JAY PRAKASH NARAYAN INTERNATIONAL AIRPORT

PATNA

AIRPORT NOISE MAPPING REPORT

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

Jay Prakash Narayan International Airport, Patna

Report no : UIIPL 304

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Prepared For:

Airports Authority of India
Jay Prakash Narayan
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DISCLAIMER :

Note this report is a study on 'noise mapping' at Jay Prakash Narayan International Airport, Patna conducted in accordance Environment (Protection) Amendment Rules, 2018 and to provide an initial overview of noise exposure within and outside the airport. This report and the information in it are confidential and for the sole purpose for the management of AAI. This report may not be disclosed to third party or used for any other purpose without written permission from AAI.

Part 2 Noise Zone study at Jay Prakash Narayan International Airport

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List of Abbreviations

AAI	Airport Authority of India
ADS B	Automatic Dependent Surveillance-Broadcast
ATC	Air Traffic Control
IATA: PAT	Jay Prakash Narayan International Airport , Patna
ICAO: VEPT	Jay Prakash Narayan International Airport , Patna
CAEP	Committee on Aviation Environmental Protection
CPCB	Central Pollution Control Board
DGCA	Directorate General of Civil Aviation
GPS	Global Positioning System
ICAO	lnternational Civil Aviation Organization
MOEF	Ministry of Environment and Forests
NMS	Noise Monitoring Systems
NMTs	Noise Monitoring Terminal
IRS	Indian Remote Sensing Satellite
NRSC	National Remote Sensing Centre

Introduction :

Unisearch India Instruments Pvt. Ltd. has prepared this report in response to a tender issued by Jay Prakash Narayan International Airport, Patna, for conducting Noise mapping and noise zoning studies as per the requirements of the Environment (Protection) Amendment Rules, 2018.

In 2023 year, Jay Prakash Narayan International Airport, Patna, recorded approximately 24455 annual flight movements. The airport is classified under the 'Other Airport' category according to GSR 568(E) of the Environment (Protection) Amendment Rules, 2018, which categorizes airports with annual aircraft movements between 15,000 and 50,000.

Patna airport features a single runway designated as 07/25, with a length of 6798 feet (2072 m), does not have turnarounds at both ends of the runway. Instead, it features one turnaround and multiple exit taxiways that connect to the main apron. These taxiways allow for efficient movement of aircraft from the runway to the apron area where planes are parked, loaded, and serviced. Construction of parallel Taxiways is currently underway, and the aerodrome reference code is 4C. The airport currently offers 6 parking stands capable of accommodating aircraft ranging from Code A to Code C, including narrow-body jets. Additionally, there are 5 Passenger Boarding Bridges in operation.

1.1 Objective of Study : Noise mapping and declaration of Airport Noise Zones at Jay Prakash Narayan International Airport, Patna, in accordance with the requirements of the Environment (Protection) Amendment Rules, 2018.

1.2 Scope of Work :

The scope of the noise study at Jay Prakash Narayan International Airport, Patna includes the following:

1. The comprehensive scientific study of noise generated by aircraft operations and related activities within the airport premises.

2. Noise monitoring, assessment and mapping

   a) Collection of baseline information.

   b) Installation of an online noise monitoring system near the runways. The permanent noise monitoring system was fixed at the site, and noise data was collected and analyzed over three months.

   c) Deployment of mobile noise monitoring system at four sites (silence zones, residential areas, commercial zones, and industrial zones) within a 10km radius of the airport.

   d) The installation of weather monitoring systems and radar sensors at both ends of the runways for weather and aircraft movement monitoring.

   e) Development of land use mapping for the airport and its surroundings.

   f) Noise modelling for the airport and surrounding land uses using a noise prediction model.

   g) Development of noise maps and declaration of Airport Noise Zones using standard noise modelling software.

   h) Conducting noise impact assessment using the noise maps.

   i) Studying boundary noise due to aircraft operations.

   j) Studying Lmax and its locations at Patna Airport.

1.3. Methodology of Study

The Noise mapping and Noise zone study was carried out at Jay Prakash Narayan Airport, Patna

As required by the Environment (Protection) Amendment Rules, 2018, noise maps and noise zones were developed using SoundPLAN Asia Software. SoundPLAN, developed by SoundPLAN GmbH, is a Standard software for estimating the environmental impacts of aviation activities, including airport noise, fuel consumption, and air pollutant emissions.

The basic input data for noise modelling is flight operation data. The flight operations of the year 2023-2024 data was obtained from Patna 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. Noise maps for L_{day} and L_{night} were developed using the flight data.

We installed Class 1 continuous noise monitoring systems, weather sensors, and radar sensors at both runway ends to measure and monitor noise and weather. The class 1, Mobile Noise Monitoring system collected continuous noise data from four locations near the airport. The data was gathered from March 2024 to May 2024, and the verification phase was completed successfully. Noise maps for L_{day} and L_{night} were developed using flight data, and a noise mapping campaign was conducted at Patna Airport to validate noise contours. Flight tracks were monitored using an ADS-B system. The verification and validation were conducted using field measurement data.

This report is in two parts:

1) Noise mapping study at Patna Airport

2) Noise zone study at Patna Airport

Part- 1: Noise Mapping Study at Patna Airport

2.Noise modelling

Noise modeling and mapping were developed using actual air traffic data for the Year 2023- 2024, incorporating flight tracks, geographical information of the airport, and the airport master plan. Noise maps were created to represent various noise indices, including L_{day} and L_{night} on 5 dBA intervals ranging from 55 dBA to 75 dBA for L_{day} metrics and from 45 dBA to 75 dBA for L_{night} metrics. Additionally, noise data collected from Noise monitoring system near the runways were used and verified to ensure the accuracy of the results. This comprehensive approach provided a detailed and accurate representation of noise levels around the airport, reflecting both daytime and nighttime noise impacts.

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 75 dB
L_{night}	45 dB to 75 dB

2.2. Airport data

For the calculations, the following airport-related input data were utilized, primarily derived from the Aeronautical Information Publication (AIP) and Automatic Dependent Surveillance-Broadcast (ADS-B) data.

Runways :

Jay Prakash Narayan International airport, Patna has one runway in use

Table 2-2 : Coordinates for Patna Airport Runway 07/25

Runway	End/Threshold	Elevation (meters)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Latitude (DMS Format)	Longitude (DMS Format)
7	Threshold	170	25.6070° N	85.0970° E	25° 36' 25.2" N	85° 05' 49.2" E
7	End	170	25.6100° N	85.1000° E	25° 36' 36.0" N	85° 06' 00.0" E
25	Threshold	170	25.5890° N	85.0850° E	25° 35' 20.4" N	85° 05' 06.0" E
25	End	170	25.5860° N	85.0800° E	25° 35' 09.6" N	85° 04' 48.0" E
7	Threshold	172	25.6080° N	85.0980° E	25° 36' 28.8" N	85° 05' 52.8" E
7	End	172	25.6110° N	85.1010° E	25° 36' 39.6" N	85° 06' 03.6" E
25	Threshold	172	25.5900° N	85.0860° E	25° 35' 24.0" N	85° 05' 09.6" E
25	End	172	25.5870° N	85.0810° E	25° 35' 13.2" N	85° 04' 51.6" E

The meteorological conditions used for performance calculations in SoundPLAN software are based on average data from the past 10 years, while field data from weather monitoring sensors were utilized for verification and validation purposes.

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 Patna airport, provides the actual aircraft types used for the year 2023-2024, 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. Table 2-3 provide the fleet composition of this representative day for the year 2023-2024.

2.3.1Aircraft Classes and Types at Patna Airport

Patna Airport hosts a diverse range of aircraft, categorized into different classes based on their design and operational capabilities. Below is a detailed overview of the aircraft classes and the specific types within each category:

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

Aircraft Class	Aircraft Class	Day Movements (%)	Evening Movements (%)	Night Movements (%)
Middle Range Single Aisle	A320 Family, B737 Family etc	92.45%	100%	86.49%
Turboprops	ATR72 etc	3.11%	0.00%	7.59%
Long Wide Body (2 Eng)	A330, B777 etc	0.35%	0.00%	0.21%
Long Wide Body (4 Eng)	A340, B747 etc	0.00%	0.00%	0.00%
Other Categories	General Aviation, Helicopters etc	3.41%	0.00%	6.98%
	Total	100.00%	100.00%	100.00%

Table 2.4: Detailed Fleet Mix Composition Table

Aircraft Class	Aircraft Class	Day Movements (%)	Evening Movements (%)	Night Movements (%)	% Total
Overall		76.64%	0.18%	23.18%	**100%**
Middle Range Single Aisle	A320 Family, B737 Family etc	70.86%	0.18%	20.05%	91.09%
Turboprops	ATR72 etc	2.39%	0.00%	1.76%	4.15%
Long Wide Body (2 Eng)	A330, B777 etc	0.27%	0.00%	0.05%	0.32%
Long Wide Body (4 Eng)	A340, B747 etc	0.00%	0.00%	0.00%	0.00%
Other Categories	General Aviation, Helicopters etc	2.62%	0.00%	1.62%	4.24%
		76.14%	0.17%	23.48%	**100%**

Flight profiles

The aircraft operational conditions were determined based on the Standard flight procedures, provided in the SoundPLAN 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

Runways	A	D	Total
7	8.8	3.7	12.5
25	23.9	29.02	52.99
Total	32.78	32.8	65.58

Based on the destination and cardinal direction, the distribution of aircraft types and their stage lengths for each track has been analyzed for a representative day.

2.4 Noise Monitoring

Location: Jay Prakash Narayan Airport, Patna

2.4.1.Monitoring Compliance:

Noise monitoring was carried out at Jay Prakash Narayan Airport, Patna, in accordance with the 'Requirement and Procedure for Monitoring Ambient Noise Levels Due to Aircraft' as outlined by the Central Pollution Control Board (CPCB).

2.4.2.Instrument Specifications:

The Online Noise monitoring instrument utilized conforms to Class 1 standards as specified in IEC 61672-1 (2002). The Noise Monitoring System (NMS) is equipped with a weatherproof microphone, a data storage and analysis device, and a Global System for Mobile Communications (GSM) information transmission system.

2.4.3. Installation Details:

The Noise Monitoring System was installed on flat terrain, devoid of excessive sound absorption characteristics such as thick or matted grasses, shrubs, or wooded areas. There were no obstructions affecting the sound field from the aircraft.

2.4.4.Installation Sites: The following sites were utilized for noise and weather monitoring around Patna Airport:

Table 2.6: Locations of Field Instrument Installation

Sites	Name	Location	Area	Latitude	Longitude
1	Radar Instrument	H3VR+R5F, Patna, Bihar 800014	Patna Airport	25.594481	85.090329
2	Online Noise Monitoring System - 01	Shaheed Pir Ali Khan Marg, Bhatpura village, Sheikhpura, Patna, Bihar 800014	Boundary of Patna Airport	25.593212	85.097448
3	Online Noise Monitoring System - 02	Birla Colony, Phulwari Sharif, Patna, Bihar 801505	Residential	25.582188	85.073516
4	Weather Monitoring System	Birla Colony, Phulwari Sharif, Patna, Bihar 801505	Residential	25.582188	85.073516
5	Mobile Noise Monitoring System - 01	H4V2+Q7C Patna, Bihar	Inside ZOO	25.595541	85.098945
6	Mobile Noise Monitoring System - 02	H3WX+69H Patna, Bihar	Inside ZOO	25.595594	85.098476
7	Mobile Noise Monitoring System – 03	H3VP+X95 Patna, Bihar	Institutional	25.594912	85.085972
8	Mobile Noise Monitoring System – 04	H3RJ+P46 Patna, Bihar	Near Temple	25.591793	85.080261

2.4.5.Weather Monitoring system:

The Weather monitoring system is designed to measure a range of meteorological parameters including atmospheric pressure, wind speed, dew point, and humidity. The system is equipped with wireless communication facilities to enable real-time data transmission.

2.4.6. Online Noise Monitoring System Data:

The Online Noise Monitoring System class 1 were permanently fixed at both ends of runways 07 and 25. These systems collected noise data over a 3-month period.

2.4.7.Mobile Noise Monitoring Systems:

The Mobile Noise Monitoring Systems were deployed to collect field noise data from various locations near Patna Airport. These systems are Class 1 noise monitors designed for remote and continuous noise monitoring. These mobile system provided valuable noise data from diverse locations to ensure a comprehensive assessment of noise exposure around the airport.

