

## Report on Ambient Air Quality & Noise on Deepawali 2018



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## Deepawali Monitoring

Like every year, CPCB has planned for air quality and noise level monitoring on selected pre-Deepawali day (01.11.2018) and on Deepawali day (07.11.2018) in Delhi. Ambient Noise was monitored at 16 locations (06 manual and 10 real-time noise monitoring) and Ambient Air Quality at 4 locations (manual monitoring and 36 Real time monitoring stations). Noise Level and air quality (both manual and Real time) on Pre-Deepawali day (November 01, 2018) and Deepawali day (November 07, 2018) is presented in this report to assess the impact of Diwali festival. In addition to the noise level and air quality monitoring CPCB has also collected meteorological data at Parivesh Bhawan.

### Observations:

#### 1. Noise Level

##### (A) Manual Monitoring Data: 06.00 p.m. to 12.00 a.m. (Night)

The Pre-Deepawali monitoring was conducted on 1<sup>st</sup> November, 2018; data for past five years are given in the table 1a for comparison of noise level on pre-deepawali monitoring day. There was decrease in ambient noise level except at Mayur Vihar Phase II (Residential Area) compared to 2017 pre-deepawali day (12.10.2017). The highest Leq dB (A) was also recorded at Mayur Vihar this year on pre-deepawali day. Pre-deepawali day's values are only indicative background when noise making activities (Fireworks) are not affecting ambient noise level.

Table 1a: Ambient Noise Level data on during **Pre-Deepawali Days (2014-2018)**

| S.No. | Monitoring Stations      | Pre-Deepawali Day |          |          |          |            |
|-------|--------------------------|-------------------|----------|----------|----------|------------|
|       |                          | 15.10.14          | 05.11.15 | 24.10.16 | 12.10.17 | 01.11.2018 |
| 1     | Lajpat Nagar (R)         | NM                | 61       | 55       | 62       | 62=        |
| 2     | Mayur Vihar Phase-II (R) | 60                | 60       | 59       | 62       | 68↑        |
| 3     | Pitam Pura (R)           | 61                | 55       | 43       | 55       | 43↓        |
| 4     | Kamla Nagar (R)          | 63                | 61       | 60       | 61       | 59↓        |
| 5     | Janakpuri (R)            | -                 | 58       | 59       | 59       | 55↓        |
| 6     | Okhla (I)                | NM                | 66       | 74       | 76       | 61↓        |

Note : All values are in Leq dB(A) NM= not monitored at the location

The values reported in Table 1a should not be compared with prescribed noise level standards for designated areas as the values collected can't be matched with time period (Day time 06 a.m to 10 p. m. and Night time 10 p.m. to 6 a.m.) as prescribed in standards

Noise level monitored at six locations for the last five years on Deepawali day are given in the Table 1b. The Deepawali monitoring (2018) data

indicate that at three out of six locations noise level increased compared to 2017.

| S.No. | Monitoring Stations      | Deepawali Day |          |          |          |            |
|-------|--------------------------|---------------|----------|----------|----------|------------|
|       |                          | 23.10.14      | 11.11.15 | 30.10.16 | 19.10.17 | 07.11.2018 |
| 1     | Lajpat Nagar (R)         | NM            | 76       | 76       | 74       | 69 ↓       |
| 2     | Mayur Vihar Phase-II (R) | 83            | 79       | 80       | 75       | 74 ↓       |
| 3     | Pitam Pura (R)           | 71            | 74       | ID       | 69       | 75 ↑       |
| 4     | Kamla Nagar (R)          | 80            | 86       | 74       | 69       | 74 ↑       |
| 5     | Janakpuri (R)            | 78            | 79       | 75       | 67       | 75 ↑       |
| 6     | Okhla (I)                | NM            | 86       | 86       | 83       | 68 ↓       |

Note : All values are in Leq dB(A), NM= not monitored at the location, ID = indicates Insufficient data  
The values reported in Table 1b should not be compared with prescribed noise level standards for designated areas as the values collected can't be matched with time period (Day time 06 a.m to 10 p. m. and Night time 10 p.m. to 6 a.m.) as prescribed in standards

