

Report

Study on Noise Mapping and Noise Zone at Swami Vivekananda Airport, Raipur



Submitted to

**SWAMI VIVEKANANDA AIRPORT
ATAL NAGAR-NAVA RAIPUR,
CHHATTISGARH - 492015**

Submitted by

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Report

Study on Noise Mapping and Noise Zone as per DGCA guidelines for the year 2024
at

Swami Vivekananda Airport, Raipur

Doc. No.:111

July 2024

Submitted to:

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Atal Nagar-Nava Raipur,
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DISCLAIMER

Note this report is a study on '**noise** mapping' at Raipur airport conducted in accordance Environment (Protection) Amendment Rules, 2018 and to provide an initial overview of noise exposure within and outside the airport.

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- Annexure-3: Environment (Protection) Amendment Rules, 2018
- Annexure-4: Minuets of Meeting

List of Abbreviations

AAI	Airport Authority of India
ADS B	Automatic Dependent Surveillance–Broadcast
ATC	Air Traffic Control
CPCB	Central Pollution Control Board
DGCA	Directorate General of Civil Aviation
AEDT	Aviation Environmental Design Tool
NMTs	Noise Monitoring Terminals

1. Introduction

This report is prepared by Dimensional Digital Services Pvt. Ltd in response to a tender published by Swami Vivekananda Airport, Raipur to carry out Noise mapping and noise zoning study as per the requirement of The Environment (Protection) Amendment Rules, 2018.

The annual flight movements at Swami Vivekananda Airport, Raipur is around 19737 for the year 2022. The Raipur airport comes under 'Other Airport' category as per GSR 568 (E). As per Environment (Protection) Amendment Rules-2018, Airports having Aircraft movements more than 15,000 and Less than 50,000 annually, are categorised as 'Other Airport'.

Swami Vivekananda Airport (IATA: RPR, ICAO: VERP) is a domestic airport that serves the state of Chhattisgarh, India. It was formerly known as Mana Airport, but was later renamed in 2012 after the iconic Hindu monk and philosopher. The airport is owned and operated by the Airports Authority of India (AAI). It is located 15 km south-east of Raipur and is considered the busiest airport in Chhattisgarh and the second busiest in Central India.

The study was conducted in consultation with Raipur airport Air Navigation Service Provider (ATC department) as per the requirements of Environment (Protection) Amendment Rules, 2018. The Minutes of the Meeting is provided in Annexure 4. The Minutes of the Meeting is provided in Annexure 4.

1.1. Objective of study

Noise mapping and declaration of Airport Noise Zone at Swami Vivekananda Airport, Raipur as per the requirements of Environment (Protection) Amendment Rules-2018.

1.2. Scope of work

The scope of work of the noise study at Swami Vivekananda Airport, Raipur includes the following

1. A detailed scientific study of noise caused by aircraft operations and associated activities within the premises of the airport.
2. Noise monitoring, assessment and mapping
 - a. Collection of baseline information.
 - b. Noise monitoring during operation times and also at the villages located within a 10km radius from the airport.
 - c. Develop land use mapping of airport and its surrounding.

- d. Noise modelling of airport as well as at surrounding land-use using the noise prediction model.
- e. Development of noise maps and declaration of Airport Noise Zone using standard Noise modelling software.
- f. Conduct noise impact assessment using the noise maps.
- g. Study Boundary Noise due to aircraft operations
- h. Study of Lmax and its locations at Raipur Airport

1.3. Methodology of Study

The Noise mapping and Noise zone study was carried out at Swami Vivekananda Airport, Raipur as per requirement of the Environment (Protection) Amendment Rules, 2018.

Noise maps and noise zone were developed by using the Aviation Environmental Design Tool (AEDT). AEDT is the standard software developed by The Federal Aviation Administration (FAA) US, AEDT is a integrated software to estimate the environmental consequences of aviation actions, such as airport noise, fuel consumption, and air pollutant emissions.

The basic input data for noise modelling is flight operation data. The flight operations of one year (from 1st Jan 2023 to 31st Dec. 2023) were obtained from Raipur airport.

The flight data covers the details of each flight that was operated at airport including: runway usage, flight registration no, Airline operator, Call sign information, date, time, route etc. All the flight details were processed to check any missing or errors in the flight data.

Noise maps for Lday and Lnight were developed using the flight data. In order to validate the Noise contours, noise monitoring campaign was conducted at Raipur airport for a period of one week (from 19th April. 2024 to 25th April 2024). During noise monitoring at Raipur airport, flight tracks were also monitored using Automatic Dependent Surveillance–Broadcast (ADS-B) station.

This report is in two parts:

- 1) Noise mapping study at Raipur Airport
- 2) Noise zone study at Raipur Airport

Part-1: Noise Mapping Study at Raipur Airport

2. Noise modelling

Noise modelling and mapping was developed using the actual air traffic data of the year 2023, flight tracks and geographical information of airport, airport master plan. Noise maps were developed for the following noise indices: L_{day} , L_{night} , on 5 dBA intervals starting from 55 dBA to 75 dBA for L_{day} metrics and from 45 dBA to 75 dBA for L_{night} metrics.

2.1. Noise Metrics

L_{day} Means the average sound level, in decibels, from 0600-2200hrs

L_{night} Means the average sound level, in decibels, from 2200-0600hrs

The following noise contours have been determined (table 2-1):

Table 2-1: Noise metrics.

Metric	Level dB(A)
L_{day}	55dB to 75dB
L_{night}	45dB to 75dB

2.2. Airport data

For the calculations the following airport related input data has been used, mainly based on the information provided in the Aeronautical Information Publication (AIP) and Automatic Dependent Surveillance - Broadcast (ADS-B) data.

Runways

Swami Vivekananda Airport, Raipur has one runway in use, the details are given in Table 2-2.

Table 2-2: Runway details.

Runway	Header	Runway end / Runway threshold	Latitude	Longitude	Elevation [ft]
06-24	06	THR	21°10'35.21"N	081°43'54.22"E	THR: 1017.0FT
		RWY END	21°11'11.33"N	081°44'58.26"E	TDZ: 1028.0FT
	24	THR	21°11'11.33"N	081°44'58.26"E	THR: 1036.0FT
		RWY END	21°10'33.06"N	081°43'50.40"E	TDZ: 1043.0FT

The meteorological conditions that have been used for performance calculations in AEDT are the average meteorological data for the last 10 years.

2.3. Traffic data

Following internationally accepted conventions, noise maps are to be derived for a representative day of the year. Since the flight plan provided by Raipur airport, provides the actual aircraft types used in the year 2023, the typical fleet composition can easily be derived by dividing the total number of operations of each aircraft type by the total number of days. Tables 2-3 and 2-4 provide the fleet composition of this representative day for the year 2023 divided by 365.

Table 2-3: Fleet composition and percentage of operations for each time period.

Class	Aircraft Models	% Day	% Evening	% Night
Medium-range (single aisle)	A320 family, B737 family, etc.	86%	76%	75%
Long-range wide bodies (2 eng)	A330, B777, etc.	0	0	0
Long-range wide bodies (4 eng)	A340, B747, etc.	0	0	0
Turboprops	ATR72, etc.	14%	24%	25%
Other	General aviation, helicopters, etc.	0	0	0
	Total	100%	100%	100%

Table 2-4: Fleet composition and percentage of operations for the time period of the total number of operations.

Class	Aircraft Models	% Day	% Evening	% Night	% Total
Medium-range (single aisle)	A320 family, B737 family, etc.	53%	27.6%	1%	82%
Long-range wide bodies (2 eng)	A330, B777, etc.	0	0	0	0
Long-range wide bodies (4 eng)	A340, B747, etc.	0	0	0	0
Turboprops	ATR72, etc.	9%	9%	0.4%	18%
Other	General aviation, helicopters, etc.	0	0	0	0
	Total	62%	36%	2%	100%

Flight profiles

The aircraft operational conditions were determined based on the Standard flight procedures, provided in the AEDT aircraft performance database.

Track distribution

Based on the flight plan data the distribution among the runways (see Table 2-5) of all operations has been derived for the representative day.

Table 2-5: Distribution among the runways.

Runway	A	D	Total
06	3.9	3.9	7.8
24	21.9	22.1	44.0
Total	25.7	26.0	51.8

Based on the destination and cardinal, the distribution among the tracks of each aircraft type (incl. stage-length) has been derived for the representative day.

This combination of the actual runway usage and distribution among the tracks will thus allow for the determination of a single noise map for the combined result of the various runway use configurations. This is normal practice in airport noise mapping, since it provides the noise exposure in a single map, taking into account the actual use (in terms of relative importance of each runway) of the airport.

2.4. Noise Monitoring

Noise monitoring was conducted at Swami Vivekananda Airport, Raipur as per the 'Requirement and Procedure for monitoring ambient noise levels due to aircraft' by CPCB.

The Noise monitoring instrument meets the requirements for a Class 1 Instrument, as specified in IEC 61672-1 (2002) Class 1. The Noise Monitoring Station (NMS) consists of a weatherproof microphone, a data storage and analysis device, and an information transmission system - GSM (Global System for Mobile Communications).

The Sound Level Meter was installed in flat terrain having no excessive sound absorption characteristics such as thick, matted or tall grasses, shrubs, or wooded areas. There were no obstructions influencing the sound field from the aircraft.

The location of the NMSs placed at Raipur airport are shown in figure 2-1.



Figure 2-1: Location of Noise Monitoring Stations.

Both the noise monitoring stations are located within the airport boundary. The noise instrument was placed at a height of 4m from ground level. The following photographs highlight the position and setup of the noise monitoring locations (Figure 2-2).



Noise monitoring at 06 end.



Noise monitoring at 24 end.

Figure 2-2: Photographs of Noise Monitoring Stations at Raipur Airport

3 Noise mapping

One of the main objectives of the present study is to derive noise maps for the current noise situation at Raipur airport. In this section, the input data, methodology and results of the noise maps are described.

It should be noted that, the noise maps provided do NOT take into account any existing background noise.

3.1 Input data

The following are the input data used to calculate the noise contours:

- Existing tracks for the runways
- Forecast for Traffic
- Fleet mix
- Distribution of flights

3.2 Methodology

The noise maps were developed for the noise indices: L_{day} , & L_{night} , on 5dBA intervals starting from 55 dBA to 75 dBA and for L_{night} it start from 45dBA.