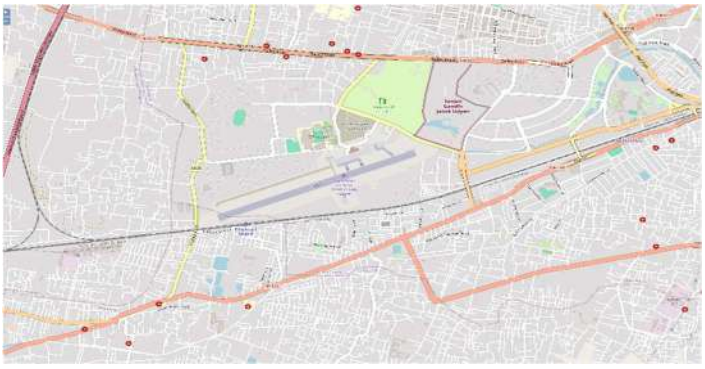


Fig 2-1: The Boundary of Patna Airport.

Figure 2-2: Location of Noise Monitoring System

2.4.7.1.Noise Monitoring System Installation at sites:

Location and Placement

The Noise Monitoring Systems were strategically positioned within the airport boundary to ensure comprehensive coverage of the noise environment. The instruments were installed at a height of 4 meters above ground level. This elevation minimizes ground reflection effects and ensures accurate noise level readings.

Instrumentation and Measurement

The noise monitoring systems are equipped with high-precision instruments designed to capture a wide range of sound frequencies and intensities. These instruments continuously record noise levels along with relevant environmental conditions such as temperature, humidity, and wind speed. The data collection spans over 90 days, providing a robust dataset for analysis.

Figure 2-3: Installation Photographs of Online Noise Monitoring System at Patna airport

Online Fixed Noise Monitoring system at 07 Runway End

Online Fixed Noise Monitoring system at 25 Runway End

Figure 2-4: The below photographs show, Installation of Class 1 , Mobile Noise Monitoring System near Patna Airport

Location 1: H4V2+Q7C Patna, Bihar

Location 2: H3WX+69H Patna, Bihar

Location 3: H3VP+X95 Patna, Bihar

Location 4: H3RJ+P46 Patna, Bihar

3. Noise Mapping:

The primary goal of this study is to develop noise maps that represent the current noise situation at Patna Airport. This report outlines the input data, methodology, and results used to create these noise maps.

3.1 Input Data:

The following data sources were utilized to calculate the noise contours:

- **Existing Runway Tracks:** Current flight paths and runway usage data.
- **Traffic Forecast:** Projected aircraft traffic levels over the study period.
- **Fleet Mix:** Composition of aircraft types and their corresponding noise characteristics.
- **Flight Distribution:** Patterns and distribution of flights over the airport.

3.2 Methodology:

Noise Indices and Intervals:

- **L_{day} (Daytime Noise Levels):** Calculated in 5 dBA intervals ranging from 55 dBA to 75 dBA.
- **L_{night} (Nighttime Noise Levels):** Calculated in 5 dBA intervals starting from 45 dBA.

Data Collection Period:

- **Flight Data:** 2023-2024 Year

Data Processing:

- **Flight Data Filtering:** Invalid or erroneous flight events were excluded from the dataset.
- **Modelling Software:** The processed flight data was input into the SoundPLAN noise model. SoundPLAN is recognized as an international standard for aircraft noise and air quality modelling.

- **Flight Tracks:** Acquired through an ADS-B system installed at the airport during the measurement period.

Noise Mapping Execution:

- **Model Application:** The SoundPLAN software was used to generate noise maps depicting L_{day} and L_{night} noise levels in the specified intervals. This modelling tool integrates flight data, runway tracks, and spatial maps to produce comprehensive noise contours.

3.3. Results

Noise Contours Overview:

The noise contours presented in this section are derived from the noise indices L_{day} and L_{night}, and they represent the noise levels experienced around Patna Airport. The contours are based on the aircraft noise models and validated with real time noise monitoring data.

3.3.1 Noise Contours for L_{day} Metric:

Time Frame: The contours shown in Figure 3-3 represent noise levels during daytime operations, specifically from 06:00 to 22:00 hours.

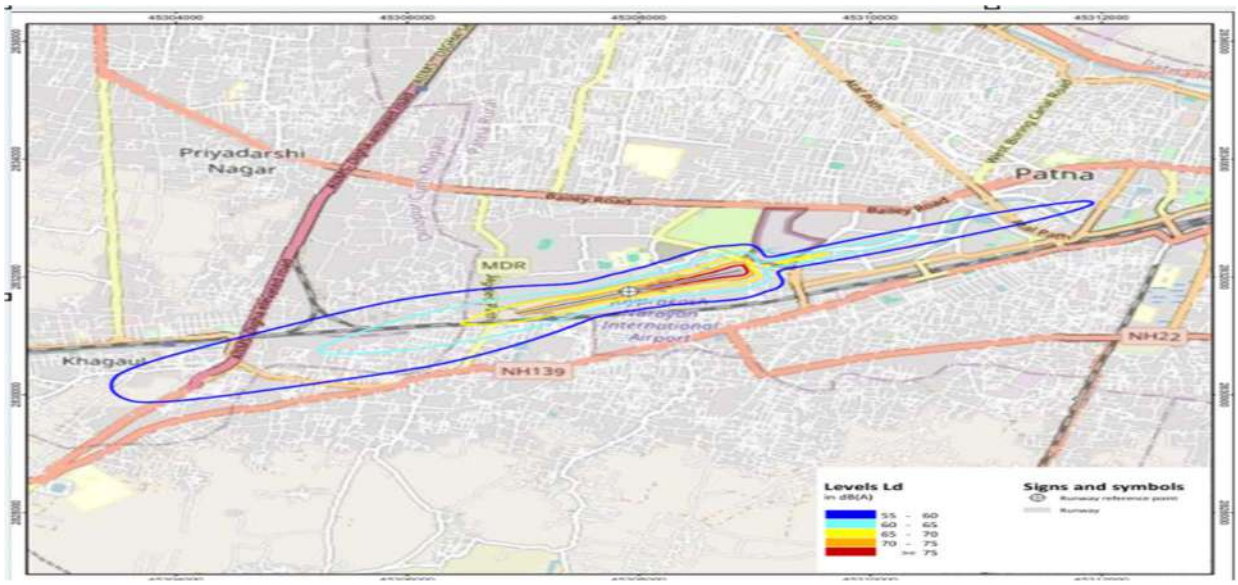


Figure 3-1 : Noise contour: L_{day} (55,60,...,75)

3.3.2 Noise Contours for L_{night} Metric:

Time Frame:

Operational Hours: The noise contours in Figure 3-4 represent noise levels during nighttime operations, specifically from 22:00 to 06:00 hours. This period covers the hours when aircraft activity typically occurs less frequently, resulting in generally quieter conditions compared to daytime operations.

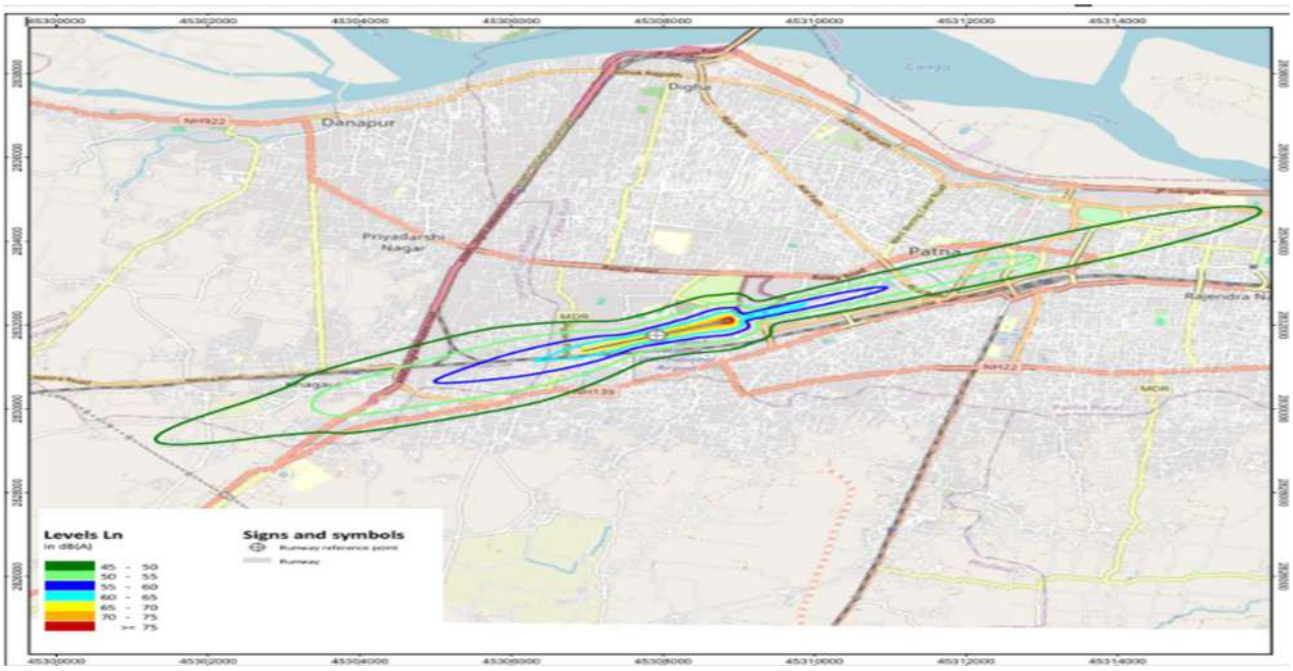


Figure 3-2: Noise Contour; L_{night} (45,50,…….75).

3.4. Validation of Predicted Noise Levels with Measurement Results

To ensure the accuracy and reliability of the noise mapping process, noise measurements were conducted using noise monitoring systems positioned at two locations near runways. The validation process also incorporated the use of an ADS-B receiver, which captured detailed information about the actual flight tracks during the measurement period. The collected data were analyzed using the noise monitoring system to derive the noise metrics corresponding to those used in the noise maps.

Data Collection and Processing:

- **ADS-B Receiver:** An ADS-B receiver was deployed to track actual flight paths during the measurement period. This provided accurate data on aircraft operations, which were crucial for validating the noise model.
- **Noise Monitoring System:** The noise monitoring systems captured noise levels at both locations, recording data for both L_{day} (daytime noise levels) and L_{night} (nighttime noise levels).

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

Location	Position		L_{day}			L_{night}		
Runway end	Latitude	Longitude	Meas	Model	Δ	Meas	Model	Δ
7	25.5896° N	85.0909° E	55.2	56.8	1.6	51.4	52.0	0.6
25	25.5917° N	85.0823° E	58.1	60.0	1.9	54.3	55.5	1.2

Analysis of Results:

- Average Difference: The average difference between the predicted and measured noise levels is within 2 dB(A), which is considered acceptable for noise prediction accuracy.
- Variation in Differences: The differences between the predicted and measured values for each location and noise metric (L_{day} and L_{night}) show no significant bias, indicating that the noise maps are accurate and reliable.

Part -2: Noise Zone Study at Patna Airport

4.Noise Zone study

In accordance with the Environment Protection Amendment Rules of 2018, a comprehensive noise zone study was conducted at Patna Airport during March, April, and May of 2024. This study aimed to analyze Lmax levels, determine boundary noise, and develop noise zones around the airport. The primary goal was to establish noise contours for a future scenario, representing the maximum capacity of the airport, thereby reserving space for growth.

4.1. Input Data

The noise zone study utilized the following input data to develop accurate noise contours:

- **Existing Tracks for the Runways:** Current flight paths and runway usage patterns were analyzed.
- **Forecast for Traffic:** Projections for future air traffic based on historical data and expected growth.
- **Fleet Mix:** The composition of different aircraft types operating at the airport.
- **Distribution of Flights:** The temporal distribution of flights, including day and night operations.

The fleet mix for the study period 2023-2024 year was used as a baseline.

Table 4-1: Current Scenario Hourly Traffic Handling Capacity

Without Radar Approach

Runway	Max no of Arrival & Departure	Average Hourly Arrivals	Average Hourly Departures
RWY 07	14	7	7
RWY 25	14	7	7

Current Operations

The current operations have a 77% / 23% distribution between day (6 AM to 10 PM) and night (10 PM to 6 AM). With respect to runway operation, currently 80 % / 20% West /East share is found.

