F2	NRV Hospital	RES	25.239	42	69.68	60.04	43.9	40.4	44.9	41.4	50.6	45.6
F3	NRV Hospital	RES	25.239	42	69.68	60.04	45	41.5	46	42.5	51.5	46.5
F4	NRV Hospital	RES	25.239	42	69.68	60.04	47.1	43.6	48.1	44.6	53.4	48.4

G	KNS Convention Center	RES	25.73	67.61	69.68	60.04	40.1	36.6	41.1	37.6	47.4	42.4
F2	KNS Convention Center	RES	25.73	67.61	69.68	60.04	40.3	36.8	41.3	37.7	47.2	42.3
F3	KNS Convention Center	RES	25.73	67.61	69.68	60.04	40.6	37.1	41.6	38	47.3	42.3
G	Agape Bible Church	REL	26.116	48.32	66.03	64.15	43.2	39.7	44.2	40.6	50.1	45.2
F2	Agape Bible Church	REL	26.116	48.32	66.03	64.15	43	39.5	44	40.4	49.7	44.7
G	Chikkajala Police Station	COM	26.319	60.99	66.03	64.15	40.8	37.3	41.7	38.2	47.9	42.9
F2	Chikkajala Police Station	COM	26.319	60.99	66.03	64.15	40.7	37.2	41.7	38.2	47.6	42.6
G	Chikkajala Public School	SCH	26.345	35.3	66.03	64.15	45.3	41.7	46.2	42.7	52.2	47.2
F3	Chikkajala Public School	SCH	26.345	35.3	66.03	64.15	45.8	42.3	46.7	43.2	52.3	47.3
G	Chikkajala Old Fort and Temple	REL	26.574	26.35	66.03	64.15	45.2	41.7	46.2	42.7	51.9	46.9
F2	Chikkajala Old Fort and Temple	REL	26.574	26.35	66.03	64.15	45.2	41.7	46.2	42.6	51.7	46.7
G	Sri Anjaneya Swamy Temple	REL	28.166	10.09	69.5	63.1	47.4	43.9	48.4	44.9	53.8	48.8
G	Shivaji Hotel and Re	COM	29.027	87.7	69.5	63.1	40.5	37	41.4	37.9	47.8	42.8
G	Sunny Villa Farms	RES	29.168	33.29	62.48	65.37	45.1	41.6	46.1	42.6	51.9	47

Vibration Impact Assessment

38. Ground-borne vibration is the motion of the ground transmitted into a building that can be described in terms of displacement, velocity, or acceleration. Vibration velocity is used in evaluating transit projects and defined by the following:

    - Level - Vibration is expressed in terms of vibration velocity level, using vibration decibels (VdB), with a reference of 1 micro-inch per second. The level of vibration represents how much the ground is moving. The threshold of human perception to transit and freight rail vibration is approximately 65 VdB and annoyance begins to occur for frequent events at vibration levels over 70 VdB.
    - Frequency: Vibration frequency is expressed in Hertz (Hz). Human response to vibration is typically from about 6 Hz to 200 Hz.
    - Time Pattern: Environmental vibration changes all the time and human response is roughly correlated to the number of vibration events during the day. The more events that occur, the more sensitive humans are to the vibration.

39. Vibratory motion can be generated in all directions, but the vertical descriptor is usually used in environmental assessments because vibration amplitude along the ground surface is greatest in the vertical direction. The succeeding Figure shows the typical ground-borne vibration levels for transit including railway projects and the corresponding human and structural responses to vibration. Vibration from light rail projects generates about 70 VdB near the tracks and levels are dictated by the roughness of the wheels and rails and the suspension system’s resonance properties.