Noise mapping was carried out using the flight data of 2023 (flight data from 1st Jan 2023 to 31st Dec 2023). The flight data was processed and filtered out invalid events. The flight data was used as input data in the AEDT noise model that is developed by FAA. AEDT is the international standard software used for air and noise modelling of aircrafts. Using this software L_{day} , & L_{night} on 5 dBA intervals were developed.

Along with the flight data, flight tracks, GIS maps of airport and master plan of airport were also used as an input data for noise mapping. The flight tracks were obtained using the ADS-B station installed at the airport during measurement period.

The flight tracks of the Raipur airport is shown in figure 3-1 and 3-2.

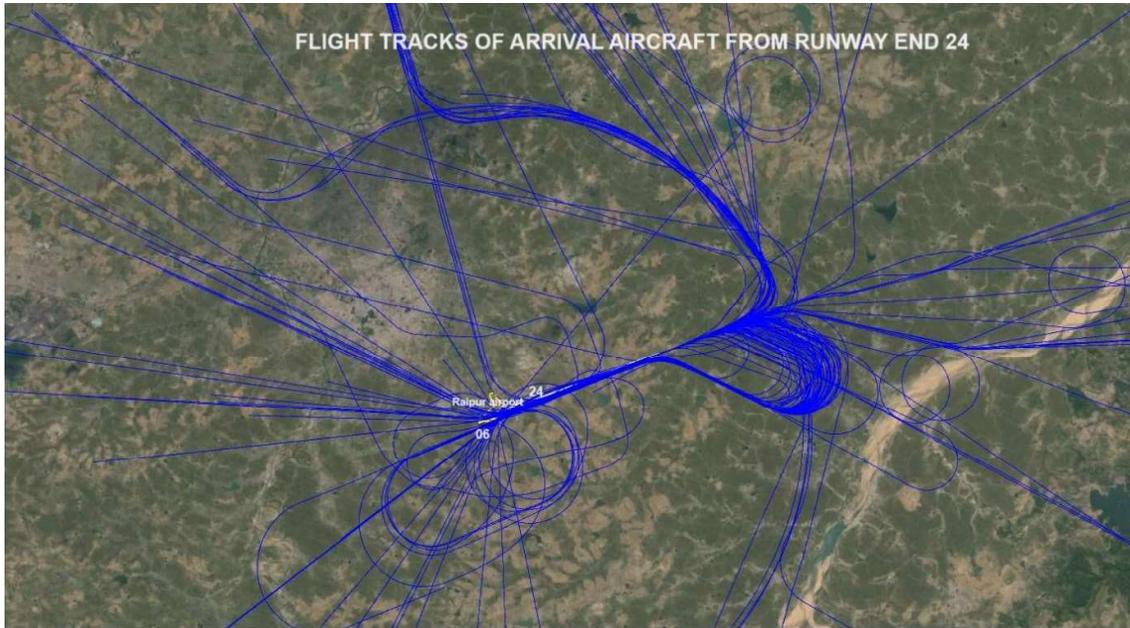


Figure 3-1: Showing the Arrivals from Runway end 24.

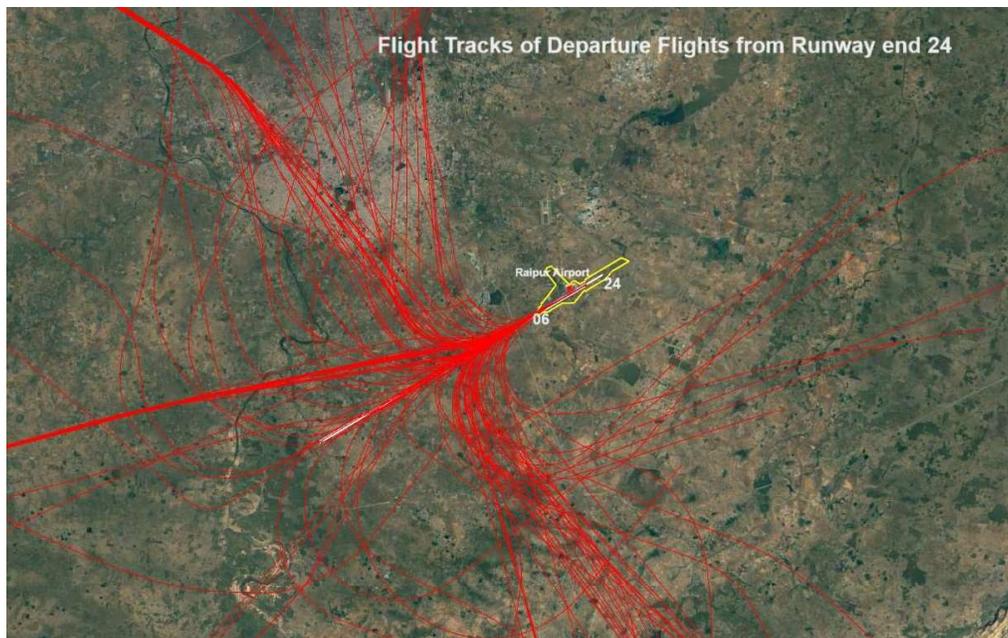


Figure 3-2: Showing the Departure from Runway end 24.

It is observed that both the arrival and departure flight paths from both ends of the runway (06 and 24) confirm that the flights are operating within the approach and take-off climb funnel described in the GSR 751 (E).

3.3 Results

In the following section, the noise contours are provided for the metrics defined above and for the required range of aircraft noise levels. These contours are validated with the noise monitoring data.

Figure 3-3 presents the noise contours for the L_{day} metric. This map only takes into account the operations occurring between 06h and 22h.

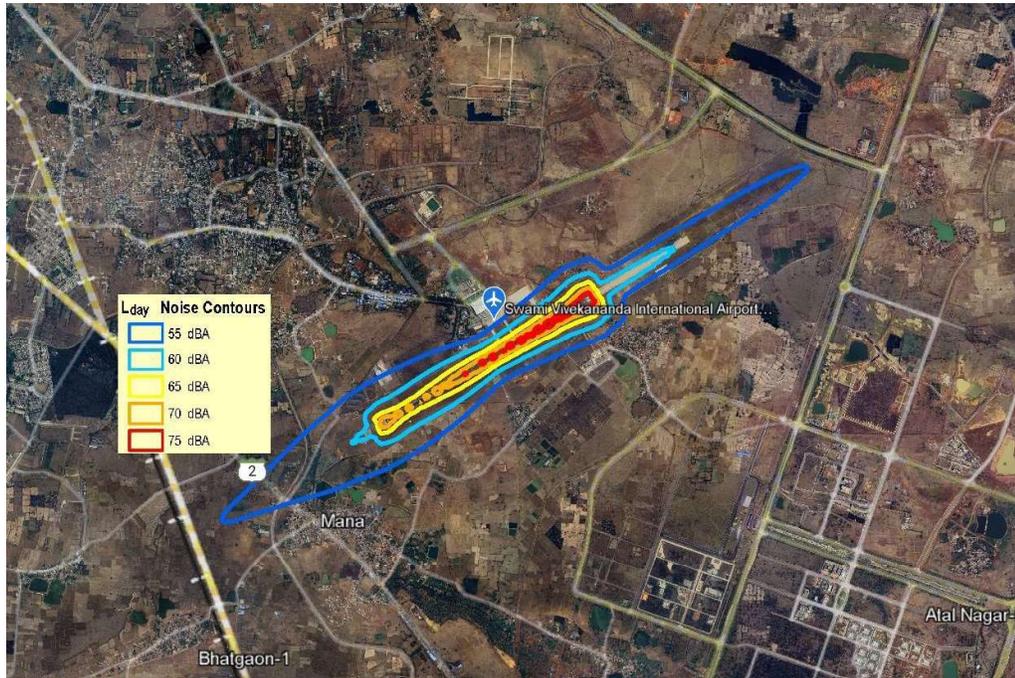


Figure 3-3: Noise Contour: L_{day} (55,60,....,75).

Figure 3-4 gives the noise contours for the L_{night} metric. This map only takes into account the operations occurring between 22h and 06h. However, these contours are provided also for lower noise levels (down to 45 dBA), which corresponds to larger distance away from the airport.

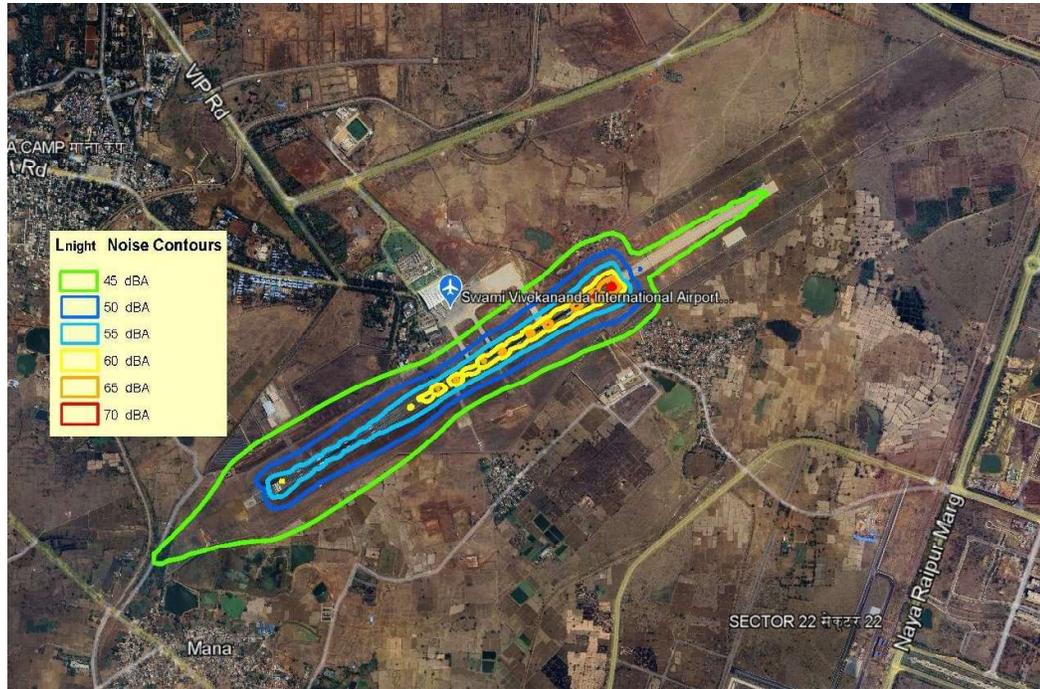


Figure 3-4: Noise Contour: L_{night} (45,50,...,75).