Future Scenario

The future scenario maintains a 77% / 23% day/night distribution and maintains an 80% / 20% distribution for the West/East runway configuration (RWY 25 / RWY 07).

Total Movements

- For the next 10 years, we forecast that total aircraft movements in the year 2033-34 will reach approximately 74,576.
- Fleet mix and capacity ratios remain consistent.

Table 4-2: Future Scenario Traffic Distribution Table

			Arrival/ Departure			
Total Movements	**Direction**	**Runway**	**% day flow direction (Traffic)**	**% day (Traffic)**	**%night flow direction (Traffic)**	**% night (Traffic)**
74576	Westernly	25	61.5	80	18.5	80
	Easternly	7	15.4	20	4.6	20

4.2. Methodology

The noise contours for the future scenario are calculated using SoundPLAN, based on the input data described in the previous section. According to the definitions 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

Noise zoning is a critical aspect of airport management, aimed at minimizing the impact of aircraft noise on surrounding communities. The Directorate General of Civil Aviation (DGCA) in India has established specific noise contour levels to define airport noise zones. This report provides an overview of the noise zoning results for Patna Airport, based on the studies performed at various Indian airports.

Noise Contour Definitions

According to the DGCA guidelines, the following noise contours are used to define airport noise zones:

- **L_{day} 55:** This contour represents the 55 dB(A) noise level during the day period (typically from 06:00 to 22:00 local time).
- **L_{night} 50:** This contour represents the 50 dB(A) noise level during the night period (typically from 22:00 to 06:00 local time).

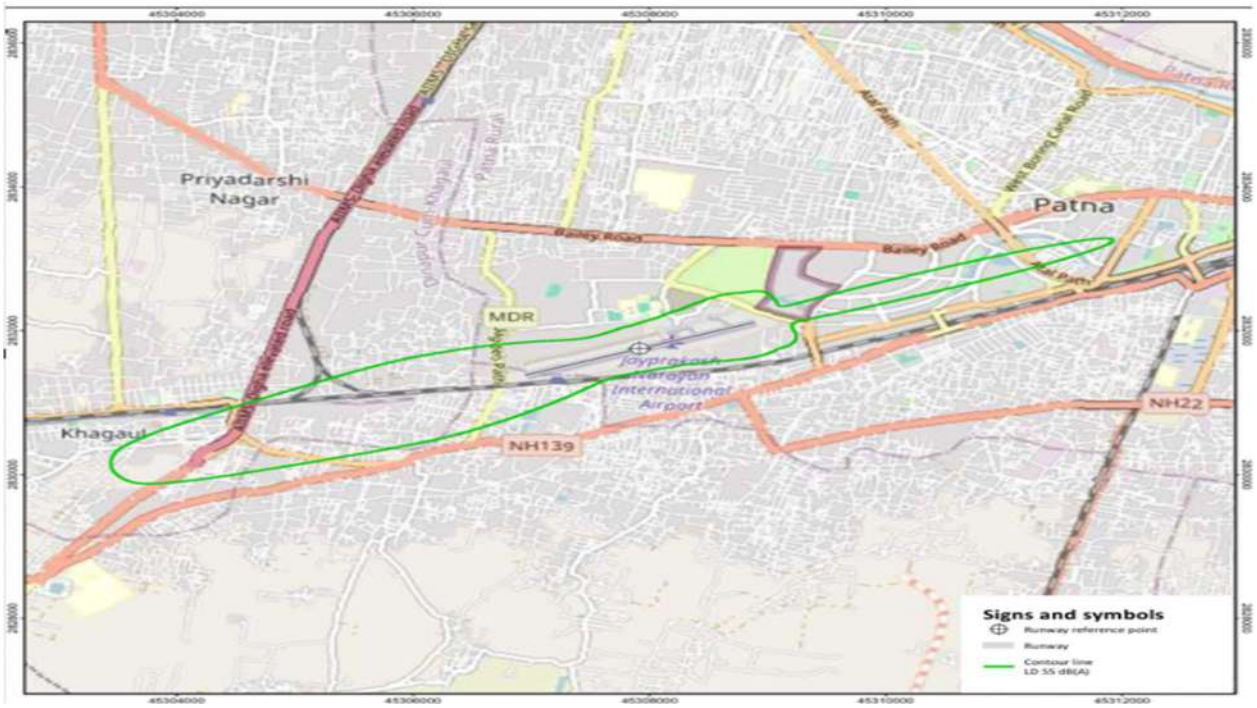


Figure 4-1: Airport noise zone for day time (based on L_{day} 55 noise contour)

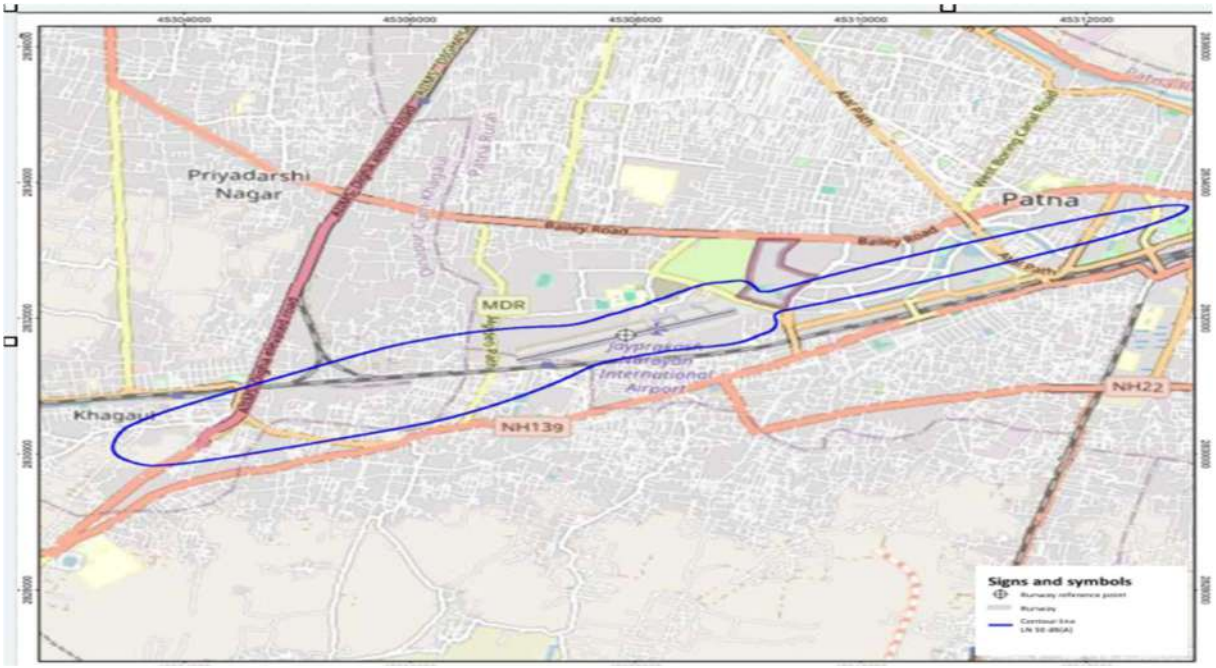


Figure 4-2: Airport noise zone for night time (based on L_{night} 50 noise contour)

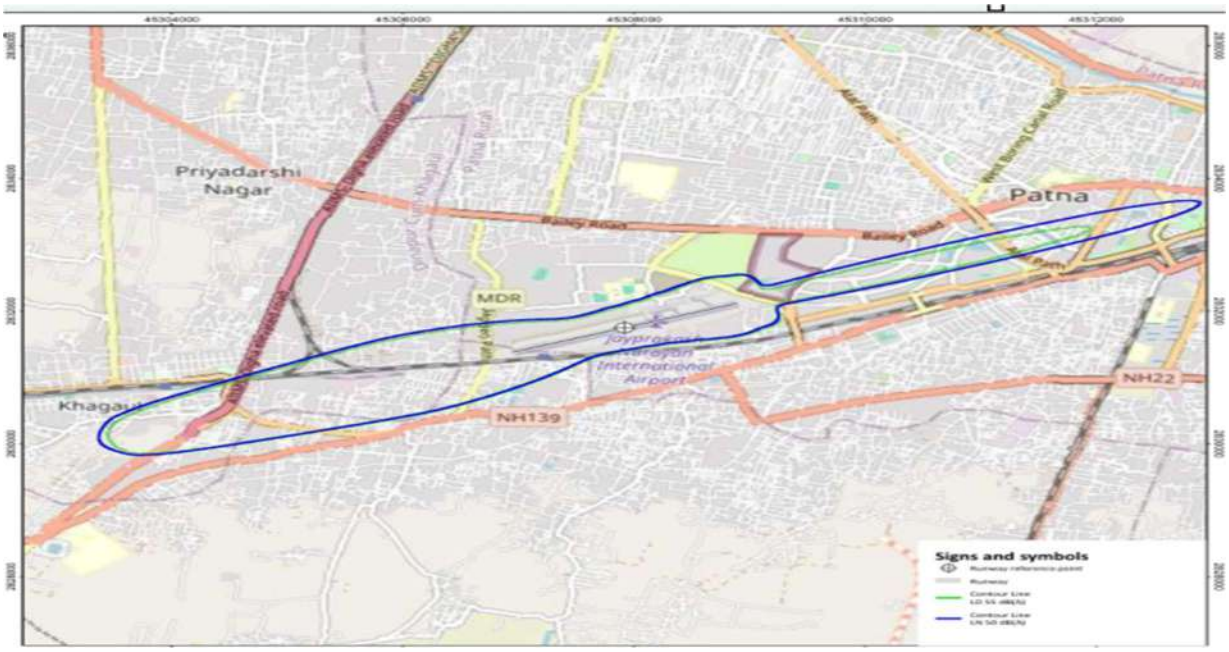


Figure 4-3: Airport noise zone for day and night time (based on L_{day} 55 and L_{night} 50 noise contour)

The noise zone maps are shown on topographical maps which are given in Annexure 1.

5. Noise Monitoring and Assessment at Patna Airport

In accordance with the Environment Protection Amendment Rules, June 2018, it is mandatory to determine the maximum noise levels at specific points around the airport. This determination is typically based on measurements performed using a noise monitoring system. At Patna Airport, a comprehensive noise monitoring system has been installed to achieve this goal.

5.1. Installation and Operation

The Installation of noise monitoring system at Patna Airport consists of both fixed and mobile monitoring systems:

5.1.1.Fixed Noise Monitoring Systems:

- Two fixed online continuous monitoring systems have been installed near the runways.
- These systems have been operational for more than three months, providing continuous monitoring of noise levels.

5.1.2.Mobile Noise Monitoring Systems:

- Mobile noise monitoring systems were utilized to collect field noise data from various locations around the airport.
- These systems are strategically placed to cover a wide area and gather comprehensive noise data.

5.1.3 Data Collection and Validation

The Noise data collection process involves several steps to ensure accuracy and reliability:

Continuous Monitoring:

- The fixed Noise Monitoring systems have been monitoring noise levels continuously for more than three months.
- This long-term data collection helps in capturing the variations in noise levels over time.

Mobile Data Collection:

- Mobile Noise Monitoring systems have been deployed at different locations near the airport to collect noise data at site.
- These locations include the nearest villages on both sides of the extended centreline of the runway.

5.2. Input Data

To determine the Lmax at two specified locations near Patna Airport, the analysis involved examining actual flight data for 2023-2024 along with the following information:

- Lmax Measurements: Maximum noise levels recorded from individual aircraft operations at various noise monitoring locations to capture the peak noise levels produced by different aircraft.
- Operational Details: Information on aircraft types, the runways or tracks used, and the distance between the aircraft and the noise monitoring microphones to understand the factors influencing noise levels.
- Flight Data: Comprehensive flight data for 2023-2024, including flight timings, frequencies, and patterns, to provide context and accuracy for the noise level predictions.

5.3. Methodology for the definition of Lmax

To determine the maximum noise levels (Lmax) at each proposed location, the following methodology was applied:

- Data Analysis: Analyze Lmax single-event data for each proposed location to understand the peak noise levels associated with individual aircraft events.
- Event Filtering: Filter out non-valid events to ensure that only relevant and accurate noise measurements are considered.
- Determine Maximum Levels: Calculate the maximum noise level (Lmax) for each location based on the filtered data.