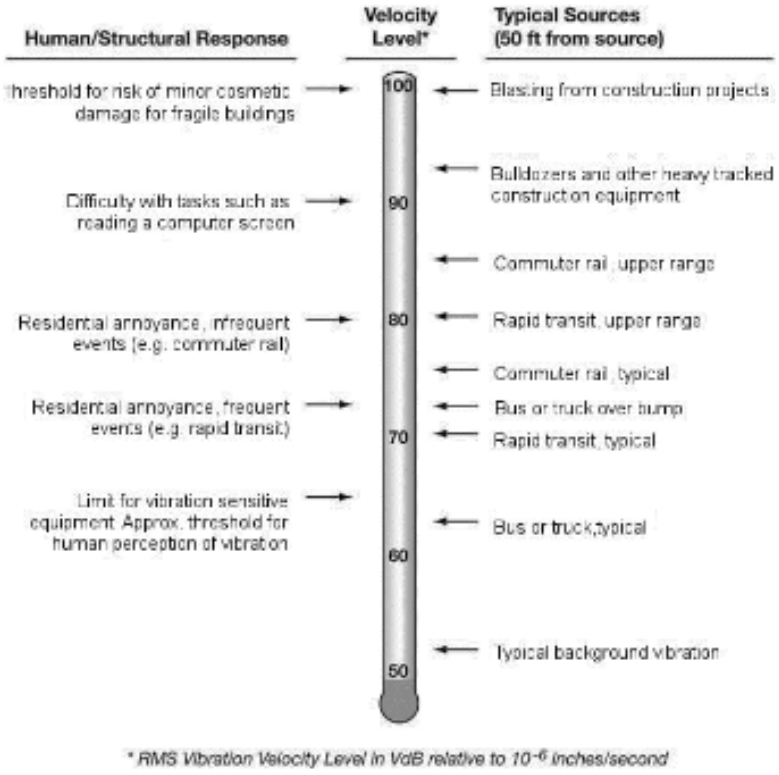


Figure 10: Typical Levels of Ground-Borne Vibration

40. The Government of India has "no criterion prescribed in the Noise Pollution (Regulation and Control) Rules, 2000 regarding the limits of ground borne vibrations and noise on the account of the railway systems.[13]" Instead, the government refers to the Transit Noise and Vibration Impact Assessment (TNVIA) Manual 2006 of the United States Federal Transit Administration [U.S. FTA (2006)] which is adopted in this study.

Existing Vibration Levels

1. The existing vibration level measurements were conducted by the Geosmart Engineering and Constructions Pct. Ltd and AECOM India Pvt Ltd for the BMRCL. Vibration measurements were conducted from 11-15/12/2019 at 10 locations for both project phases. The vibration measurement results are provided below while the detailed monitoring report detailing the methodology, location, and data quality control are provided in Appendix A.

Table 26: Vibration Monitoring Summary

No	Measurement		
	Date/Duration	Location	Level (mm/s)
Phase 2A			
VM01	11/12/2019	Near HSR Apt. Bus Stop	Below detection

[13] Research Designs and Standards Organization (September 2015). "Guidelines for Noise and Vibrations. Metro Rail Transit System" Track Design Directorate

VM02	12/12/2019	Krupanidhi College (RHS) and Thick Residential Area (LHS	Below detection
VM03	11/12/2019	Saphire Honda Show Room near Salarpuria Hallmark	Below detection
VM04	12/12/2019	Car Care Show Room near ISRO	1.22
VM05	13/12/2019	Lowry Memorial Educational Institution	Below detection
VM06	15/12/2019	Motherhood Hospital	3.32
VM07	15/12/2019	Manyata Tech Park	Below detection
VM08	13/12/2019	Columbia Asia Hospital Hebbal	1.82
VM09	14/12/2019	Cyte Care Cancer Center	Below detection
VM10	14/12/2019	Chikkajala Fort	1.71

Vibration Criteria

Construction

41. There are two (2) types of impacts related to construction vibrations presented by the U.S. FTA (2006)—1) human annoyance and 2) building damage. According to the U.S. FTA (2006), the same vibration criteria for general assessment can be applied for the evaluation of annoyance or interference with vibration-sensitive activities. These annoyances can occur when construction vibration rises above the threshold of human perception over extended periods. Often, the primary concern regarding construction vibration is its potential damage effects. Damages to buildings can be cosmetic or structural.

42. Historical structures like the Chikkajala Fort are fragile and vulnerable to cosmetic and structural damages caused by ground vibration which makes them ideal structures to assess the potential impacts from the project. This contrasts with to modern reinforced buildings which can withstand higher level of vibration. The level of vibration at the receiver is dependent not only on the strength of the source but like noise is also function of the media where the where and how far the waves are transmitted. Distance, soil composition, and subsurface conditions will be considered in the assessment. The U.S. FTA's construction vibration damage criteria and guidance values from the Caltrans' Transportation and Construction Vibration Guidance Manual are provided in the following Tables.

Table 27: Construction Vibration Damage Criteria

Building Category	Peak Particle Velocity (PPV) (in/s)
i. Reinforced-concrete, steel or timber (no plaster)	0.5
ii. Engineered concrete and masonry (no plaster)	0.3
iii. Non-engineered timber and masonry buildings	0.2
iv. Buildings extremely susceptible to vibration damage	0.12

Source: U.S. FTA, 2006

Table 28: Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 29: Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Figure 11: Most vibration sensitive structure in the project area – Chikkajala Old Fort and Temple @26+574km, 26.35m away, phase 2b

Operation

43. To evaluate the vibration impacts during Metro operation, the Vibration Impact Criteria for General Assessment and for Special Buildings of the U.S. FTA (2006) was adopted. These

criteria is based on the magnitude and exposure from vibration and as the number of passing trains at specified locations increases the criteria value decreases. The daily schedule of trains as presented in the noise assessment exceeds 70 daily trips, the vibration criteria level for frequent events will be applied as presented in the succeeding Table. This approach assumes that one vibration event equals one train pass-by.