3.4 Validation of predicted noise levels with measurement results

In order to assess the validity of the noise mapping process, measurements were made with noise monitoring stations at 2 points near the airport. These measurements also included the deployment of an ADS-B receiver, which provided information on the actual flight tracks of the operations detected during the measurement period. The data were processed with the noise monitoring system to obtain the various noise metrics for which the noise maps have been determined. The following table 3-1 gives both datasets for measured and predicted noise levels respectively.

Table 3-1: Comparison of measured and calculated noise levels.

Location	Position		L_{day} in dB			L_{night} in dB		
	Latitude	Longitude	Meas	Model	Δ	Meas	Model	Δ
06	21.173773 N	81.728008E	57	57.3	0.3	41.7	44.0	2.3
24	21.188605 N	81.755265 E	54.3	56.8	2.5	39.8	41.4	1.6

As can be seen from this table, the average difference between prediction and measurements is in the order of at most 2.5 dB(A), which is considered as an acceptable result. From the variation in the difference for the various metrics of each single point it can be concluded that there does not appear to exist a significant bias in noise maps. The noise maps is also shown on topographical maps which is given in Annexure 1.

Part-2: Noise Zone Study at Raipur Airport

4 Noise Zone study

As per the Environment Protection Amendment Rules of 2018, the noise zone study was carried out at Raipur airport during month of March - May 2024. The noise zone study includes the L_{max} levels study, the boundary noise determination and development of noise zone.

For the purpose of establishment of noise zones, the noise contours for a future scenario are to be determined, representative for the maximum capacity of the airport. In this manner, the airport "reserves" space for growth.

4.1 Input data

The following are the input data used to calculate the noise zone contours:

- Existing tracks for the runways
- Forecast for Traffic
- Fleet mix
- Distribution of flights

The fleet mix is based on the 2023 flight plans data.

For the future fleet the same fleet mix share of all aircraft types is maintained, except for the A320 family, for which a 20%/80% ratio is assumed for Classic and Neo versions respectively.

The number of movements is based on the maximum capacity presented in table 4-1. The maximum capacity corresponds to a total of 1,05,028 movements per year, which is the amount used in this study.

Table 4-1 : Hourly Runway Traffic Handling Capacity

Operational Mode	with Approach RADAR		without Approach RADAR	
	RWY 06	RWY 24	RWY 06	RWY 24
Max Number of Arrival and Departure	12	12	10	10
Max Number of Arrival Only	06	08	05	05
Max Number of Departure Only	15	10	12	10

At present an 98%/2% distribution between Day and Night operations is found. For the future scenario this same distribution is maintained.

With respect to runway operation, currently an 85%/15% Southwest / Northeast share is found.

For the future scenario an 85%/15% for Southwest / Northeast configuration is assumed.

Combining the above, the following table 4-2 can be compiled as a description for the future scenario:

Table 4-2: Future scenario traffic distribution.

Total Movement	Direction	Runway	Arrival / Departure			
			% day flow direction (Traffic)	% day (Traffic)	% night flow direction (Traffic)	% night (Traffic)
105028	Northeast	06	14.74	15.00	0.26	15.00
	Southwest	24	83.50	85.00	1.50	85.00

Considering that noise contours are quite close to the runway ends and do not cover the turn point, it is assumed that the tracks are straight ahead the longitudinal axes of the runway.

4.2 Methodology

The noise contours for the future scenario are calculated with the AEDT 3e model, using the input data as described in the former section.

As per definition provided by DGCA, the noise zones are determined based on the following noise contours:

Metric	Contour (dB)
L _{day}	55
L _{night}	50

4.3 Noise zones

Based on the noise zoning results from studies performed at various Indian airports, DGCA concluded that the L_{day} 55 and L_{night} 50 noise contours shall be used as the airport noise zones for day and night period respectively. Figures 4.1-4.2 present these contours for Raipur airport. The combined map of L_{day} and L_{night} zone is shown in figure 4-3.



Figure 4-1: Airport noise zone for day time (based on L_{day} 55 noise contour).

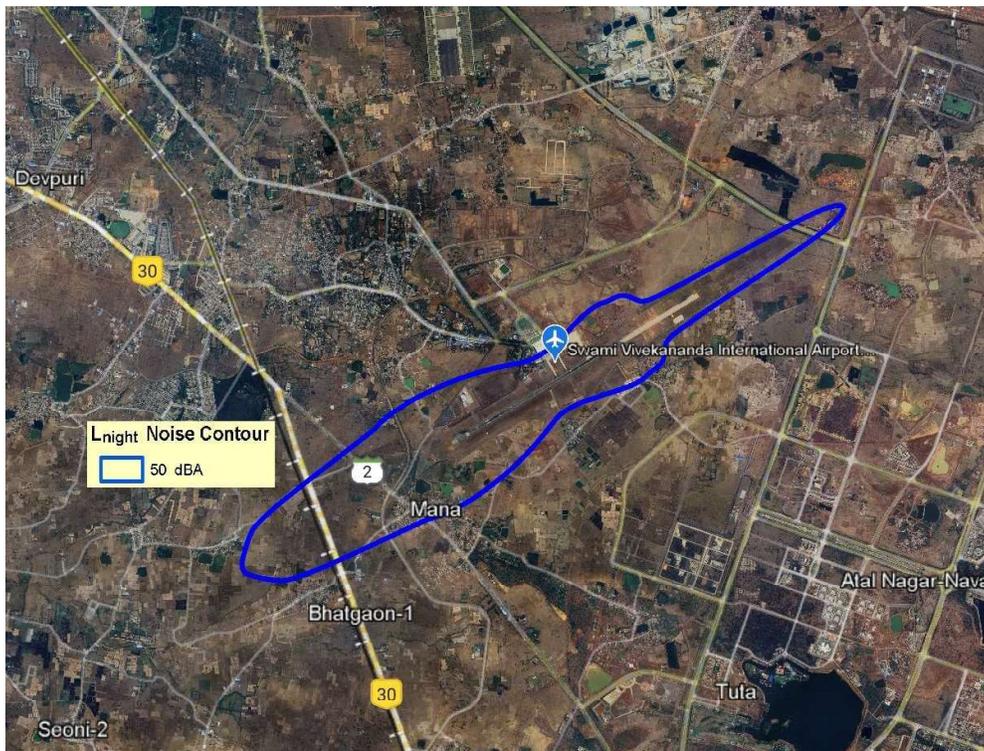


Figure 4-2: Airport noise zone for night time (based on L_{night} 50 noise contour).



Figure 4-3: Airport noise zone for day and night time (based on L_{day} 55 and L_{night} 50 noise contours).

The noise zone maps is also shown on topographical maps which is given in Annexure 2.

5 L_{max} of Airport

In accordance with Environment Protection Amendment Rules, June 2018 the maximum noise levels should be determined at specific points. Usually this would be done based on the measurements performed with a noise monitoring system. At Raipur airport such system is not yet installed and thus the maximum noise levels will have to be determined based on the predictions with the noise model. For this, 2 locations are defined in the nearest villages on both sides of the extended center-line of the runway.

5.1 Input data

In order to determine the L_{max} at two locations, the actual flight data of 2023 was analysed along with the following information:

- L_{max} of individual aircraft operations measured at the various noise monitoring locations.
- Information on operation (Aircraft type, runway/track used, distance to microphone, etc).
- Flight Data for the years 2023.

5.2 Methodology for the definition of L_{max}

- Analyse L_{max} single event data for each proposed location
- Filter out non-valid events
- Determine maximum noise level at each location
- Define limit on L_{max} for each location

For every month of 2023 all aircraft noise events were identified and the L_{max} level of each event was determined. This procedure is used for all points outside the expected band, for both Departures and Approaches. At this stage it is important to distinguish between Departure and Approach, because the noise characteristics in both flight phases are very different. The L_{max} noise levels were determined by the noise modelling software AEDT. However, these L_{max} limits are temporary and shall be revised once permanent noise monitoring stations are installed at the both ends of the runway.

5.3 L_{max} of Raipur airport

When establishing the limits for L_{max} , several considerations should be made:

- Should be sufficiently high to allow for the vast majority of operations to comply with.
- Should be sufficiently low to avoid the (unnecessary) noisiest operations.

- What to do with those events that exceed the limit.

In order to avoid an arbitrary definition of the L_{max} level, it is proposed to set the limit at each location such that the 10 highest noise events detected in the period 2023 should be considered excessive. Table 5-1 presents the results of this exercise. The L_{max} values are derived using the AEDT noise model considering the type of flights, flight tracks, flight plan and geographical location of settlement areas.

Table 5-1: Maximum calculated noise levels at the nearest residential areas.

Village	Lmax in dB	Coordinates	
	AEDT	Latitude	Longitude
Mana	85.6	21°10'13.56"N	81°43'31.48"E
Atal Raipur Sector 6	86.8	21°12'10.19"N	81°47'6.46"E

The figure 5-1, shows the location of L_{max} points outside the airport at both end of runway. These points are temporary located at the nearest residential areas, however, the L_{max} location points will change after installation of permanent noise monitoring stations in future.



Figure 5-1: Location of villages with L_{max} values.

With these limits only few operations would have been in excess, whereas they will safeguard the currently existing noise climate at both locations. It is suggested to send a letter to those airlines operators that exceed the limit, indicating the measured L_{max} level. The main purpose of this would be to raise awareness among the operators to fly quietly. At a later stage the limits may be reconsidered downwards, in order to enforce even quieter flights, and it shall be a part of the Noise Action Plan.

6 Boundary Noise Study

As per the Environment Protection Amendment Rules, June 2018, the noise at the boundary of the airport premises needs to be determined. The boundary noise levels are determined by means of calculation by using AEDT 3e noise model.

6.1 Input data

The following are the input data used to model boundary noise.

- Coordinates of the points at the boundary
- Noise and track data from calculations and measurements
- Flight Plan for 2023
- All data for full year 2023

6.2 Methodology

The following methodology was adopted to determine boundary noise:

1. Analyse available data
2. Establish noise model for full year 2023
3. Acquire land use information
4. Determine noise levels of airport operations at airport boundary
5. Background noise from nearby residential areas close to the boundary are excluded
6. Determine average noise level over all positions of airport boundary at an interval of 150m
7. Noise levels at boundary was determined using AEDT modelling software consider the flight operation of 2023.

The details of the boundary along with the points for noise level calculation are given in figure 6-1. Total receptor points are 93 at an interval of 150m.



Figure 6-1: Definition of points on boundary, every 150 m.