- Define Lmax Limits: Establish the Lmax limit for each location to provide a benchmark for noise assessment.
- Aircraft Noise Event Identification: Throughout the 2023-2024 period, each aircraft noise event was systematically identified on a monthly basis.
- Lmax Level Determination: For every identified event, the Lmax (maximum noise level) was accurately measured, capturing peak noise levels for all points outside the designated noise band.
- Analysis of Departures and Approaches: The analysis covered both aircraft departures and approaches, recognizing that noise characteristics differ significantly between these two flight phases.
- Noise Modeling Software: The Lmax noise levels for these events were calculated using SoundPLAN noise modeling software, which provided precise and reliable measurements of peak noise levels.

5.4 Lmax of Patna airport

When establishing the limits for Lmax, several key considerations should be taken into account:

5.4.1.Proposed Methodology

- Adequate Threshold: The Lmax limit should be set sufficiently high to ensure that the majority of aircraft operations fall within acceptable noise levels.
- Minimizing Excessive Noise: The limit should also be low enough to prevent the inclusion of excessively noisy operations, thus avoiding unnecessary disturbances.
- Handling Exceedances: Procedures need to be defined for addressing events that exceed the established Lmax limit.

To avoid arbitrary Lmax level definitions, it is proposed to set the limit at each location based on the 10 highest noise events recorded during the 2023-2024 period. This approach ensures that the Lmax limit is realistically high enough to accommodate regular operations while maintaining a threshold that prevents extreme noise levels from being deemed acceptable.

5.4.2. Data Analysis

The Lmax values for each location were derived using the SoundPLAN noise modelling software, which takes into account:

- Aircraft Types: Different types of aircraft have varying noise characteristics.
- Flight Tracks: The paths taken by aircraft during operations.
- Flight Plans: The specific flight plans and their impact on noise levels.
- Geographical Location: The location of residential areas relative to the airport.

Table 5-1: Maximum Calculated Noise Levels at the Nearest Residential Areas

Village	Lmax		
	SoundPLAN	Latitude	Longitude
Sheikhpura	78.81	25.6104° N	85.1327° E
Phulwari sharif	79.44	25.6162° N	85.1577° E

Figure 5-1: Location of villages with Lmax Values.

The Lmax limits were established using actual noise event data of 2023-2024 year. By setting these limits based on the 10 highest noise events, we ensure that the limits are grounded in real data rather than being arbitrary. The use of SoundPLAN for noise modelling, along with field data verification, provides a robust framework for accurately determining Lmax limits.

These limits will effectively manage the noise impact around Patna Airport, ensuring that operational compliance is maintained while minimizing unnecessary noise. Future actions may involve monitoring events that exceed these limits and considering adjustments to enforce quieter operations as part of the Noise Action Plan.

With these limits in place, only a few operations are expected to exceed them, thus preserving the current noise climate at both locations. It is recommended to notify airline operators who exceed the limit, informing them of the measured Lmax values. This will help raise awareness among operators about the importance of quieter flying practices. In the future, the limits may be adjusted downward to further reduce noise, and this will be incorporated into 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 SoundPLAN noise model.

6.1 lnput data

The input data used for modelling boundary noise include:

- Geographic coordinates of the boundary points
- Noise and flight track data from calculations and measurements
- Flight schedule for the year 2023-2024
- Complete data set for the year 2023-2024

6.2 Methodology

6.2.1Analyze Available Data: Noise, flight track, and operational data were reviewed and analyzed.

6.2.2.Establish Noise Model : The Noise model was developed using data from 2023-2024

6.2.3. Acquire Land Use Information: Land use data around the airport boundary were collected.

6.2.4. Determine Noise Levels of Airport Operations at Airport Boundary:

Noise levels at the airport boundary were measured and calculated

6.2.5.Exclude Background Noise from Nearby Residential Areas:

Background noise from nearby residential areas was removed from the data.

6.2.6.Determine Average Noise Level Over All Positions of Airport Boundary at Equal Intervals

The Average noise levels along the boundary at equal intervals were calculated.

6.2.7.Noise levels at Boundary Using SoundPLAN Modelling Software:

Noise levels at the boundary were determined using SoundPLAN software, considering flight operations for the year 2023-2024

6.3.Results

Details of the Boundary and Receptor Points

- Figure 6-1: Illustrates the boundary along with points for noise level calculation.
- Total Receptor Points: 52 receptor points are placed at equal intervals along the boundary for comprehensive noise assessment.

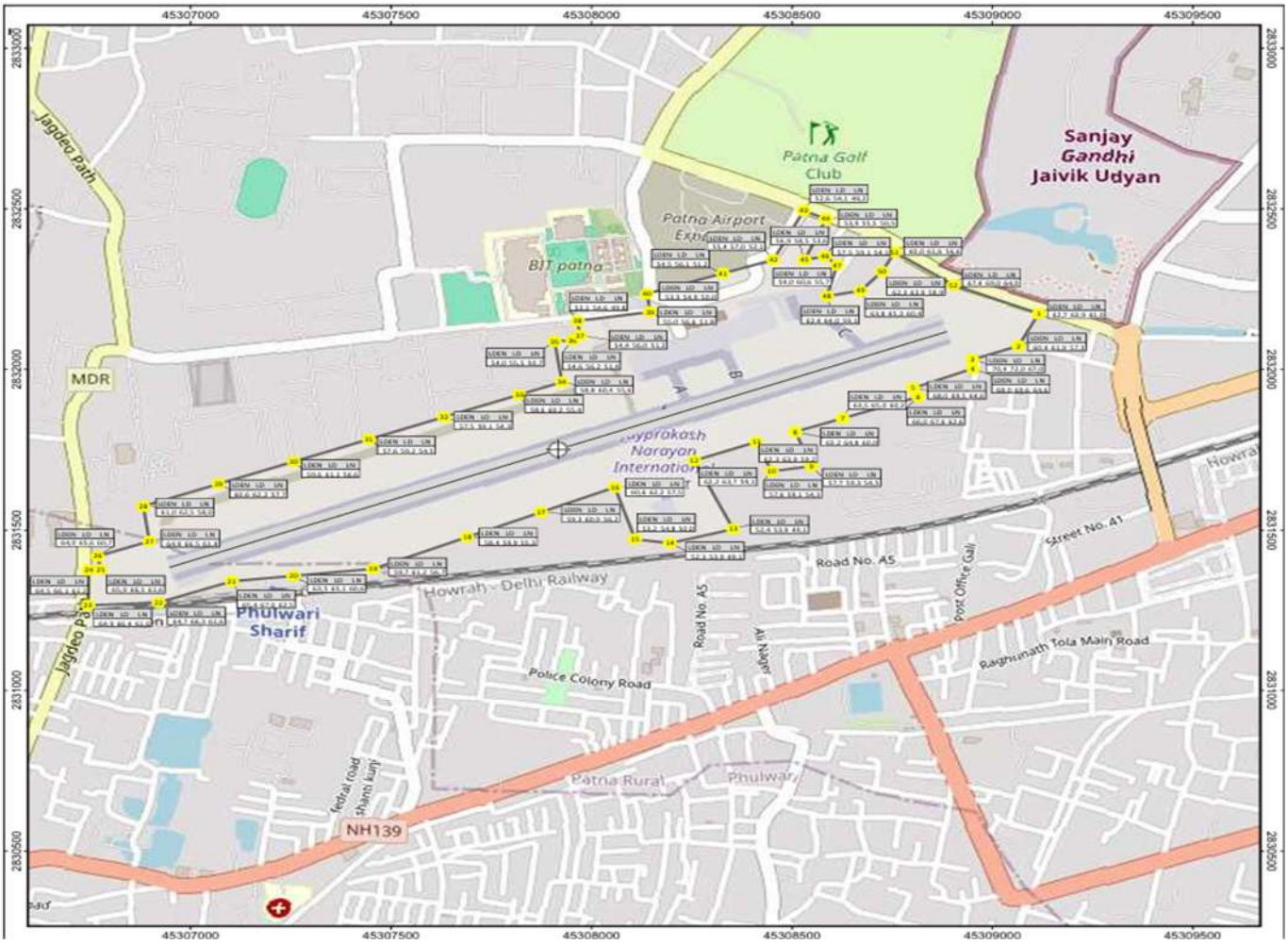


Figure 6-1: Definition of points on boundary

- **LD:** Average noise level during the day.
- **LN:** Average noise level during the night.
- **LDEN:** Weighted average noise level over a 24-hour period, considering daytime, evening, and nighttime variations.

These metrics are crucial for understanding noise impacts and making informed decisions about noise management and mitigation strategies.

Table 6-1: Points of the Airport boundary

Point #	LD (dB)	LN (dB)	LDEN (dB)
1	63.9	61.0	62.7
2	61.9	57.3	60.4
3	72.0	67.0	70.4
4	69.6	64.6	68.0
5	69.5	64.6	68.0
6	67.6	62.6	66.0
7	65.0	60.2	63.5
8	64.8	60.0	63.2
9	59.3	54.5	57.7
10	59.1	54.3	57.6
11	63.9	59.2	62.3
12	63.7	59.1	62.2
13	53.9	49.1	52.4
14	53.9	49.1	52.3
15	54.8	50.0	53.2
16	62.2	57.5	60.6
17	60.9	56.2	59.3
18	59.9	55.3	58.4
19	61.2	56.7	59.7
20	65.1	60.6	63.5
21	67.0	62.5	65.4
22	66.3	61.6	64.7
23	66.4	61.6	64.9
24	66.1	61.2	64.5
25	66.5	61.6	65.0
26	65.6	60.7	64.0
27	66.5	61.8	64.9
28	62.5	58.0	61.0
29	62.2	57.7	60.6
30	61.1	56.6	59.6
31	59.2	54.5	57.5
32	59.1	54.5	57.5
33	60.2	55.4	58.6
34	60.4	55.6	58.8
35	55.5	50.7	54.0

36	56.2	51.4	54.6
37	56.0	51.2	54.4
38	54.6	49.8	53.1
39	56.6	51.8	55.0
40	54.9	50.0	53.3
41	56.1	51.2	54.5
42	57.0	52.1	55.4
43	54.1	49.2	52.6
44	55.5	50.5	53.9
45	58.5	53.6	56.9
46	59.1	54.1	57.5
47	60.6	55.7	59.0
48	64.0	59.1	62.4
49	65.3	60.4	63.8
50	63.9	58.9	62.3
51	61.6	56.6	60.0
52	69.0	64.0	67.4

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

Table 6-2: Boundary noise levels.

	L_{day}	L_{night}
Boundary	55.3	50.1
Limit	75	70
Margin	19.7	24.9

Considering the applicable limits for industrial zones as specified by the Noise Pollution (Control and Regulation) Rules, 2000, which set noise limits of 75 dBA for the daytime period and 70 dBA for the nighttime period, the boundary noise levels at the site were compared with these regulatory thresholds. It was observed that the measured boundary noise level is significantly below these limits, with a margin of 19.7 dBA during the daytime and 24.9 dBA during the nighttime. This indicates that the boundary noise levels are well within the permissible limits, demonstrating compliance with the noise regulations and suggesting minimal impact on the surrounding environment.

7.Conclusion:

The noise mapping and noise zone study was conducted to provide an initial assessment of the current noise situation at Patna Airport. The study spanned three months, from Mar to May 2024. Based on the analysis of the collected data, the following conclusions were drawn:

i. Noise Monitoring and Data Validation:

a. The noise monitoring utilized a Standard Class 1 noise instrument alongside a flight track monitoring system. The collected data was validated with existing noise monitoring results, resulting in a comprehensive database encompassing both noise levels and flight operations. This dual-validation approach ensures accuracy in the recorded noise data.

ii. Development of Noise Maps:

a. Noise maps were created using flight operation data spanning a year 2023-2024.These maps were generated with the SoundPLAN noise modelling software. The maps visually represent the noise distribution around the airport, allowing for better understanding and analysis of noise impacts in various areas.

iii. Creation of Noise Zones:

a. Noise zones were established based on the maximum runway capacity, using SoundPLAN software. These zones were delineated for both daytime (L_{day}) and nighttime (L_{night}) periods, with contour lines indicating noise levels of 55 dB for L_{day} and 50 dB for L_{night}. This zoning helps in identifying areas affected by different levels of noise during different times of the day.

iv. Compliance with Environmental Regulations:

a) The Airport Noise Zone area for Patna Airport has been developed based on the existing GSR 751(E), issued by the Ministry of Civil Aviation under the Height Restrictions for Safeguarding of Aircraft Operations Rules, 2015, published on 30th September 2015, and amended from time to time. This zoning considers all approach and departure funnels, as well as Instrument Flight Procedures (including Instrument Approach Procedures, Standard Instrument Departure, and Standard Terminal Arrival Routes). The process was carried out in consultation with the airport's Air Navigation Service Provider, in alignment with the Airport Master Plan.