### (B) Real-time Noise Monitoring Data:

CPCB is conducting round the clock noise level monitoring at ten locations in Delhi. The data of selected pre-Deepawali days for last four years is tabulated at table: 2a. The data shows increasing trend as compared to 2017. Only at Anand Vihar and Punjabi Bagh both day time and night time noise level declined. DCE, Dilshad Garden, ITO, Mandir Marg, Dwarka and R.K. Puram recorded increase in both day and night time noise observed on 1<sup>st</sup> November 2018 compared to selected pre-deepawali day in 2017.

| S. No. | Monitoring Stations | Pre-Deepawali Day |            |            |            |            |            |            |            | Prescribed Standards |            |
|--------|---------------------|-------------------|------------|------------|------------|------------|------------|------------|------------|----------------------|------------|
|        |                     | 05.11.2015        |            | 24.10.2016 |            | 12.10.2017 |            | 01.11.2018 |            | Day Time             | Night Time |
|        |                     | Day Time          | Night Time | Day Time   | Night Time | Day Time   | Night Time | Day Time   | Night Time |                      |            |
| 1      | Anand Vihar (C)     | 68                | 63         | 66         | 62         | 68         | 64         | 64↓        | 61↓        | 65                   | 55         |
| 2      | Punjabi Bagh (R)    | 60                | 55         | 59         | 49         | 60         | 59         | 59↓        | 52↓        | 55                   | 45         |
| 3      | CPCB HQ (C)         | 67                | 57         | 66         | 57         | 66         | 56         | 63↓        | 59↑        | 65                   | 55         |
| 4      | Civil Lines (C)     | 62                | 60         | 61         | 59         | 61         | 57         | 61=        | 58↑        | 65                   | 55         |
| 5      | DCE, Bawana (S)     | 77                | 80         | 54         | 50         | 55         | 50         | 57↑        | 53↑        | 50                   | 40         |
| 6      | Dilshad Garden(S)   | 53                | 48         | 54         | 49         | 53         | 53         | 62↑        | 62↑        | 50                   | 40         |
| 7      | ITO (C)             | 74                | 68         | 71         | 66         | 73         | 68         | 74↑        | 71↑        | 65                   | 55         |
| 8      | Mandir Marg (S)     | 60                | 46         | 60         | 45         | 55         | 46         | 62↑        | 57↑        | 50                   | 40         |
| 9      | NSIT, Dwarka (S)    | 56                | 52         | 57         | 53         | 57         | 54         | 57=        | 56↑        | 50                   | 40         |
| 10     | R.K. Puram (S)      | 63                | 52         | 61         | 51         | 60         | 52         | 64↑        | 56↑        | 50                   | 40         |

Note : All values are in Leq dB(A):  
Day Time - 0600 hrs to 2200 hrs and Night time - 2200 hrs to 0600 hours

The noise level data of last four years recorded at real-time monitoring stations in Delhi on Deepawali days is tabulated at table: 2b. The data shows that almost at all the stations the noise level was increased at day and night on Deepawali day compared to last year Deepawali day.

Table 2(b): Online Ambient Noise Level data during **Deepawali Days (2015-2018)**