Table 30: U.S. FTA Ground-Borne Vibration Impact Criteria

Receptor Land Use		RMS Vibration Levels (VdB)		
Category	**Description**	**Frequent Events[1]**	**Occasional Events[2]**	**Infrequent Events[3]**
1	Building where vibration would interfere with interior operations.	65[4]	65[4]	65[4]
2	Residences and buildings where people normally sleep.	72	75	80
3	Institutional land uses with primarily daytime use.	75	78	83
Specific Buildings	Televisions/ Recording Studios/ Concert Halls	65	65	65
	Auditoriums	72	80	80
	Theaters	72	80	80

[1] Defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
[2] Defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk line have these many operations.
[3] Defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

Source: U.S. FTA, 2006

Construction Vibration Assessment

44. The vibration impact assessment during the construction phase focused on the impact equipment that will be used during construction phase which were enumerated in the construction noise assessment. These impact equipment are the backhoe with pavement breakers and vibro-hammers for piling. Caltrans provides the reference vibration levels for pavement breakers[14] and vibro-hammers[15] at 0.035 in/sec and 0.65 in/sec, respectively. The predicted vibration levels at Chikajala Fort are computed as follows:

$$PPV_{Impact\ Pile\ Driver} = PPV_{Ref}\ (25/D)^{n} \times (E_{equip}/E_{Ref})^{0.5}\ (in/sec)$$

Where: PPVRef = 0.65 in/sec for a reference pile driver at 25 ft.
D = distance from pile driver to the receiver in ft. (26.35m/86.4 ft)
n = 1.3 for red loamy and sandy soils, laterite soil in the project area
ERef = 36,000 ft-lb (rated energy of reference pile driver)
= assumed at 15,000 ft-lbs which is typical value for sheet piling at less than 25ft[16]
Eequip = rated energy of impact pile driver in ft-lbs. (80,000)

$= 0.65(25/86.4)^{1.3} \times (15{,}000/80{,}000)^{0.5}$
$= 0.130 \times 0.433$
$= 0.056$ in/sec

[14] Assumed as jack hammer
[15] Assumed as pneumatic hammer
[16] R.G Ahlvin and V.A. Smooths (1988)."Construction Guide for Soils and Foundations.) 2nd ed. John Wiley and Sons, Inc.Canada

PPVpavement breaker = PPVRef $(25/D)^n$ (in/sec)

Where: PPVRef = reference PPV at 25 ft. (0.035 for jack hammer)
D = distance from equipment to the receiver in ft. (86.4 ft)
n = 1.3 (the value related to the attenuation rate through ground)

$= 0.035(25/86.4)^{1.3}$
$= 0.007$ in/sec

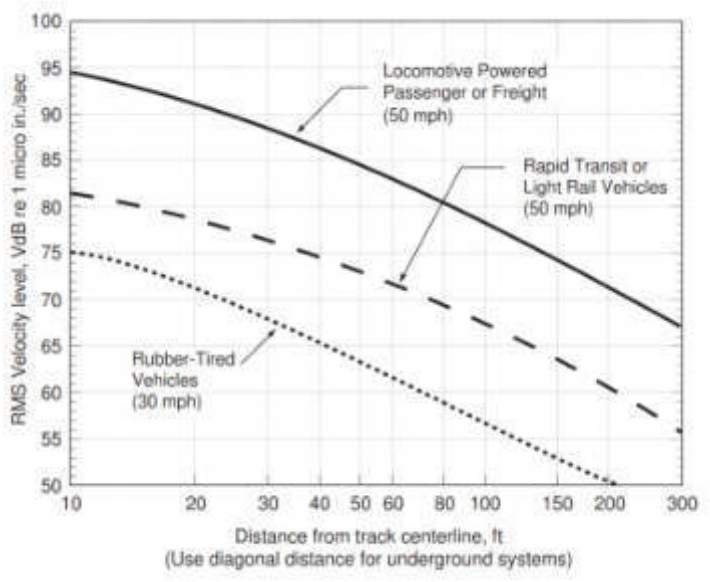
45. The predicted vibration level at Chikajala Fort during piling and pavement breaking are lower than the criteria value for extremely fragile structures and ruins of 0.08 in/sec. There is no risk posed by the construction activities to the Fort and no further mitigations are needed.

Operation Vibration Assessment

46. The succeeding Table summarizes the operational vibration general assessment for the proposed project. The assessment utilized the Federal Transit Administration (FTA) EMU train vibration curve and adjusted based on speed, suspension, track condition, and track treatment; vibration pathway that considers elevated track configuration and soil type; and the type of receiver, in this case small masonry structures. The vibration levels were estimated from 6 to 30 meters from the edge of the track. The base curve is provided in the succeeding Figure. The following adjustments from the curve were made based on the track design provided in the BRMCL Detailed Project Reports for Phase 2A and 2B.