V. Display of Noise Zone Information

a) After receiving approval from the DGCA, the noise zone information will be published on the respective airport operator's website.

Vi Land Use Planning Around Airports

a) State and Union Territory Development Authorities should consider the requirements of airport operations when planning land use in areas surrounding the airport noise zone.

Vii Design and Construction Standards for Sound Insulation in Airport Noise Zones

a) The Development Authorities/Regional Planning Department shall specify provisions for incorporating sound resistance into the design, construction, and material selection of new residential, institutional, hospital, and commercial buildings. This requirement aims to enhance the indoor environment in accordance with existing building codes and by-laws for any construction within airport noise zones.

7.1 Mitigation Measures

The following mitigation measures are proposed to reduce noise impact at Patna Airport:

i. Minimum Usage of Reverse Thrust After Landing:

a. Reducing the use of reverse thrust during landing can help decrease noise levels generated by aircraft engines.

ii. Use of Quieter Aircraft:

a. Deploying quieter aircraft, such as the A320 NEO, will significantly contribute to noise reduction.

iii. Continuous Descent Approach (CDA) During Non-Peak Hours:

a. Implementing CDA during non-peak hours helps reduce noise impact. However, it has been observed that the noise reduction from steeper arrivals is generally not noticeable to those living near the airport.

iv. Avoid Intersection Take-Off:

a. Intersection take-offs should be avoided as they can increase noise exposure. When aircraft take off from intersections, they are lower along the departure path, resulting in higher noise levels for nearby villages.

v. Restrict Night-Time Flight Operations:

a. Limiting night-time flight operations as much as possible will help reduce the noise levels associated with aircraft operations during these hours.

Global Reference for Noise Mitigation Procedures

The mitigation procedures are based on global references such as ICAO guidelines for aircraft noise management and airport planning, the EU Noise Directive for environmental noise and best practices, and FAA guidance on airport noise compatibility and mitigation strategies.

7.2 Action Plan

Detailed Action Plan for Noise Management at VEPT , Patna.

7.2.1. Installation of Permanent Noise Monitoring and Flight Track System

- **Objective:** To ensure accurate and continuous measurement of noise levels and tracking of flight paths, especially as the airport approaches or exceeds 50,000 movements per year.
- **Action Items:**
    - **Installation:** Set up permanent monitoring systems in the identified sensitive areas.
    - **Integration:** Ensure the monitoring system is integrated with existing airport operations and data management systems.
    - **Maintenance:** Establish a routine maintenance schedule to ensure equipment reliability and accuracy.

7.2.2. Implementation of Noise Mitigation Measures

- To address and reduce the noise impact based on the findings of the noise study.

7.2.3. Periodic Noise Observation and Reporting Mechanism

- **Objective:** To maintain ongoing awareness of noise issues and ensure timely responses.
- **Action Items:**
    - **Schedule:** Develop a periodic schedule for noise observations, including frequency and specific observation times.
    - **Reporting System:** Establish a reporting mechanism for capturing and addressing noise-related issues.
    - **Training:** Train staff on the reporting and response procedures.

- **Review:** Regularly review noise observation data and reports to identify trends and issues.

7.2.4. Evaluation of Noise Reductions from Optimized Take-Off Procedures

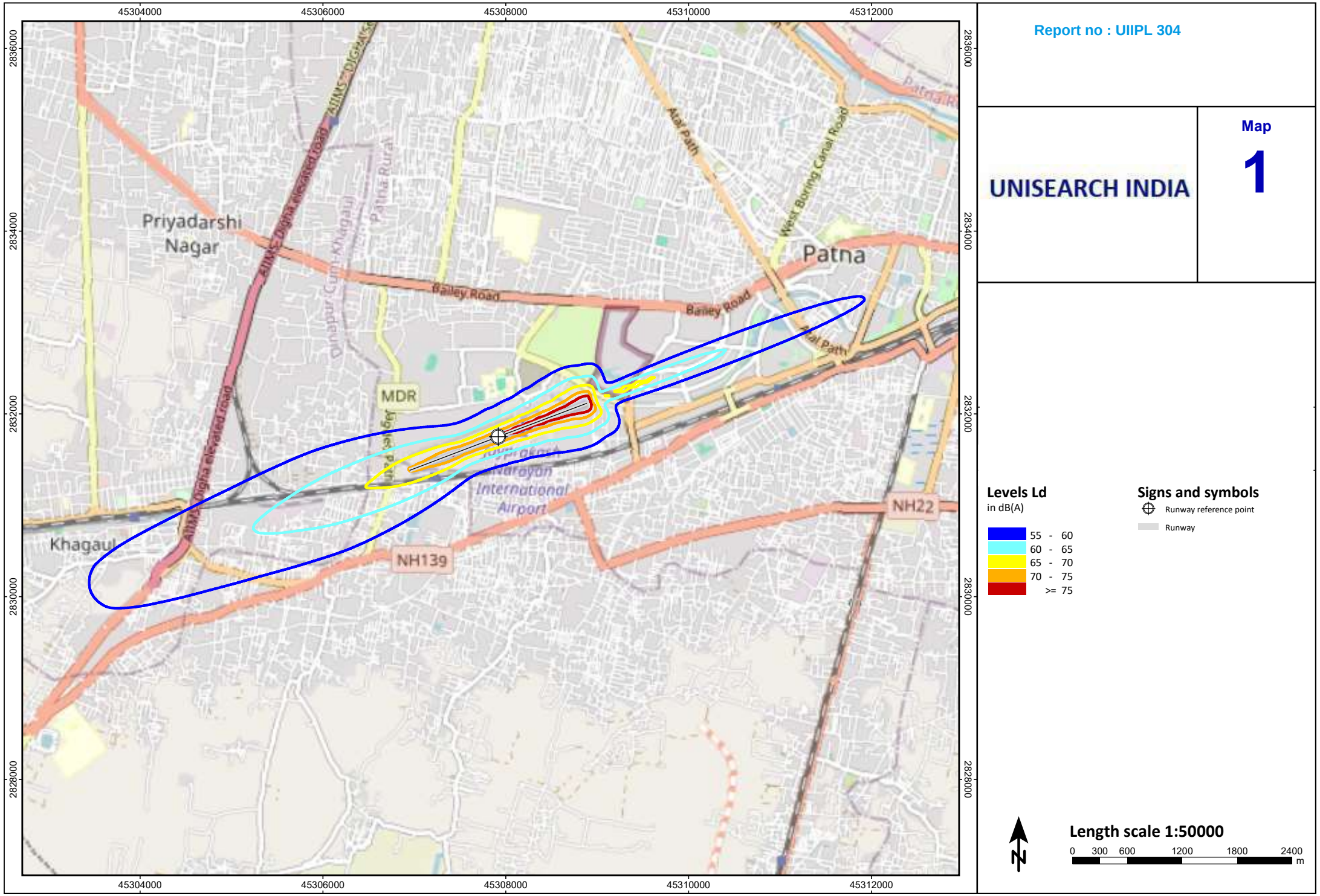
- Objective: To assess the impact of optimized take-off procedures on noise levels for key aircraft types.
- **Action Items:**
  - Procedure Optimization: Develop and implement optimized take-off procedures for aircraft types such as A320, B737-800, A330, B777, and B747-400.
  - Monitoring: Track and compare noise levels before and after the implementation of optimized procedures.
  - Data Analysis: Evaluate the effectiveness of the procedures in reducing noise based on collected data.

Summary

This action plan provides a comprehensive approach to managing and mitigating noise at VEPT, Patna Airport. By installing permanent noise monitoring systems, implementing recommended noise reduction measures, maintaining regular noise observation, and evaluating optimized take-off procedures, the airport can effectively address noise issues and enhance its operational practices.

Annexure l

Noise maps and Noise Zone maps of Patna Airport



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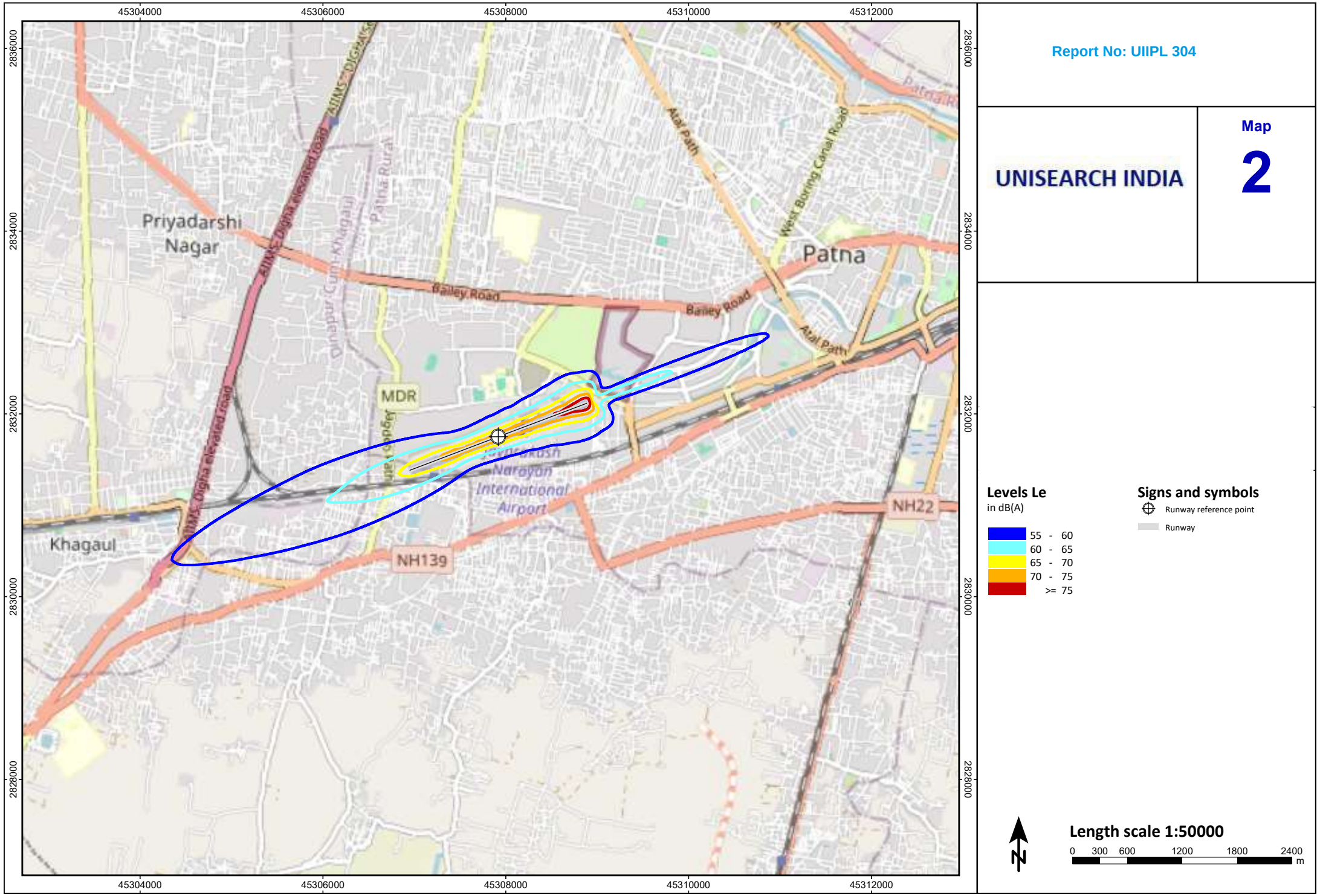
Map

1



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Map

2

Levels Le
in dB(A)