6.3 Results

L_{day} and L_{night} noise levels were calculated using the model. The L_{day} noise details are shown in figure 6-2. The L_{night} noise details is shown in figure 6-3.

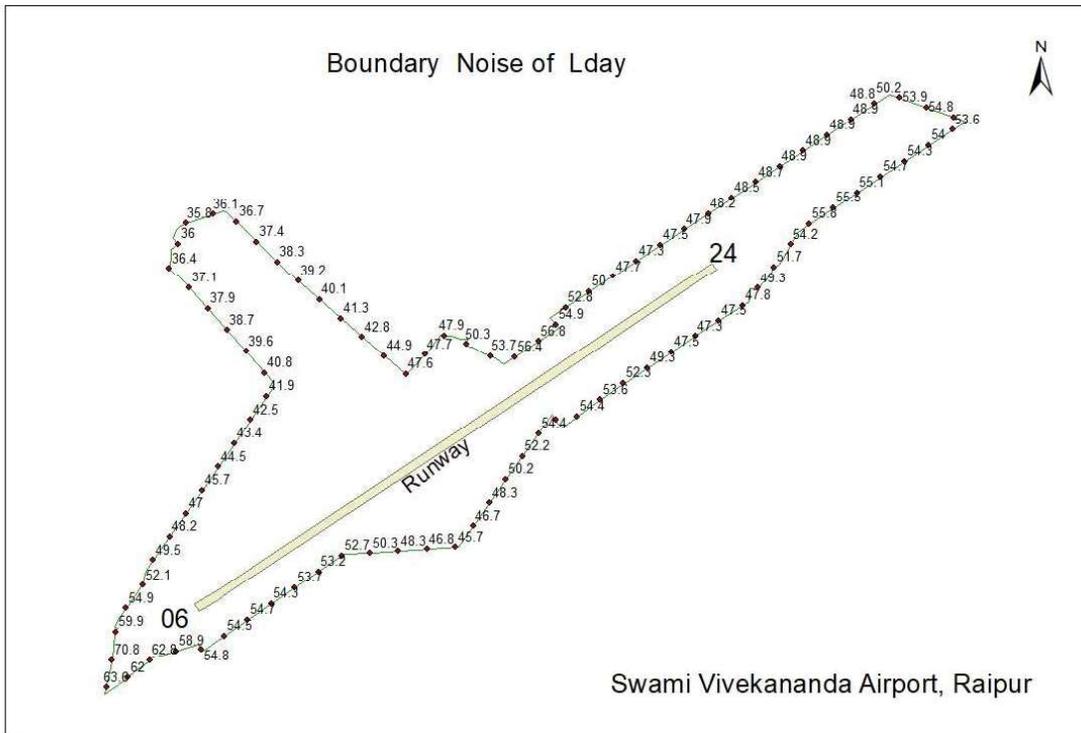


Figure 6-2: L_{day} levels at boundary points.

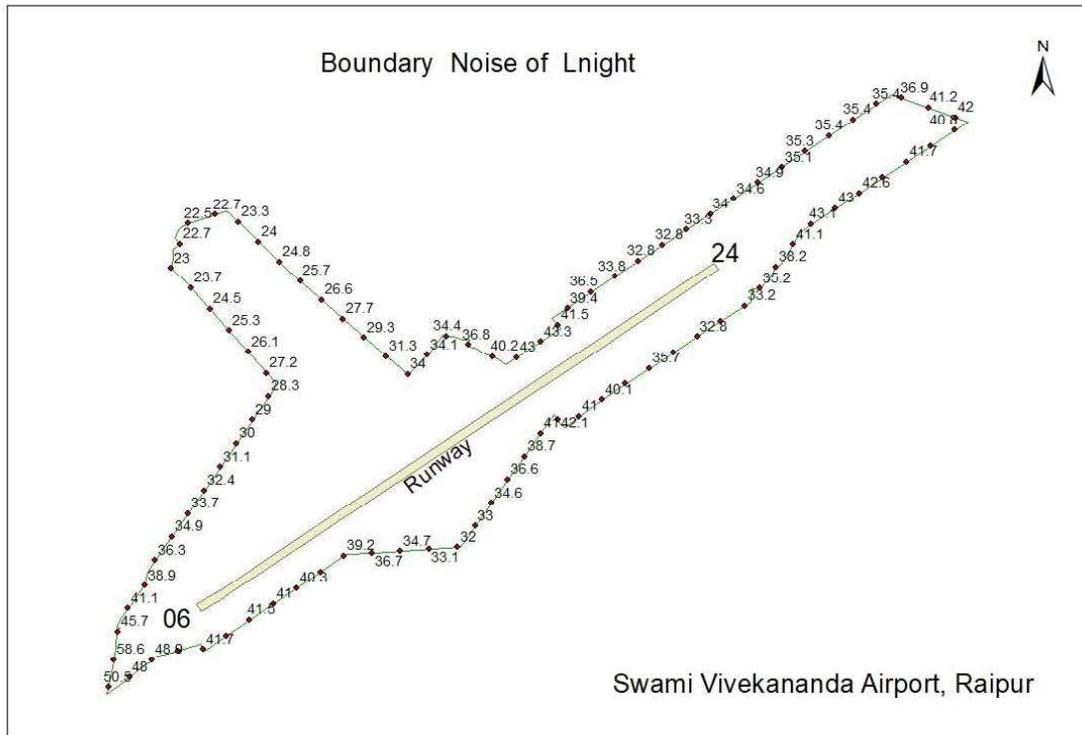


Figure 6-3: L_{night} levels at boundary points.

L_{day} and L_{night} noise levels were calculated using the model. The L_{day} and L_{night} noise details are shown in table 6-1.

Table 6-1: Points of the Airport boundary in dB

Point #	Latitude (deg)	Longitude (deg)	L _{day}	L _{night}
1	21.17229	81.72597	63.6	50.5
2	21.17359	81.72632	70.8	58.6
3	21.17491	81.72657	59.9	45.7
4	21.176	81.72713	54.9	41.1
5	21.17705	81.72802	52.1	38.9
6	21.17822	81.7286	49.5	36.3
7	21.17929	81.72948	48.2	34.9
8	21.18035	81.73036	47	33.7
9	21.18142	81.73123	45.7	32.4
10	21.1825	81.7321	44.5	31.1
11	21.18358	81.73295	43.4	30
12	21.18467	81.7338	42.5	29
13	21.18573	81.73468	41.9	28.3
14	21.18685	81.73463	40.8	27.2
15	21.1879	81.73372	39.6	26.1
16	21.18894	81.73281	38.7	25.3
17	21.18998	81.7319	37.9	24.5
18	21.19103	81.73099	37.1	23.7
19	21.19199	81.73002	36.4	23
20	21.19312	81.73053	36	22.7

Point #	Latitude (deg)	Longitude (deg)	Lday	Night
21	21.19409	81.73096	35.8	22.5
22	21.19446	81.73234	36.1	22.7
23	21.19406	81.73352	36.7	23.3
24	21.19307	81.7345	37.4	24
25	21.19209	81.73548	38.3	24.8
26	21.19114	81.7365	39.2	25.7
27	21.1902	81.73753	40.1	26.6
28	21.18926	81.73856	41.3	27.7
29	21.18833	81.7396	42.8	29.3
30	21.18742	81.74066	44.9	31.3
31	21.18651	81.74171	47.6	34
32	21.1874	81.74272	47.7	34.1
33	21.18824	81.74374	47.9	34.4
34	21.18779	81.74482	50.3	36.8
35	21.18718	81.74601	53.7	40.2
36	21.18709	81.74723	56.4	43
37	21.18778	81.74846	56.8	43.3
38	21.18853	81.74938	54.9	41.5
39	21.18933	81.74989	52.8	39.4
40	21.19002	81.75113	50	36.5
41	21.19072	81.75236	47.7	33.8
42	21.19141	81.75358	47.3	32.8
43	21.19211	81.75482	47.5	32.8
44	21.1928	81.75605	47.9	33.3
45	21.19349	81.75728	48.2	34
46	21.19419	81.75851	48.5	34.6
47	21.19488	81.75974	48.7	34.9
48	21.19557	81.76098	48.9	35.1
49	21.19626	81.76221	48.9	35.3
50	21.19696	81.76344	48.9	35.4
51	21.19765	81.76467	48.9	35.4
52	21.19834	81.7659	48.8	35.4
53	21.19857	81.76717	50.2	36.9
54	21.19806	81.7685	53.9	41.2
55	21.19755	81.76983	54.8	42
56	21.19695	81.76975	53.6	40.8
57	21.19626	81.76852	54	41.3
58	21.19557	81.76728	54.3	41.7
59	21.19488	81.76605	54.7	42.1
60	21.19419	81.76482	55.1	42.6
61	21.1935	81.76358	55.5	43
62	21.19281	81.76235	55.8	43.1
63	21.19187	81.76137	54.2	41.1
64	21.19085	81.76048	51.7	38.2
65	21.18985	81.75963	49.3	35.2
66	21.18905	81.75885	47.8	33.2
67	21.18839	81.7576	47.5	32.9

Point #	Latitude (deg)	Longitude (deg)	Lday	Lnight
68	21.18771	81.75636	47.3	32.8
69	21.18701	81.75513	47.5	33.5
70	21.18632	81.7539	49.3	35.7
71	21.18563	81.75266	52.3	38.9
72	21.1849	81.75145	53.6	40.1
73	21.18415	81.75026	54.4	41
74	21.18405	81.74916	55.5	42.1
75	21.18344	81.74829	54.4	41
76	21.18238	81.74741	52.2	38.7
77	21.18132	81.74653	50.2	36.6
78	21.18025	81.74565	48.3	34.6
79	21.17918	81.74478	46.7	33
80	21.17822	81.74383	45.7	32
81	21.17819	81.74239	46.8	33.1
82	21.17815	81.74096	48.3	34.7
83	21.17812	81.73952	50.3	36.7
84	21.17806	81.7381	52.7	39.2
85	21.17735	81.73689	53.2	39.7
86	21.17663	81.73567	53.7	40.3
87	21.17592	81.73445	54.3	41
88	21.17521	81.73323	54.7	41.5
89	21.17449	81.73201	54.5	41.4
90	21.17391	81.73082	54.8	41.7
91	21.17388	81.72956	58.9	45.6
92	21.17351	81.72821	62.8	48.9
93	21.17272	81.72705	62	48

Based on the above-described study, the following Boundary noise levels (Table 6-2) were found for Raipur airport:

Table 6-2: Boundary noise levels in dB

	L_{day}	L_{night}
Boundary	55.2	42.3
Limit	75	70
Margin	19.8	27.7

Considering the applicable limits of Industrial zone as per Noise Pollution (Control and Regulation) Rules 2000, 75 and 70 dBA are noise limits for Day and Night period respectively. Boundary noise was compared with these noise limits and found that the boundary noise level is far (19-27 dB(A)) below the limit.