- Speed adjustment: -2.545 VdB for speed of 60 kmph for 2B and 34 kph at 2A
- Wheel condition: maintained in good condition, no adjustment.
- Track system: maintained in good condition, no adjustment
- Track Treatment: -10VdB for ballast mats, - 5VdB for resilient fasteners, used -5 for resilient fasteners
- Track factor: -10 VdB for viaduct
- Propagation: 8 VdB, Normal propagation is considered with rock layer within 150ft,
- Foundation coupling: 0 VdB
- Receiver adjustment: 3 VdB for small masonry

47. The succeeding Tables summarize the vibration levels at certain distances away from the foundation centerline. With trains running at 34 kph, there is no zone of impact and no structures at risk from operational vibration. Mitigation are needed. With trains running at 60 kph, a corridor within 6.1m from both sides of the foundation will be exposed to vibration levels that barely exceeds the 72 VdB criteria for residential land uses at 72.1 VdB. No mitigation measures are recommended.



Source: FTA (2018)

Figure 12: Generalized Ground Surface Vibration Curves

Base Curve. The generalized projection curves for high-speed trains are shown in below figure 33..

Table 31: Summary of the Operational Vibration Assessment Running at 60KPH, in VdB

			ADJUSTMENTS									Vibration Based on Source and Path	RECEIVER	mated Vibra
DISTANCE FROM CENTERLINE		REFERENCE VIBRATION	SOURCE						PATH					
meter	feet	Lv, RMS	Speed	Suspension		Track Condition	Track Treatment		Resilient Tie Block	Elevated Tracks	Soil	ELEVATED SECTION	Small Masonry	
6.1	20	78.6580	-2.5475	0	0	0	-5	-10	-10	-10	8	74.1105	3	77.1105
9.15	30	76.4483	-2.5475	0	0	0	-5	-10	-10	-10	8	71.9008	3	74.9008
12.2	40	74.6500	-2.5475	0	0	0	-5	-10	-10	-10	8	70.1025	3	73.1025
15.25	50	73.1159	-2.5475	0	0	0	-5	-10	-10	-10	8	68.5684	3	71.5684
18.3	60	71.7684	-2.5475	0	0	0	-5	-10	-10	-10	8	67.2209	3	70.2209
21.35	70	70.5612	-2.5475	0	0	0	-5	-10	-10	-10	8	66.0137	3	69.0137
24.4	80	69.4638	-2.5475	0	0	0	-5	-10	-10	-10	8	64.9163	3	67.9163
27.45	90	68.4551	-2.5475	0	0	0	-5	-10	-10	-10	8	63.9076	3	66.9076
30.5	100	67.5200	-2.5475	0	0	0	-5	-10	-10	-10	8	62.9725	3	65.9725

Speed	60	kph
	37.26	mph
ref speed	50	mph
	80.45	kph

Table 32: Summary of the Operational Vibration Assessment Running at 34 KPH, in VdB

			ADJUSTMENTS									Vibration Based on Source and Path	RECEIVER	Estimated Vibration
DISTANCE FROM CENTERLINE		REFERENCE VIBRATION	SOURCE						PATH					
meter	feet	Lv, RMS	Speed	Suspension		Track Condition	Track Treatment		Resilient Tie Block	Elevated Tracks	Soil	ELEVATED SECTION	Small Masonry	
6.1	20	78.6580	-7.48094	0	0	0	-5	-10	-10	-10	8	69.1770	3	72.1770
9.15	30	76.4483	-7.48094	0	0	0	-5	-10	-10	-10	8	66.9674	3	69.9674
12.2	40	74.6500	-7.48094	0	0	0	-5	-10	-10	-10	8	65.1691	3	68.1691
15.25	50	73.1159	-7.48094	0	0	0	-5	-10	-10	-10	8	63.6349	3	66.6349
18.3	60	71.7684	-7.48094	0	0	0	-5	-10	-10	-10	8	62.2875	3	65.2875
21.35	70	70.5612	-7.48094	0	0	0	-5	-10	-10	-10	8	61.0802	3	64.0802
24.4	80	69.4638	-7.48094	0	0	0	-5	-10	-10	-10	8	59.9828	3	62.9828
27.45	90	68.4551	-7.48094	0	0	0	-5	-10	-10	-10	8	58.9742	3	61.9742
30.5	100	67.5200	-7.48094	0	0	0	-5	-10	-10	-10	8	58.0391	3	61.0391

Speed	34	kph
	21.114	mph
ref speed	50	mph
	80.45	kph

ANNEXES

ANNEX A - Sample Photos of Noise Measurements

ANNEX B - Vibration Monitoring Reports

ANNEX C – BMRC Noise Contour Maps

ANNEX D – Track Layout