55 - 60	
60 - 65	
65 - 70	
70 - 75	
>= 75	

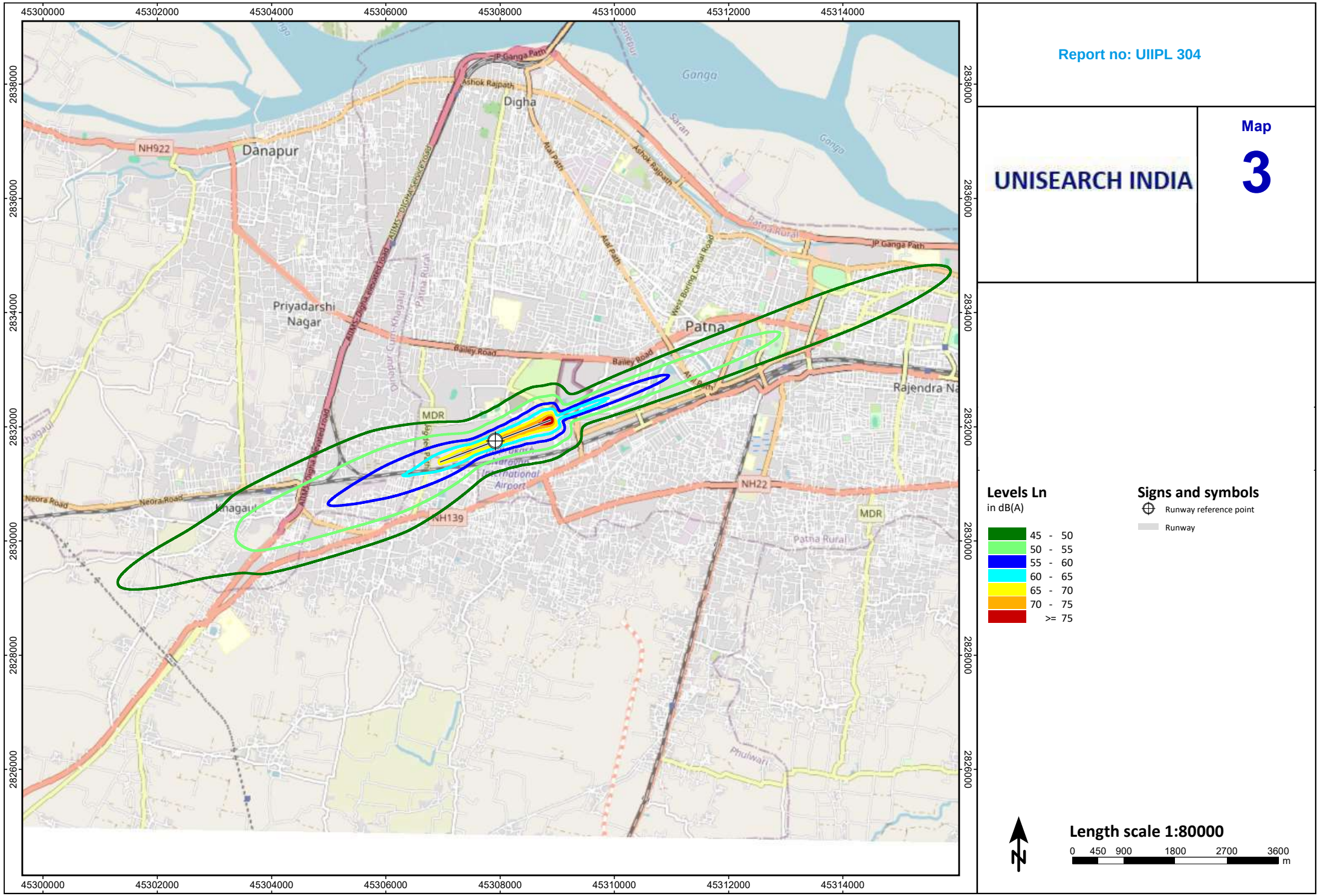
Signs and symbols

- Runway reference point
- Runway

N

Length scale 1:50000

0 300 600 1200 1800 2400 m



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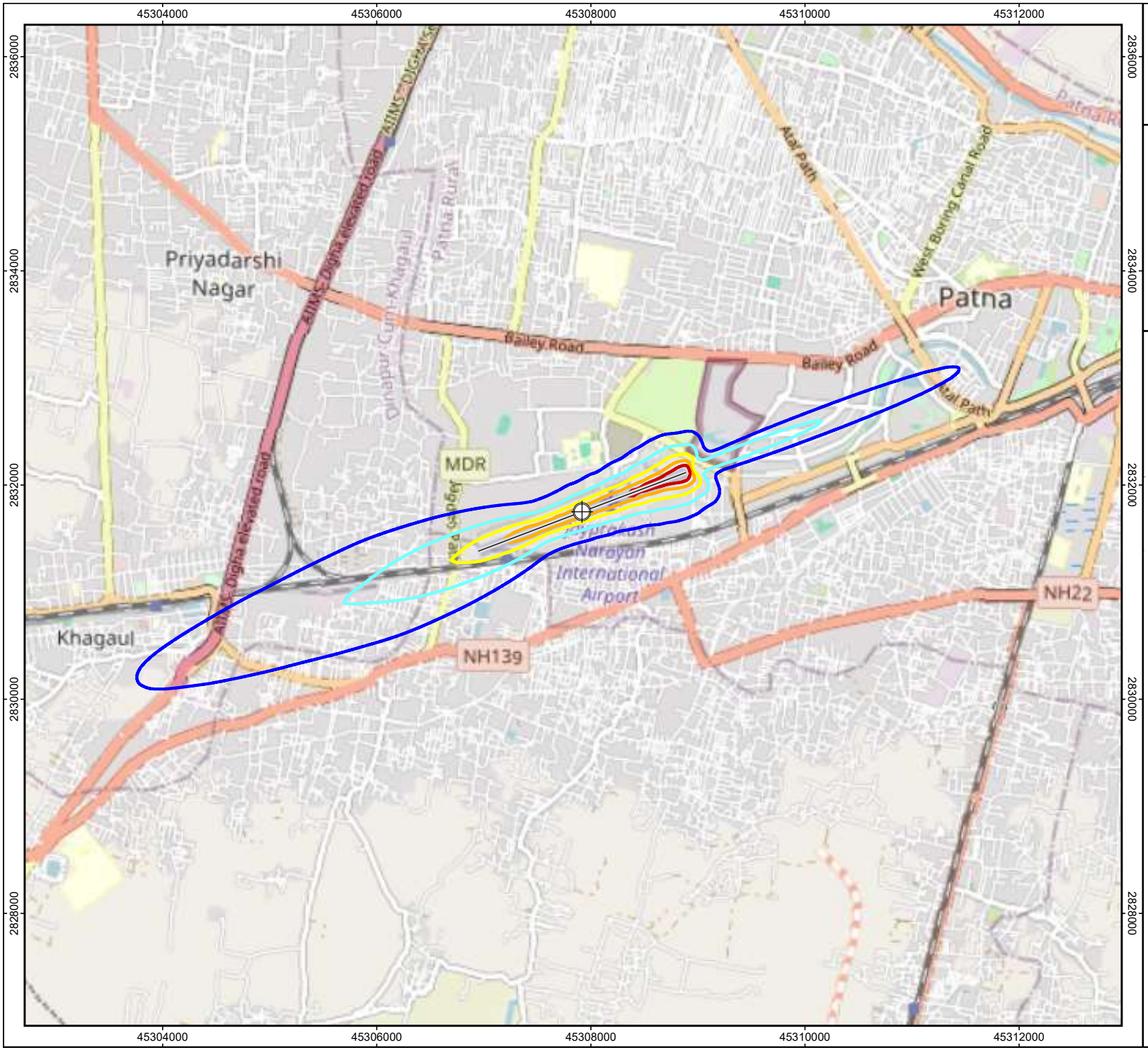
Map

3



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Map

4

Levels Lden
in dB(A)

55 - 60	
60 - 65	
65 - 70	
70 - 75	
>= 75	

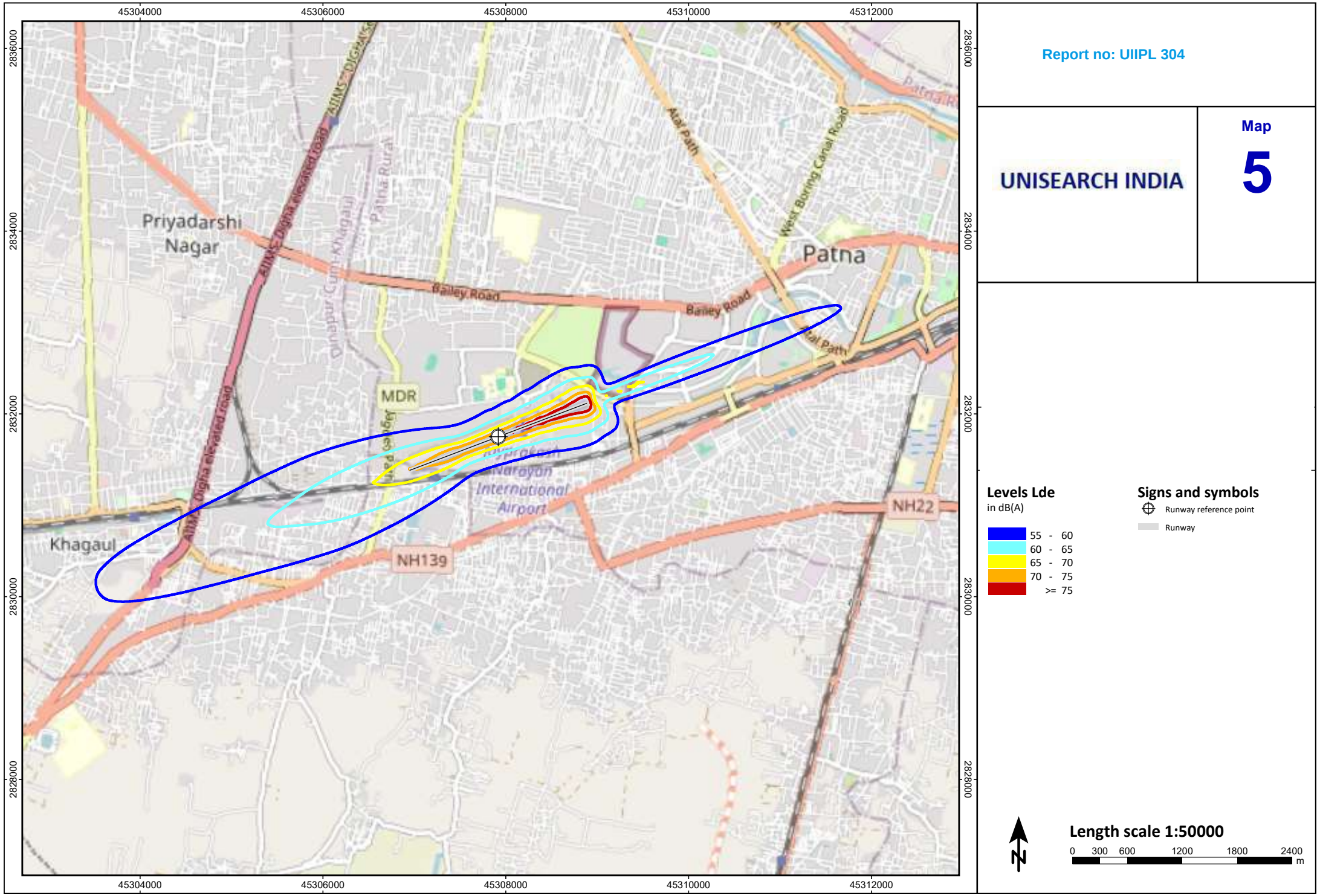
Signs and symbols

- Runway reference point
- Runway

N

Length scale 1:50000

0 300 600 1200 1800 2400 m



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Map

5

Levels Lde
in dB(A)