7 Conclusion

A Noise mapping and noise zone study has been performed to get a first indication of the current noise situation at Raipur Airport. The study was carried out for a period of 3 months from March to May 2024. Flight tracks were measured using ADS-B system. Based on the analysis of the data gathered, the following conclusions can be derived:

1. Noise monitoring was undertaken by the Standard Class 1 type with 1/3 Octave band noise instrument and flight track monitoring system. The monitored results were validated with noise monitoring data. A comprehensive database of both noise levels and flight tracks was obtained.
2. Noise maps were developed using the flight operation data of 2023 and Noise modelling software AEDT.
3. Noise zone was developed based on the maximum capacity of runway using the AEDT software. Noise zones were developed for L_{day} and L_{night} indices with the noise contour of 55 dB and 50 dB respectively.
4. The Airport Noise Zone area for Raipur Airport has been developed on the basis of existing GSR 751 (E), issued by the Ministry of Civil Aviation (Height Restrictions for Safeguarding of Aircraft Operations) Rules, 2015 published on 30th September, 2015 as amended from time to time on Height Restriction for Safeguarding of Aircraft Operation considering all approach and departure funnels and Instrument Flight Procedures (i.e.Instrument Approach Procedures, Standard Instrument Departure & Standard Terminal Arrival Route) in consultation with airports Air Navigation Service Provider as per the Master Plan of the Airport
5. After obtaining approval from DGCA, the Noise zone shall be displayed on the website of respective Airport Operators.
6. State / Union Territory Development Authorities should take into consideration of Airport Operations requirements in the airport noise zone area for the land use planning around the airport.
7. The Development Authorities/Regional Planning Department shall specify provisions for inclusion of sound resistance in new buildings, facilities and projects of residential, institutional, hospital and commercial facilities in the design, construction and materials selections for improving indoor environment under existing building codes and bye laws for any building constructions coming under airport noise zones.

7.1 Mitigations measures

The following are some of the recommended mitigation measures proposed:

- Minimum usage of reverse thrust after landing.
- Use of quieter aircrafts such as A320 NEO will significantly help in reducing noise impact.
- Use of Continuous Descent Approach during non-peak hours. It is found that the reduction in noise levels due to steeper arrivals are generally not noticeable for anyone living in the vicinity of airport.
- Avoid intersection take-off: The intersection take-off can result in an increase in noise exposure because the aircraft is lower along the departure path, resulting in an increase in noise levels at the vicinity of the villages. Therefore, it is advised to avoid intersection take-offs.
- Restrict night time flight operations as much as possible to reduce aircraft noise levels associated with aircraft operations during night-time hours.

7.2 Action plan

Based on the results of this noise study, Raipur airport management is recommended to perform a more detailed follow-up study which should at least address the following:

- ✚ Once the airport crosses 50,000 movements per year, the airport shall install a permanent noise monitoring and flight track system, with stations located in the most noise-sensitive areas.
- ✚ The possibility to implement noise mitigation measure stated in this report.
- ✚ A periodic schedule for observing noise related issues and implementing a reporting mechanism.
- ✚ The evaluation of the noise reductions by optimised take-off procedures for the most relevant aircraft types (such as A320, B737-800, A330, B777, B747-400)..

Annexure 1

Noise maps of Raipur Airport

(Developed using 2023 flight data)

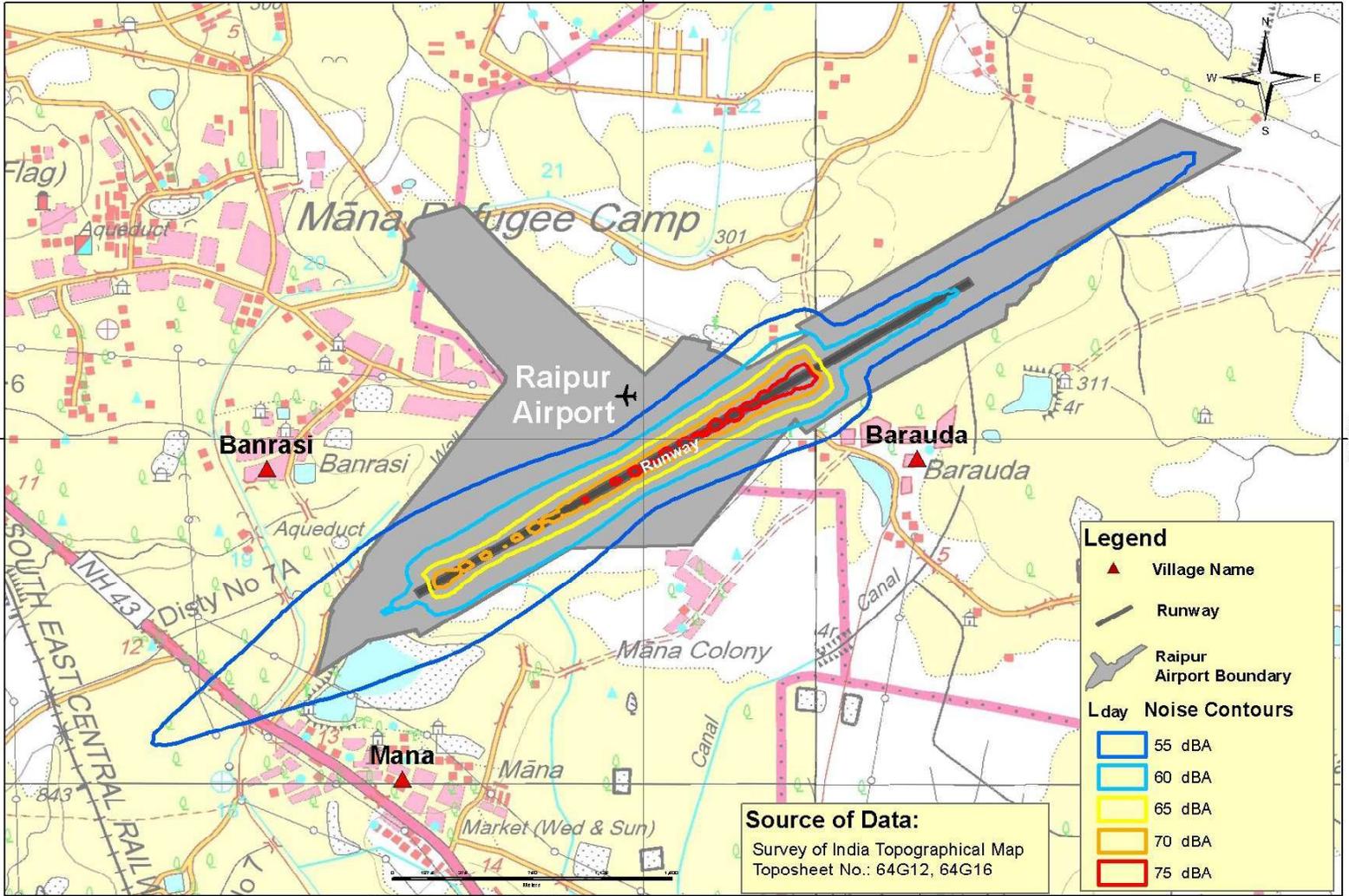
Noise maps

The following noise contours are provided. These maps have been determined applying the methodology described in report.

Metric	Level dB(A)
L _{day}	55dB to 75dBb with 5 dB Interval
L _{night}	45dB to 75dB with 5 dB Interval

Noise Contour Map of L_{day} in dB (A)

81°44'30"E



Legend

- ▲ Village Name
- Runway
- ⬭ Raipur Airport Boundary

L_{day} Noise Contours

- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA

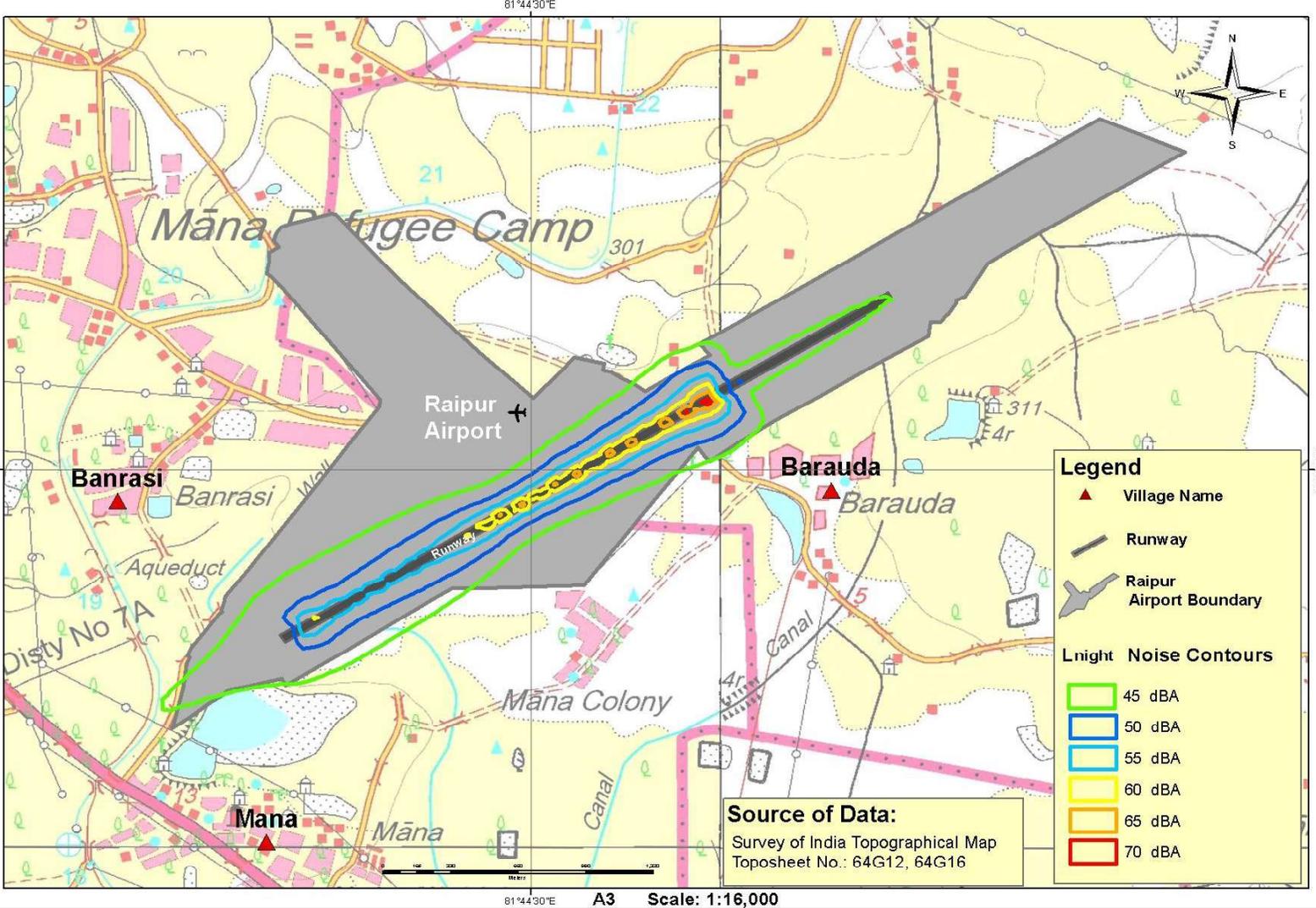
Source of Data:
 Survey of India Topographical Map
 Toposheet No.: 64G12, 64G16