| S.No. | Monitoring Stations | Deepawali Day |            |            |            |            |            |            |            | Standards |            |
|-------|---------------------|---------------|------------|------------|------------|------------|------------|------------|------------|-----------|------------|
|       |                     | 11.11.2015    |            | 30.10.2016 |            | 19.10.2017 |            | 07.11.2018 |            | Day Time  | Night Time |
|       |                     | Day Time      | Night Time | Day Time   | Night Time | Day Time   | Night Time | Day Time   | Night Time |           |            |
| 1     | Anand Vihar (C)     | 69            | 70         | 68         | 68         | 68         | 68         | 64↓        | 66↓        | 65        | 55         |
| 2     | Punjabi Bagh (R)    | 66            | 71         | 60         | 58         | 56         | 54         | 57↑        | 57↑        | 55        | 45         |
| 3     | CPCB HQ (C)         | 67            | 68         | 64         | 61         | 64         | 59         | 64=        | 62↑        | 65        | 55         |
| 4     | Civil Lines (C)     | 64            | 66         | 61         | 62         | 59         | 60         | 60↑        | 60=        | 65        | 55         |
| 5     | DCE, Bawana (S)     | 66            | 71         | 56         | 55         | 53         | 52         | 55↑        | 57↑        | 50        | 40         |
| 6     | Dilshad Garden (S)  | 65            | 67         | 57         | 55         | 53         | 53         | 62↑        | 62↑        | 50        | 40         |
| 7     | ITO (C)             | 73            | 70         | 70         | 67         | 71         | 68         | 72↑        | 70↑        | 65        | 55         |
| 8     | Mandir Marg (S)     | 60            | 60         | 54         | 51         | 51         | 48         | 68↑        | 50↑        | 50        | 40         |
| 9     | NSIT, Dwarka (S)    | 63            | 62         | 58         | 57         | 57         | 57         | 58↑        | 70↑        | 50        | 40         |
| 10    | R.K. Puram (S)      | 67            | 65         | 61         | 57         | 59         | 53         | 77↑        | 61↑        | 50        | 40         |

Note : All values are in Leq dB(A)

### Ambient Air Quality

#### (A)Data of manual monitoring: 06.00 a.m. to 06.00 a.m.

The station-wise data for comparison of air quality on Pre-deepawali and Deepawali days is presented in following tables. It can be observed that all the pollutants reported higher values at all the stations if compared with 2017 data for pre-deepawali day. This may be due to the differences in background air quality status in October (12.10.2017) and November (01.11.2018). Meteorology as well as stubble burning makes huge difference in Delhi air quality in late October and November. This year Deepawali day shows that the PM<sub>10</sub> and PM<sub>2.5</sub> values have increased this year compared to 2017; however the data are similar to Deepawali day of 2016 which was observed on 30<sup>th</sup> October.

Table 3(a): Ambient Air Quality Status during Pre-Deepawali & Deepawali Day, **ITO**

| Parameter         | Pre-Deepawali day |      |      |      |      | Deepawali day |      |      |      |      |
|-------------------|-------------------|------|------|------|------|---------------|------|------|------|------|
|                   | 2014              | 2015 | 2016 | 2017 | 2018 | 2014          | 2015 | 2016 | 2017 | 2018 |
| SO <sub>2</sub>   | 05                | 14   | 09   | 07   | 09↑  | 08            | 22   | 16   | 11   | 5    |
| NO <sub>2</sub>   | 85                | 78   | 83   | 87   | 100↑ | 82            | 57   | 77   | 74   | 50   |
| PM <sub>10</sub>  | 129               | 166  | 203  | 208  | 284↑ | 442           | 531  | 878  | 438  | 470↑ |
| PM <sub>2.5</sub> | -                 | NM   | 104  | -    | 221  | 323           | NM   | 797  | 180  | 322↑ |

Table 3(b): Ambient Air Quality Status during Pre-Deepawali & Deepawali Day, **Pitampura**

| Parameter         | Pre-Deepawali day |      |      |      |      | Deepawali day |      |      |      |      |
|-------------------|-------------------|------|------|------|------|---------------|------|------|------|------|
|                   | 2014              | 2015 | 2016 | 2017 | 2018 | 2014          | 2015 | 2016 | 2017 | 2018 |
| SO <sub>2</sub>   | 04                | 21   | 10   | 13   | 20↑  | 10            | 19   | 16   | 28   | 29↑  |
| NO <sub>2</sub>   | 45                | 72   | 58   | 73   | 130↑ | 67            | 27   | 43   | 61   | 82↑  |
| PM <sub>10</sub>  | 115               | 161  | 368  | 226  | 296↑ | 756           | 460  | 1297 | 690  | 990↑ |
| PM <sub>2.5</sub> | -                 | 117  | 102  | 147  | 257↑ | 678           | 435  | 1238 | 677  | 831↑ |