55 - 60	
60 - 65	
65 - 70	
70 - 75	
>= 75	

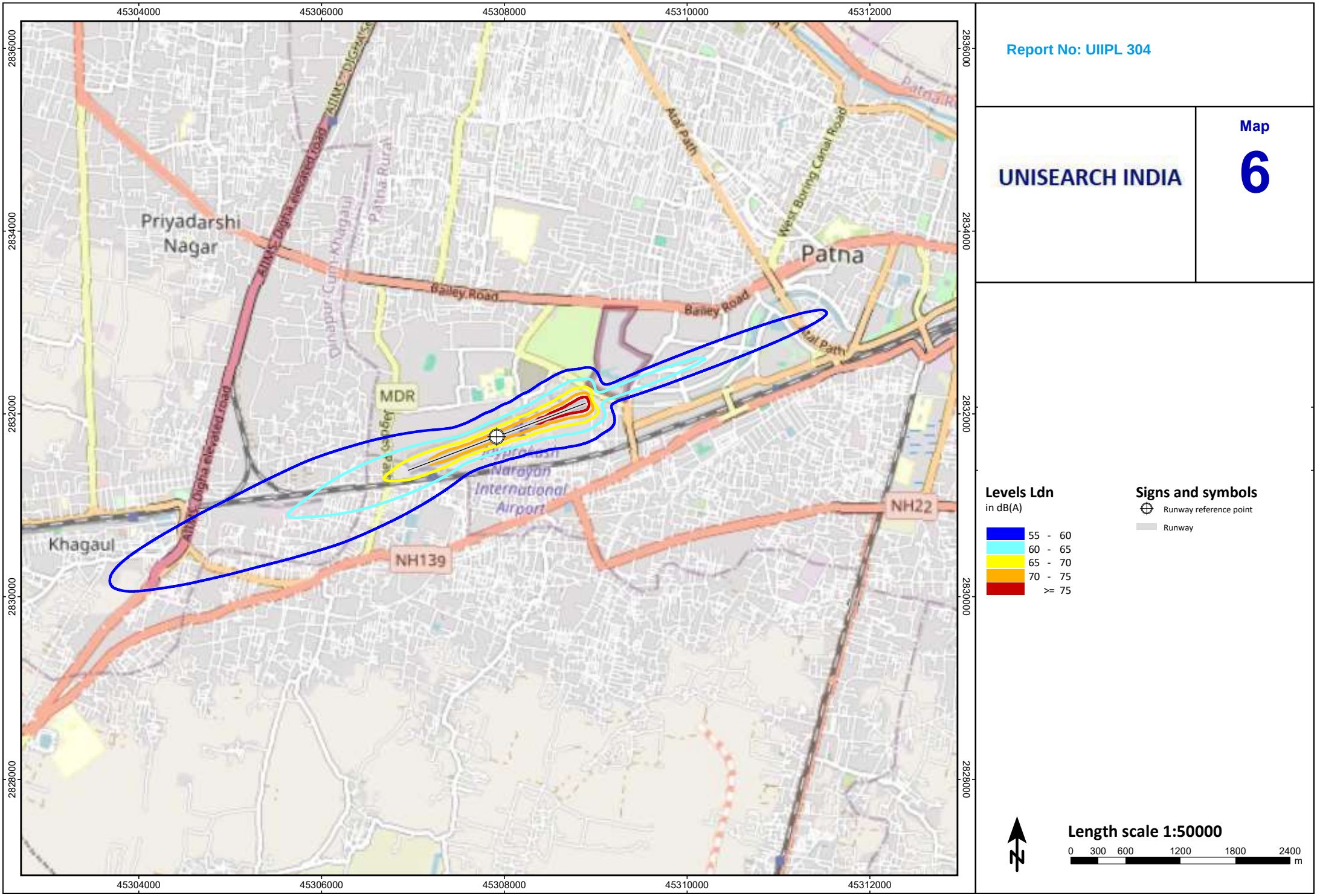
Signs and symbols

- Runway reference point
- Runway

N

Length scale 1:50000

0 300 600 1200 1800 2400 m



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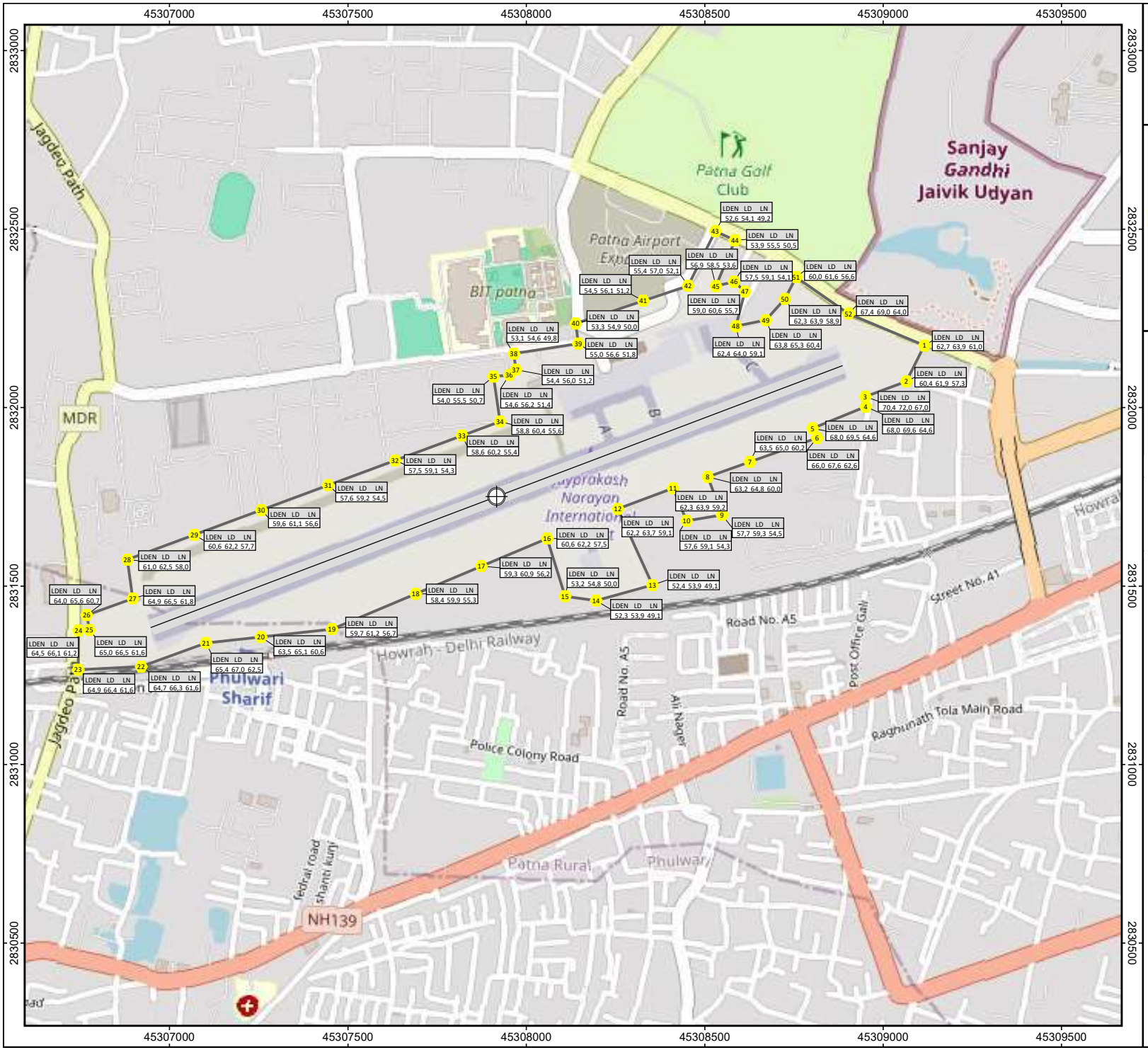
Map

6



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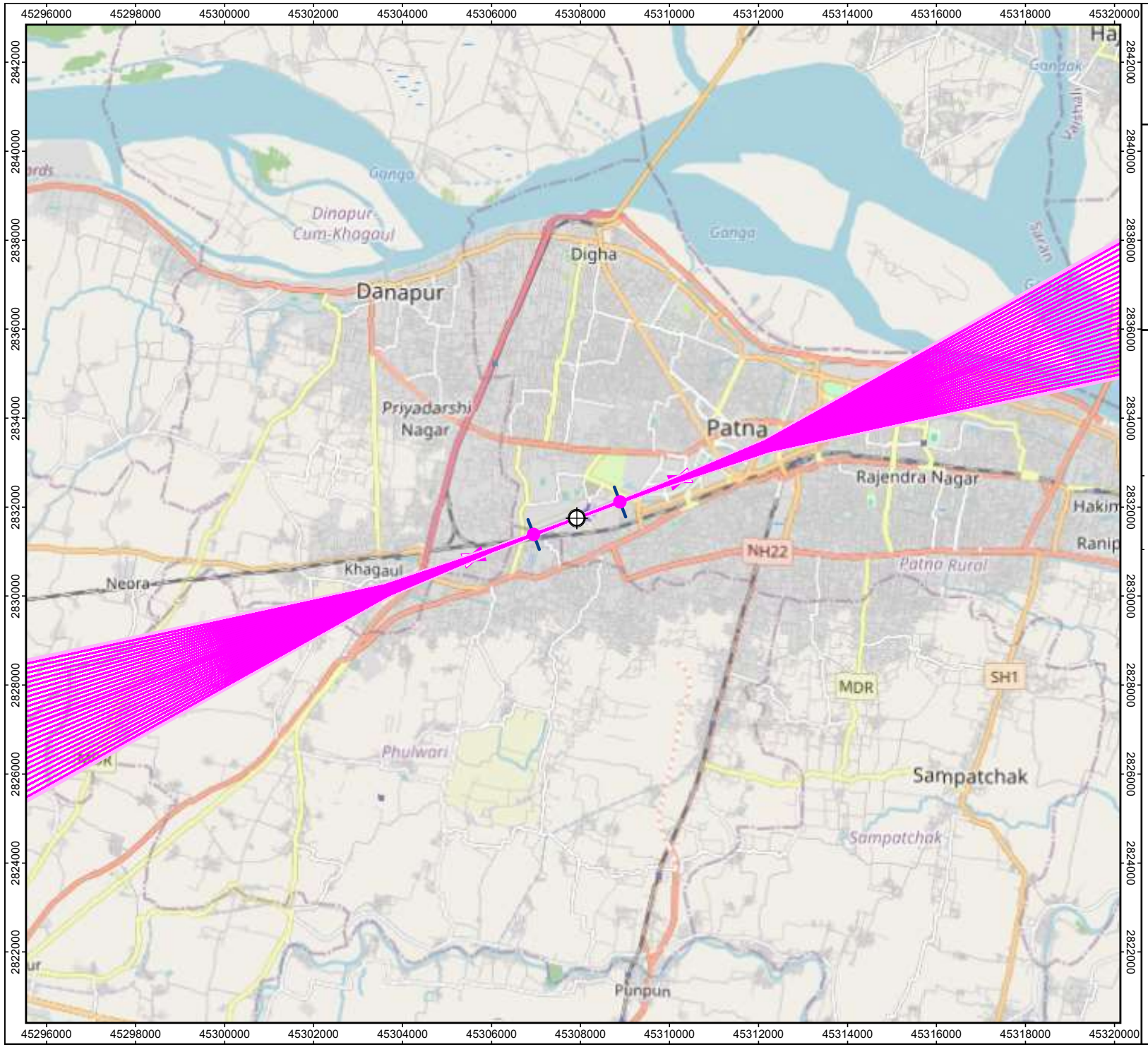
Map

7



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Map

8

Signs and symbols

- Runway reference point
- Runway
- Airport reference point
- Start of roll
- Approach threshold
- Departure
- Approach
- Corridor (2D)
- Emission line