A3 Scale: 1:18,000 81°44'30"E

21°10'N

21°10'N

Noise Contour Map of L_{night} in dB (A)



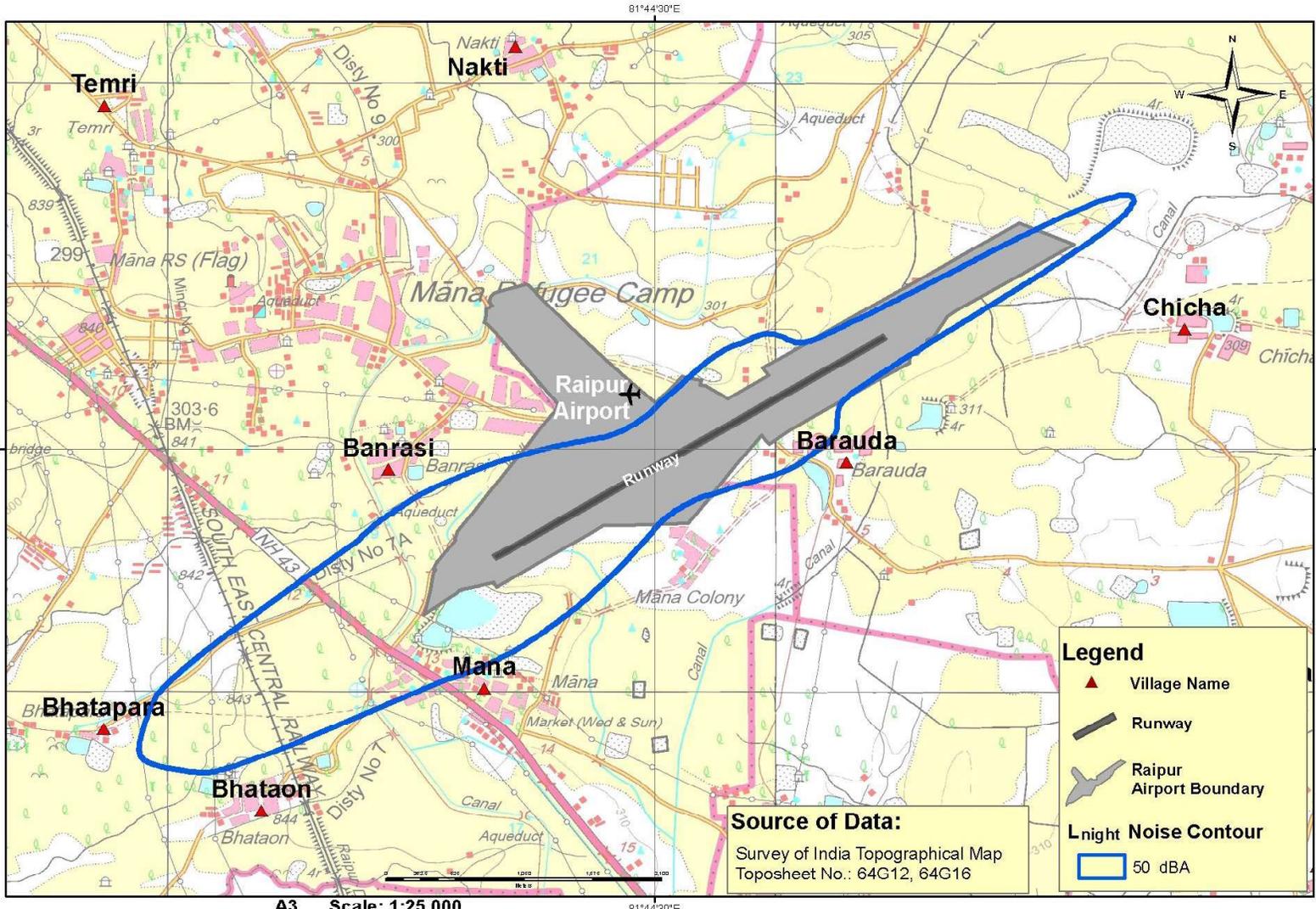
Annexure 2

Noise Zone maps of Raipur Airport

Noise Zone maps

The following noise zone contours are provided. These maps have been determined applying the methodology described in report.

L_{night} 50 dBA Contour for Noise Zone



Annexure 3

Environment (Protection) Amendment Rules, 2018



भारत का राजपत्र The Gazette of India

असाधारण

EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (i)

PART II—Section 3—Sub-section (i)

प्राधिकार से प्रकाशित

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अधिसूचना

नई दिल्ली, 18 जून, 2018

सा.का.नि. 568(अ)—केन्द्रीय सरकार पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 6 और धारा 25 में प्रदत्त शक्तियों का उपयोग करते हुए पर्यावरण (संरक्षण) नियमावली, 1986 में और संशोधन करने के लिए एतद्वारा निम्नलिखित नियम बनाती है, अर्थात्:-

- (1) इन नियमों का संक्षिप्त नाम पर्यावरण (संरक्षण) संशोधन नियम, 2018 है।
(2) ये राजपत्र में प्रकाशन की तारीख को प्रवृत्त होंगे।
- पर्यावरण (संरक्षण) नियम, 1986 में, अनुसूची-I में क्रम सं.111 और उससे संबंधित प्रविष्टियों के बाद निम्नलिखित क्रम संख्या और प्रविष्टियां अंतःस्थापित की जाएंगी, अर्थात्:-

क्रम सं.	उद्योग	प्राचल	मानदंड	
1	2	3	4	
		विमानपत्तन ध्वनि परिक्षेत्र में ध्वनि के संबंध में परिवेशी वायु गुणवत्ता मानक		
"112	विमानपत्तन	विमानपत्तनों के प्रकार	db (A) Leq* में सीमाएं	
			दिन का समय	रात्रि का समय
		व्यस्त विमानपत्तन	70	65
		प्रस्तावित विमानपत्तनों से इतर सभी अन्य विमानपत्तन	65	60

परिभाषाएं:

- (क) *dB (A) Leq माप A पर डेसीबल में ध्वनि स्तर में भारित औसत में लगे समय को सूचित करता है, जो मानवीय श्रवण से संबंधित है। भारित औसत के लिए समय सीमा के लिए दिन में 6.00 प्रातः से 10.00 बजे रात्रि तक और रात्रि समय में 10.00 बजे रात्रि से 6.00 बजे प्रातः तक की समय सीमा पर विचार किया जाता है।
- (ख) db (A) Leq "A" से ध्वनि के मापन में भारिता बारम्बारता और मानव श्रवण की बारम्बारता प्रतिक्रिया विशेषताओं के प्रति समनुरूपता को सूचित करता है। (मानव श्रवण सीमा 20 Hz से 20 KHz तक है)
- (ग) "डेसीबल" वह इकाई है जिसमें ध्वनि मापित की जाती है।
- (घ) Leq : B यह एक विनिर्दिष्ट समय सीमा में ध्वनि स्तर का ऊर्जा औसत है।
- (ङ.) व्यस्त विमानपत्तन- विमानपत्तनों पर ध्वनि प्रबंधन के प्रयोजनार्थ एक व्यस्त विमान पत्तन को "उस नागर विमानपत्तन, जहां हल्के यानों के केवल प्रशिक्षण प्रयोजनार्थ संचालन को छोड़कर, 50,000 प्रति वर्ष यानीय संचालन (विमान के उड़ान भरने अथवा उसे उतारने की क्रिया) से अधिक हो, के रूप में परिभाषित किया जाएगा।
- (च) उड़ान भरना- उड़ान भरने की शक्ति के प्रयोग से उड़ान भरने की अंतिम उच्च सीमा तक की अवस्था
- (छ) जमीन पर उतरना –लैंडिंग फ्लेयर की शुरुआत से उड़ान का एक चरण, जब तक कि जमीन पर उतरने के लिए विमान, धावन पथ (रनवे) पर रुक नहीं जाता जब अथवा टच-एण्ड-गो लैंडिंग के मामले में उड़ान भरने के लिए शक्ति प्रयुक्त की जाती है।
- (ज) Lmax – यह db (A) में विमान की अधिकतम ध्वनि स्तर के लिए इकाई है, जो संबंधित विमानपत्तनों के लिए नागर विमानन महानिदेशालय द्वारा अधिसूचित ध्वनि मानकों के अनुसार अनुवीक्षण अवस्थान पर विमानों के लिए अधिकतम अथवा उच्चतम ध्वनि मान है।
- (झ) अन्य विमानपत्तन- ऐसा विमानपत्तन, जहां 15000 से अधिक किंतु 50000 से कम वार्षिक यानीय संचालन हो रहे हैं।
- (ञ) प्रस्तावित विमानपत्तन-ऐसा विमानपत्तन जो अभी प्रचालनात्मक नहीं है किंतु निर्माणाधीन है।

टिप्पणी :