Length scale 1:120000

0 5001000 2000 3000 4000 m

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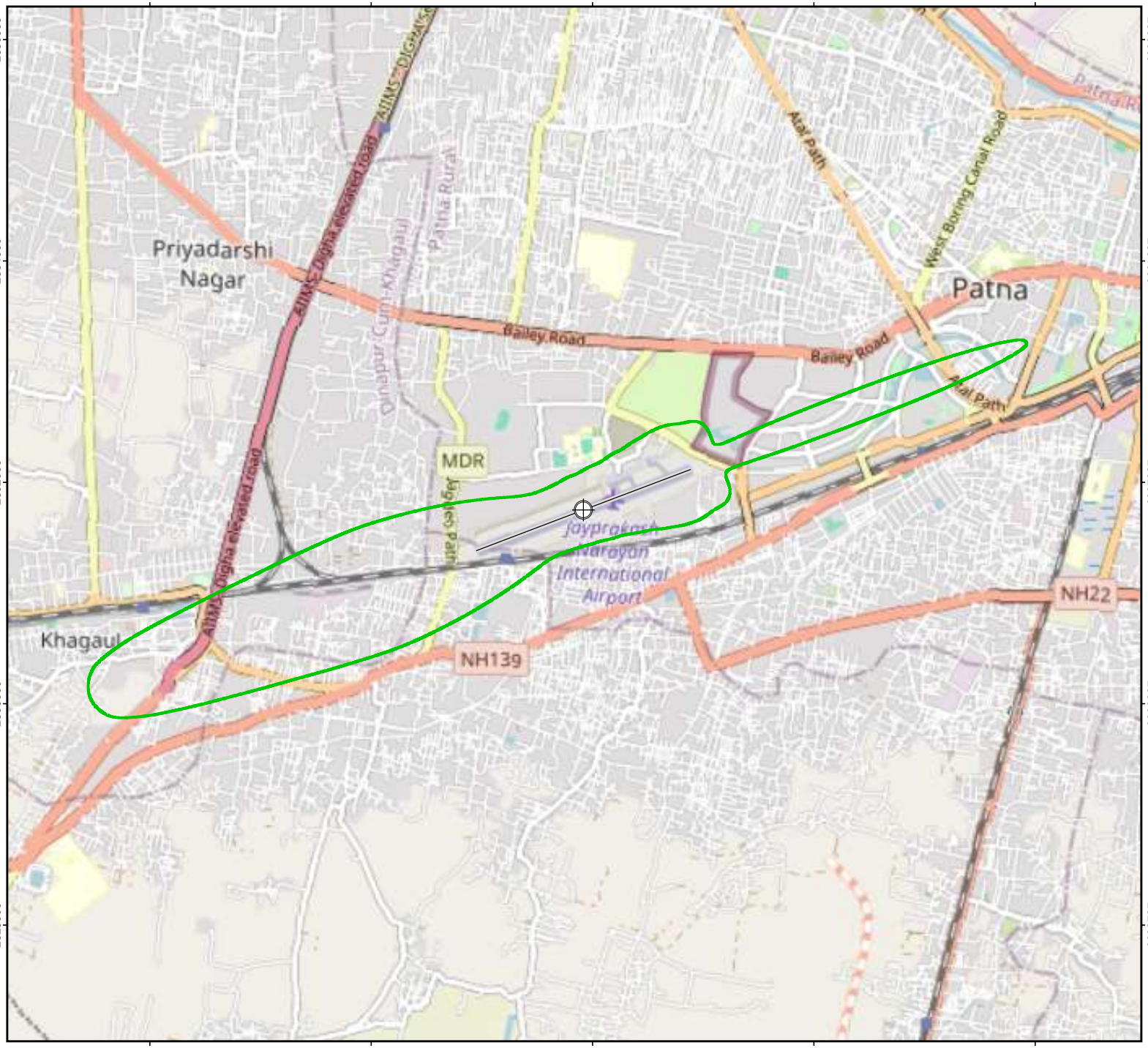
Map

9



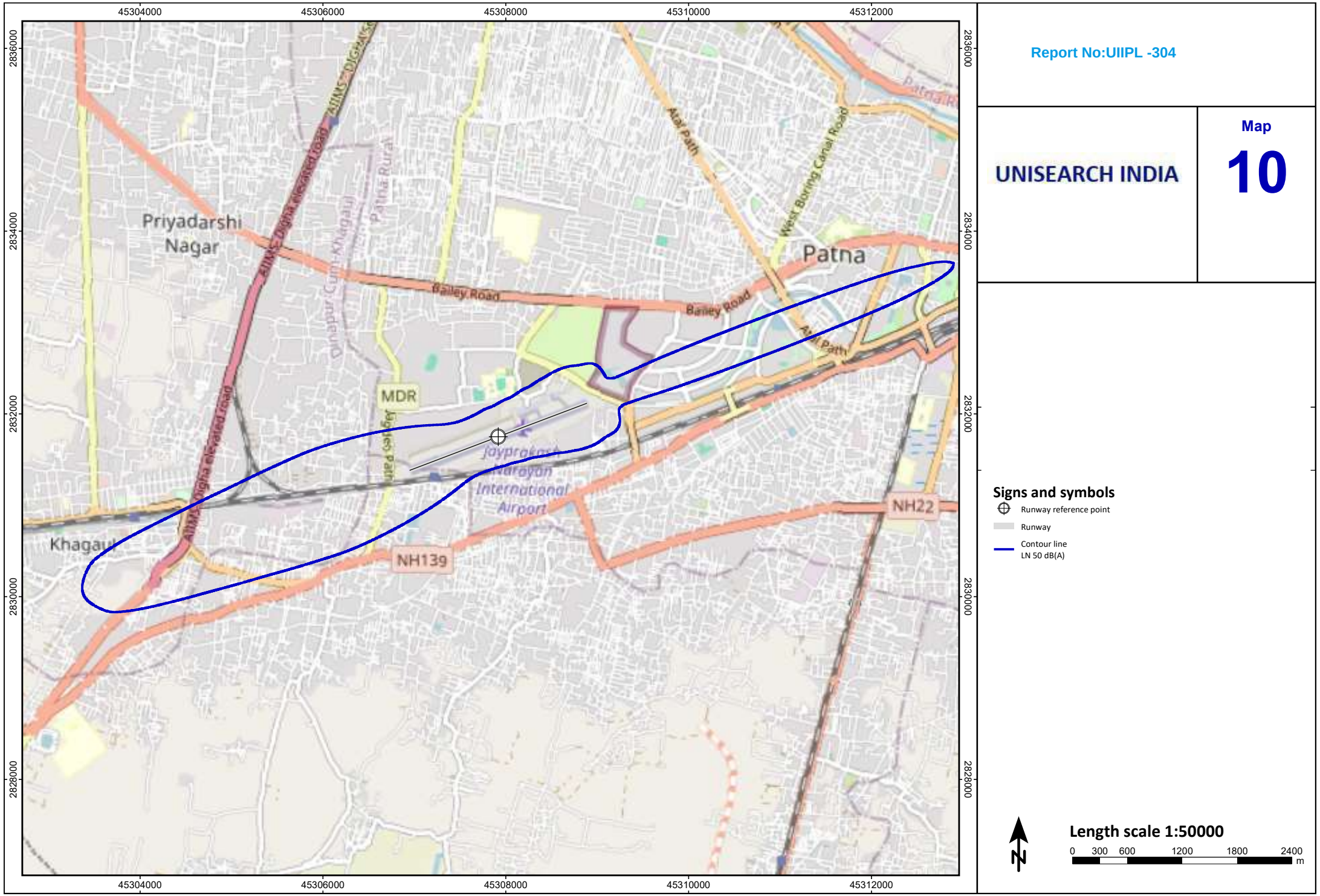
Signs and symbols

- Runway reference point
- Runway
- Contour line LD 55 dB(A)

N

Length scale 1:50000

0 300 600 1200 1800 2400 m



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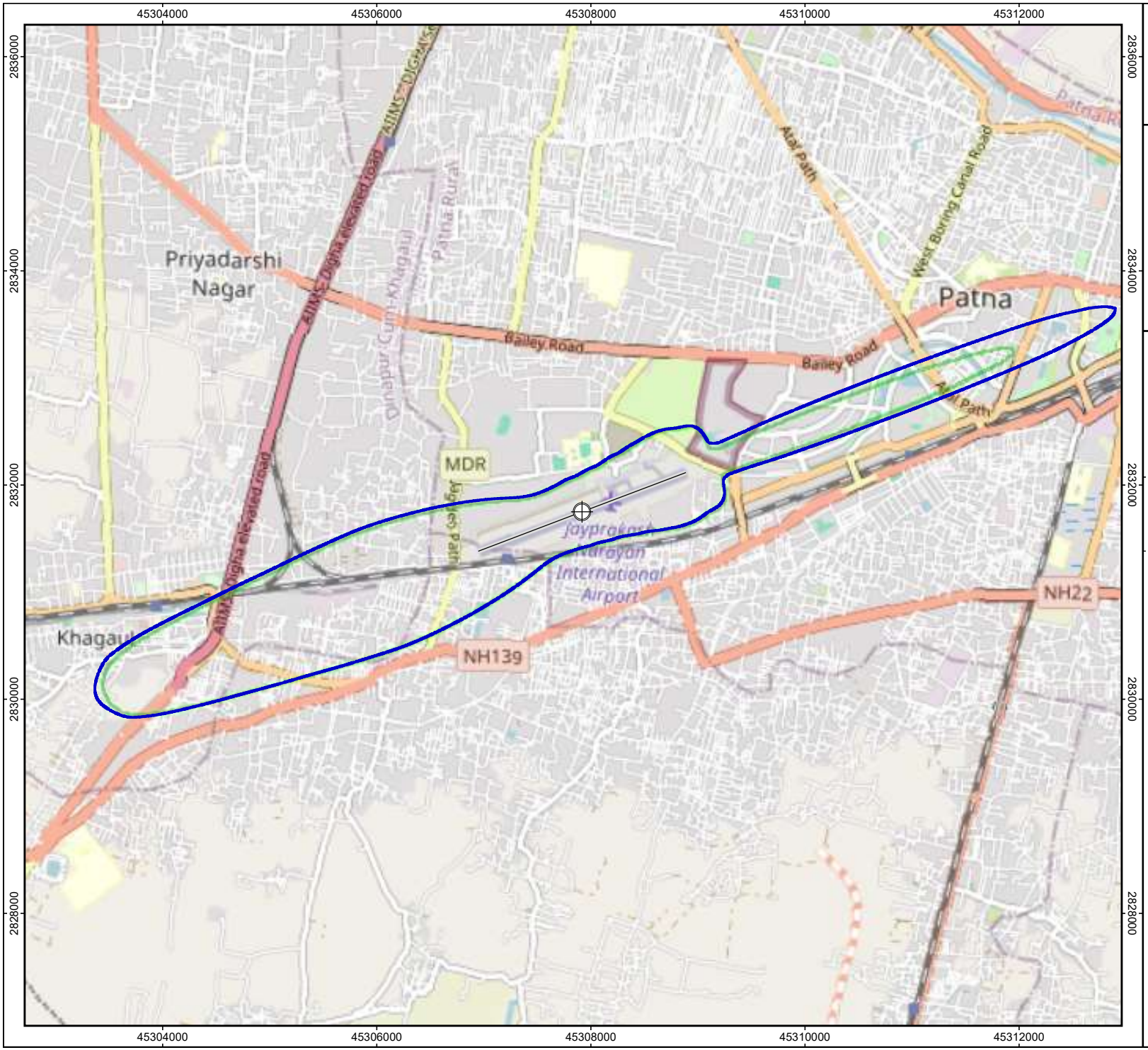
Map

10



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Map

11

Signs and symbols

- Runway reference point
- Runway
- Contour Line LD 55 dB(A)
- Contour Line LN 50 dB(A)

N

Length scale 1:50000

0 300 600 1200 1800 2400 m

Annexure 2

Environment (Protection) Amendment Rules, 2018

रजिस्ट्री सं० डी० एल०-33004/99

REGD. NO. D. L.-33004/99

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The Gazette of India

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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 एतद्द्वारा निम्नलिखित नियम बनाती है, अर्थात्:-

1. (1) इन नियमों का संक्षिप्त नाम पर्यावरण (संरक्षण) संशोधन नियम, 2018 है।

(2) ये राजपत्र में प्रकाशन की तारीख को प्रवृत्त होंगे।

2. पर्यावरण (संरक्षण) नियम, 1986 में, अनुसूची-I में क्रम सं.111 और उससे संबंधित प्रविष्टियों के बाद निम्नलिखित क्रम संख्या और प्रविष्टियां अंत:स्थापित 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 प्रात: से 10.00 बजे रात्रि तक और रात्रि समय में 10.00 बजे रात्रि से 6.00 बजे प्रात: 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।

(ड.) 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 पारिभाषित 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 –लैंडिग 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 लैंडिग 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 प्रात: से 10.00 बजे रात्रि तक और रात्रि समय 10.00 बजे रात्रि से 6.00 बजे प्रात: 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/ग्रांउड 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 (विनियम 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 योजनातैयार 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 लिएध्वनि मैपिंग का कार्यविमानपत्तन 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. सेंथिल 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 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.

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