- (i) दिन का समय 6.00 प्रातः से 10.00 बजे रात्रि तक और रात्रि समय 10.00 बजे रात्रि से 6.00 बजे प्रातः तक अभिप्रेत है।
- (ii) उपरोक्त विनिर्दिष्ट सीमाओं की 10 dB (A) Leq की सहनीय सीमा होगी।
- (iii) निर्धारित सीमा में सभी धावन पथों (रनवे) से रक्षा विमान और विमान के उतरने और उड़ान भरने के दौरान ध्वनि और विमान इंजन/ग्राउंड रनअप्स, इस प्रयोजनार्थ विमानपत्तन संचालक द्वारा अभिनिर्धारित की गई हेलीपैड अवस्थानों को शामिल नहीं किया गया है।
- (iv) तथापि, यानीय ध्वनि के लिए Lmax के रूप में सीमा, इस अधिसूचना के पैरा 1 में यथा उल्लिखित विमानपत्तनों द्वारा संस्थापित यानीय ध्वनि अनुवीक्षण अवस्थानों पर नागर विमानन महानिदेशालय के अनुमोदन से विमानपत्तन संचालकों द्वारा अधिसूचित की जाएगी।
- (v) उपरोक्त विनिर्दिष्ट ध्वनि सीमाएं, निम्नलिखित मौजूदा परिक्षेत्रों की ध्वनि सीमाओं के संबंध में परिवेशी वायु गुणवत्ता को प्रतिस्थापित और अधिक्रांत करेगी;
 - (क) शांत;
 - (ख) आवासीय; और
 - (ग) वाणिज्यिक क्षेत्रों;

- (vi) जैसा कि विमानपत्तन ध्वनि परिक्षेत्रों के अंतर्गत सीधे तौर पर आ रहे क्षेत्रों में ध्वनि प्रदूषण (विनियमन और नियंत्रण) नियम, 2000 में विनिर्दिष्ट किया गया है।
- (vii) विमानपत्तनों की समूची चारदीवारी के भीतर ध्वनि मानक, औद्योगिक क्षेत्रों के लिए लागू किए गए अनुसार होंगे अर्थात् ध्वनि (विनियमन और नियंत्रण) नियम, 2000 के अनुसार दिन के समय 75 dB (A) Leq होंगे और रात्रि के समय 70 dB (A) Leq होंगे और विमानपत्तन की चारदीवारी पर भिन्न-भिन्न बिंदुओं पर मापित किया जाएगा और तब उसका औसत निकाला जाएगा।
- (viii) यह अधिसूचना उस नागर विमानपत्तन पर लागू नहीं होगी जहां वार्षिक यानीय संचालन 15,000 से कम है।
- 1 (1) नए प्रस्तावित विमानपत्तनों को छोड़कर, विमानपत्तनों के लिए:
- dB (A) Leq जैसा उल्लेख किया गया है, "विमानपत्तन ध्वनि परिक्षेत्र" में लागू के अतिरिक्त, dB (A) में Lmax मान को केवल 50,000 से अधिक वार्षिक यानीय संचालन कर रहे विमानपत्तनों के लिए नागर विमानन महानिदेशालय के अनुमोदन से विमानपत्तन संचालकों द्वारा प्रकाशित किया जाएगा। इन Lmax मानों का एयरलाईन्स द्वारा अनुपालन किया जाएगा और इन विमानपत्तन के संचालकों द्वारा अनुवीक्षण किया जाएगा। नागर विमानन महानिदेशालय के सूचित किया जाएगा है। भविष्य में जब भी आवश्यकता होगी, इन Lmax मान की समीक्षा की जाएगी।
- (2) प्रस्तावित विमानपत्तनों के लिए (अभी संचालन किया जाना है):
- (i) किसी भी नए/नवनिर्मित विमानपत्तनों के लिए ध्वनि मोडलिंग, विमानपत्तन संचालकों द्वारा की जाएगी और पर्यावरण प्रभाव मूल्यांकन अधिसूचना, 2006 के तहत पर्यावरणीय स्वीकृति प्राप्त करते समय पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय को परिणाम प्रस्तुत किए जाएंगे।
- (ii) विमानपत्तन संचालक पैरा 4 में विनिर्दिष्ट किए अनुसार विमानपत्तन ध्वनि परिक्षेत्र भी विकसित करेंगे और विमानपत्तन के आस-पास आवश्यक भूमि उपयोग आयोजना के लिए उसे आवास और शहरी कार्य मंत्रालय और संबंधित राज्य विकास प्राधिकरण के साथ साझा करेंगे।
- (iii) संबंधित राज्य/संघ शासित प्रदेश विकास प्राधिकरण किसी ध्वनि न्यूनीकरण उपाय के बिना विमानपत्तन ध्वनि परिक्षेत्र में आ रहे नए आवासीय, संस्थागत और वाणिज्यिक सुविधाओं और अन्य ध्वनि संवेदनशील क्षेत्र को अनुमति नहीं देंगे।
2. जैसा कि ऊपर विनिर्दिष्ट किया गया है विमानपत्तन ध्वनि परिक्षेत्र में लागू ध्वनि स्तरों का अनुपालन विमानपत्तन संचालकों द्वारा किया जाएगा और नागर विमानन महानिदेशालय द्वारा उसका पर्यवेक्षण किया जाना है।
3. विमानपत्तन प्रचालक, विमानपत्तन-ध्वनि मानकों के अनुपालन हेतु ध्वनि प्रबंधन योजना तैयार करेंगे।
4. **विमानपत्तन ध्वनि परिक्षेत्र:**
- (1) प्रत्येक विमानपत्तन के लिए, विमानपत्तन ध्वनि परिक्षेत्र को विमानपत्तन के मास्टर प्लान के अनुसार विमानपत्तनों के एयर नेविगेशन सेवा प्रदाता के साथ परामर्श करके सभी प्रवेश और प्रस्थान फनलों और उपकरण उड़ान प्रक्रियाओं (अर्थात् उपकरण प्रवेश प्रक्रिया, मानक उपकरण प्रस्थान एवं मानक टर्मिनल आगमन मार्ग) पर विचार करते हुए विमान संचालन की सुरक्षा के लिए ऊंचाई प्रतिबंध पर समय-समय पर यथा-संशोधित, 30 सितम्बर, 2015 को प्रकाशित नागर विमानन मंत्रालय (विमान प्रचालनों की सुरक्षा के लिए ऊंचाई प्रतिबंध) नियम, 2015 द्वारा जारी मौजूदा सा.का.नि. 751 (अ) के आधार पर संबंधित विमानपत्तन प्रचालक द्वारा दिन और रात की अवधि के लिए ध्वनि रूप-रेखा के रूप में परिभाषित किया जाएगा। इसे नागर विमानन महानिदेशालय द्वारा अनुमोदित किया जाएगा और संबंधित विमानपत्तन प्रचालकों की वेबसाइट पर प्रदर्शित किया जाएगा। यह कार्य अंतिम अधिसूचना जारी करने की तारीख से दो साल के भीतर पूरा किया जाएगा।

(2) राज्य/संघ शासित प्रदेश विकास प्राधिकरणों को विमानपत्तन के आस-पास भूमि उपयोग योजना के लिए विमानपत्तन ध्वनि परिक्षेत्र में विमानपत्तन प्रचालनअपेक्षाओं पर विचार करना चाहिए।

5. विमानपत्तन ध्वनि मैपिंग:

सभी विमानपत्तनों के लिए ध्वनि मैपिंग का कार्य विमानपत्तन के मास्टर प्लान के अनुसार, विमानपत्तन भावी विमान संचलन और यातायात अनुमानों पर विचार करते हुए विमानपत्तन के प्रचालकों द्वारा नागर विमानन महानिदेशक की अपेक्षाओं में निर्दिष्ट आवश्यकताओं के अनुसार किया जाना चाहिए। यह जानकारी विमानपत्तनों के प्रमुख स्थानों के साथ-साथ संबंधित विमानपत्तन प्रचालक और राज्य/संघ शासित प्रदेश विकास प्राधिकरण की वेबसाइट में प्रदर्शित की जाएगी।

6. प्रोटोकाल और मापन प्रक्रिया:

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय और केंद्रीय प्रदूषण नियंत्रण बोर्ड की वेबसाइट पर प्रदर्शित विमानपत्तन ध्वनि परिक्षेत्र के लिए निगरानी प्रोटोकाल और मापन प्रक्रिया का अनुपालन किया जाएगा।

7. विकास प्राधिकरण/क्षेत्रीय आयोजना विभाग, विमानपत्तन ध्वनि परिक्षेत्रों के अंतर्गत आने वाले किसी भी भवन निर्माण के लिए मौजूदा भवन कोडों और उप-कानूनों के तहत भीतरी वातावरण में सुधार के लिए डिज़ाइन, निर्माण और सामग्रियों के चयन में नई इमारतों, सुविधाओं और आवासीय, संस्थागत, अस्पताल और वाणिज्यिक सुविधाओं की परियोजनाओं में ध्वनि प्रतिरोध को शामिल करने के लिए प्रावधान निर्दिष्ट करेंगे।

8. सभी विमानपत्तन, एयरलाइन और प्राधिकरण अधिसूचना की तारीख से दो साल के भीतर अधिसूचना में निर्दिष्ट अपेक्षाओं का पालन करेंगे।”

[फा. सं. क्यू-15017/31/2015-सीपीडब्ल्यू]

डॉ. ए. सेथिल वेल, वैज्ञानिक 'जी'

टिप्पण: प्रमुख नियम, भारत के राजपत्र, असाधारण, भाग-II, खंड 3, उप-खंड (i) में दिनांक 19 नवम्बर, 1986 की संख्या – का.आ 844 (अ) के द्वारा प्रकाशित किए गए थे और अंतिम संशोधन दिनांक 22 मार्च, 2018 की अधिसूचना सा.का.नि. 263 (अ) द्वारा किया गया।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 18th June, 2018

G.S.R. 568(E).—In exercise of the powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:

1. (1) These rules may be called the Environment (Protection) Amendment Rules, 2018.
- (2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986, in Schedule-I, after serial number 111 and the entries relating thereto, the following serial number and the entries shall be inserted, namely:-

Sl. No.	Industry	Parameters	Standards	
1	2	3	4	
		Ambient Air Quality Standards with respect to Noise in Airport Noise Zone		
"112"	Airports	Type of Airports	Limits in dB (A) Leq*	
			Day Time	Night Time
		Busy Airports	70	65
		All other Airports excluding proposed airports	65	60

Definitions:

- (a) *dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing. A day time from 6.00 a.m. to 10.00 p.m. and night time from 10.00 p.m. to 6.00 a.m. are considered for time weighted average.
- (b) "A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear (The range of human hearing is 20 Hz to 20 kHz).
- (c) A "decibel" is a unit in which noise is measured.
- (d) Leq: It is energy mean of the noise level over a specified period.
- (e) Busy Airport - For the purpose of noise management at airports, a busy airport shall be defined as "a civil airport which has more than 50,000 aircraft movements per year (a movement being a take-off or a landing)" excluding those purely for training purposes on light aircraft.
- (f) Take-off – A phase of flight from the application of takeoff power to an altitude of final take-off segment.
- (g) Landing – A phase of flight from the beginning of the landing flare until aircraft exits the landing runway comes to a stop on the runway, or when power is applied for takeoff in the case of a touch-and-go landing.
- (h) Lmax is unit for aircraft maximum noise level in units dB(A) which is maximum or peak noise value for aircrafts at the monitoring location in accordance with the noise standards notified by the Directorate General of Civil Aviation for respective airports.
- (i) Other Airports – an airport having more than 15000 but less than 50000 aircraft movement annually.
- (j) Proposed Airports – airport that is not functional yet and is under development.

- Note :**
- (i) Day time shall mean from 6.00 a.m. to 10.00 p.m and night time shall mean from 10.00 p.m. to 6.00 a.m.
 - (ii) The above specified limits shall have a tolerance limit of 10dB (A) Leq.
 - (iii) The specified limit excludes defense aircraft and aircraft landing and take-off noise from all runways and aircraft engine/ground run-ups, helipad locations earmarked by Airport Operator for this purpose.
 - (iv) However, the limit for aircraft noise as Lmax will be notified by the airport operator with approval of the Directorate General of Civil Aviation at the aircraft noise monitoring locations installed by the airports as mentioned in paragraph 1 of this notification.
 - (v) The noise limits specified in above shall replace and supersede the ambient air quality in respect of noise limits of the following existing zones:
 - (a) Silence;
 - (b) Residential; and
 - (c) Commercial areas;

- (vi) As specified in the Noise Pollution (Regulation and Control) Rules, 2000 in the areas falling directly under Airport Noise Zone.
 - (vii) The noise standards within the overall boundary of airports shall be applicable as Industrial Areas i.e. day time 75 dB (A) Leq and night time 70 db (A) Leq as per the Noise (Regulation and Control) Rules 2000 and shall be measured at different points of airport boundary and then averaged.
 - (viii) These standards will not be applicable to a civil airport which has less than 15,000 aircraft movement annually.
- 1(1) For Airports excluding newly proposed airports:
- In addition to dB(A) Leq applicable in the 'airport noise zones' specified above, Lmax value in dB(A) shall be published by the airport operator with approval of the Directorate General of Civil Aviation only for airports having more than 50,000 annual traffic movements. These Lmax values shall be complied by airlines and to be monitored and communicated by Airport Operator to the Directorate General of Civil Aviation. These Lmax value shall be reviewed as and when there is a requirement in future.
- (2) For Proposed Airports (yet to be operationalized):
- (i) For any upcoming/New Airports, noise modeling shall be conducted by the airport operators and results should be submitted to the Ministry of Environment, Forest and Climate Change while seeking Environment Clearance under the Environment Impact Assessment Notification, 2006.
 - (ii) The airport operators should also develop airport noise zone as specified in paragraph 4 and share the same with Ministry of Housing and Urban Affairs and concerned State Development Authority for necessary land use planning around airport.
 - (iii) The concerned State / Union Territory Development Authorities should not allow any new residential, institutions & commercial facilities and other noise sensitive area falling in the airport noise zone area without any noise reduction measure.
2. Compliance of noise levels applicable to Airport Noise Zone as specified above shall lie with the airport operator and overseen by the Directorate General of Civil Aviation.
3. Airport operators shall prepare Noise Management Plan for compliance of the Airport Noise Standards.
4. Airport Noise Zones:
- (1) The Airport Noise Zone area for each Airport shall be defined as Noise Contour for day and night period by the respective Airport Operator on the basis of existing GSR 751 (E), issued by the Ministry of Civil Aviation (Height Restrictions for Safeguarding of Aircraft Operations) Rules, 2015 published on 30th September, 2015 as amended from time to time on Height Restriction for Safeguarding of Aircraft Operation considering all approach and departure funnels and Instrument Flight Procedures (i.e. Instrument Approach Procedures, Standard Instrument Departure & Standard Terminal Arrival Route) in consultation with airports Air Navigation Service Provider as per the Master Plan of the Airport. The same shall be approved by the Directorate General of Civil Aviation and displayed on the website of respective Airport Operators. This activity shall be completed within two years from the date of issuance of the final notification.
 - (2) State / Union Territory Development Authorities should take into consideration of Airport Operations requirements in the airport noise zone area for the land use planning around the airport.
5. Airport Noise Mapping:
- Noise mapping in for all airports should be carried out as per the requirements specified in the Director General Civil Aviation's requirements by the airport operators considering future aircraft movement and traffic projections of the airport as per the Master Plan of the Airport. This information to be displayed at a prominent places at Airports as well as in the website of respective Airport Operator and State / Union Territory Development Authority.
6. Protocol and Measurements Procedure:
- Monitoring protocol and measurements procedure for airport noise zone displayed on the website of the Ministry of Environment, Forest and the Climate Change and the Central Pollution Control Board shall be followed.
7. Development Authorities / Regional Planning Department shall specify provisions for inclusion of sound resistance in new buildings, facilities and projects of residential, institutional, hospital and commercial facilities in the design, construction and materials selections for improving indoor environment under existing building codes and bye laws for any building constructions coming under airport noise zones.

8. All the Airport, Airline and Authority shall comply with the requirements specified in the notification within two years from the date of notification. ”.

[F.No. Q-15017/31/2015-CPW]

Dr. A. SENTHIL VEL, Scientist 'G'

Note : The principal rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i), *vide* number S.O. 844 (E), dated the 19th November, 1986 and last amended *vide* notification G.S.R. 263(E), dated the 22th March, 2018.

Annexure 4

Minutes of Meeting

Minutes Of Meeting

SUBJECT: Minutes of meeting for Noise Study Report for "**Noise Mapping and declaration of airport Noise zone at Swami Vivekananda Airport, Raipur**"

VENUE OF MEETING: Conference Hall, Raipur Airport on date 12.07.2024 at 11:30Hrs.

MEMBERS / STAKE HOLDERS PRESENT: Following members were present in above meeting: -

SR. NO.	NAME	Designation	Organisation
1	Dr. S.D Sharma	APD	AAI
2	Devendra P Goswami	AGM (Elect)	AAI
3	Arun Kumar Tinkey	Jt GM(OPS)	AAI
4	Omprakash Chandrakar	AGM	AAI
5	Henry Pratap Kujur	AGM / Safety manager	AAI
6	Rameshwar Prasad	Manager (E&E)	AAI
7	Piyush Mahashabde	Station (I/C)	India one Air
8	V.K.Tamrakar	DGM (E-C)	AAI
9	L.K.Yadav	AGM (Elect)	AAI
11			
12			
13			
14			
15			
16			
17	Vinay Kumar .K	Director	M/s. Dimensional Digital Services (OPC) Pvt Ltd

The Airport Director welcomed all stake holders in the meeting. He explained that to comply the mandatory requirement of MOEF and DGCA, Noise mapping is required at Raipur Airport and Noise study has been conducted from the agency M/s Dimensional Digital Services (OPC) Pvt. Ltd.

The Director of M/s. Dimensional Digital Services explained to the stake holders about the requirement of conducting post meeting to comply the mandatory of The Environment (Protection) Amendment Rules, 2018. He also explained about the purpose of noise mapping and their requirement.

As per which Noise mapping study has been completed by agency and final report has been prepared on the basis of previous calendar year 2023 data provided from different stakeholders

- 1) Airport Master Plan layout in auto CAD / GIS format
- 2) Maximum capacity of runway designed; this is usually the max number of movements defined in the airport master plan.
- 3) Flight plan data for 2023 (individual movements, containing time of day, aircraft type, arrival/departure, origin/destination, Runway used, SID used for departures.
- 4) Flight track data of 2023 of Arrival and Departure
- 5) Weather data of 2023.
- 6) Past environment study report.

Considering these data and the results received by placing noise monitoring stations at both runway ends (i.e. 06 – 24) at Raipur Airport for one week, noise contour maps has been formed and different noise levels were recorded during day and night time. The Noise maps were developed and validated with measured noise data. Also surrounding residential villages falling inside noise contours were also surveyed and population exposed was calculated with reference to the noise limits for residential zones.

Final study concludes boundary noise level at Raipur Airport is below the noise limit.

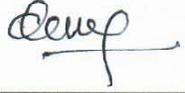
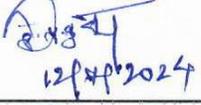
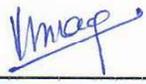
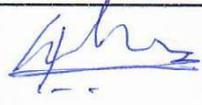
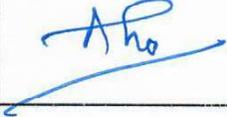
Representative of Dimensional Digital Services has further replied to queries raised by stakeholders mainly the methodology for noise mapping and noise zone maps development. The report will now to be submitted to DGCA for approval. Raipur Airport Director expressed his gratitude towards all the stakeholder for their co-operation.

AIRPORT DIRECTOR
Airports Authority of India
Raipur

स्वामी विवेकानन्द विमानतल, रायपुर

Noise Mapping study at Raipur airport

बैठक दिनांक - 12-07-2024

SN	NAME	Designation	Organization	Mobile No	Signature
1	Dr. S. D. Sharma	APD	AAI	9685048148	
2	Devendra P. Goswami	AGM(E)	AAI	7838440844	
3	Anam Kr. Tikey	JEGM(OPS)	AAI	9892715928	
	Omparkash Chandrakar	AGM(ADM)	AAI	8700850151	
5	HENRY PRATAP Kujur	AGM(ATSEP)/ SAFETY MANAGER	AAI	9822578335	 12/07/2024
6	RAMESHWAR PRASAD	MGT(EE)	AAI	7387930445	
7	PIJUSH MANASHABDE	STATION(I/C)	INDIA ONE AIR	8862800001	
8	V. K. Tombrakar	DGM(E-C)	AAI	975257999	
9	L. K. Yadav	AGM(Elen)	AAI	9893018560	
10	K. VINAY KUMAR	Director	Dimensional Digital Service	9967970446	
11	Abhishek K	APM.	Indigo	9011071325	
12					
13					