Table 3(c): Ambient Air Quality Status during Pre-Deepawali & Deepawali Day, **Janakpuri**

| Parameter         | Pre-Deepawali day |      |      |      |      | Deepawali day |      |      |      |       |
|-------------------|-------------------|------|------|------|------|---------------|------|------|------|-------|
|                   | 2014              | 2015 | 2016 | 2017 | 2018 | 2014          | 2015 | 2016 | 2017 | 2018  |
| SO <sub>2</sub>   | 04                | 12   | 16   | 06   | 18↑  | 32            | 18   | 45   | 43   | 44↑   |
| NO <sub>2</sub>   | 42                | 45   | 71   | 62   | 100↑ | 53            | 25   | 65   | 73   | 73    |
| PM <sub>10</sub>  | 152               | 119  | 213  | 193  | 290↑ | 648           | 554  | 902  | 706  | 1076↑ |
| PM <sub>2.5</sub> | -                 | 84   | 96   | 109  | 202↑ | 510           | 459  | 842  | 638  | 988↑  |

Table 3(d): Ambient Air Quality Status during Pre-Deepawali & Deepawali Day, **Parivesh Bhawan**

| Parameter         | Pre-Deepawali day |      |      |      |      | Deepawali day |      |      |      |       |
|-------------------|-------------------|------|------|------|------|---------------|------|------|------|-------|
|                   | 2014              | 2015 | 2016 | 2017 | 2018 | 2014          | 2015 | 2016 | 2017 | 2018  |
| SO <sub>2</sub>   | -                 | 12   | 16   | 06   | 19↑  | NM            | 36   | 110  | 70   | 21    |
| NO <sub>2</sub>   | -                 | 45   | 71   | 62   | 91↑  | NM            | 41   | 141  | 47   | 44    |
| PM <sub>10</sub>  | -                 | 119  | 213  | 193  | 340↑ | NM            | 593  | 1183 | 628  | 1168↑ |
| PM <sub>2.5</sub> | -                 | 84   | 96   | 109  | 206↑ | NM            | 474  | 958  | 496  | 990↑  |

**(B) Data of Real Time monitoring: 06.00 a.m. to 06.00 a.m.**

To compare the air quality on pre-deepawali and depawali day's the data of selected CAAQMS installed at IHBAS (Dilshad Garden), DMS (Shadipur) and NSIT (Dwarka) for the past 3 years are tabulated in the following tables. The increase or decrease in data for 2018 as compared to 2017 is indicated. There is an increase in reported concentrations for PM<sub>2.5</sub> at all CAAQMS on pre-deepawali day 2018 except NSIT Dwarka. On Deepawali days increase in concentrations of PM<sub>2.5</sub> was observed at IHBAS and DMS Shadipur stations; however NSIT Dwarka has reported less.

Table 4(a): Air Pollutants Profile (Online) at **IHBAS**, Dilshad Garden during Deepawali Day

| Pollutants        | Pre-Deepawali Day |          |          |          | Deepawali Day |          |          |          |
|-------------------|-------------------|----------|----------|----------|---------------|----------|----------|----------|
|                   | 05.11.15          | 24.10.16 | 12.10.17 | 01.11.18 | 11.11.15      | 30.10.16 | 19.10.17 | 07.11.18 |
| PM <sub>2.5</sub> | 78                | 119      | 147      | 177↑     | 192           | 602      | 183      | 334 ↑    |
| SO <sub>2</sub>   | 5                 | 5        | 12       | 28↑      | 9             | 40       | 24       | 36↑      |
| NO <sub>2</sub>   | 63                | 85       | 66       | 62↓      | 64            | 94       | 54       | 67 ↑     |
| CO                | 222               | 1119     | 1413     | 780      | 736           | 983      | 1423     | 1441↑    |

Note : All values are in µg/m<sup>3</sup>

Table 4(b): Air Pollutants Profile (Online) at **DMS**, Shadipur during Deepawali days

| Pollutants        | Pre-Deepawali Day |          |          |          | Deepawali Day |          |          |          |
|-------------------|-------------------|----------|----------|----------|---------------|----------|----------|----------|
|                   | 05.11.15          | 24.10.16 | 12.10.17 | 01.11.18 | 11.11.15      | 30.10.16 | 19.10.17 | 07.11.18 |
| PM <sub>2.5</sub> | 108               | 62       | 123      | 207↑     | 121           | 474      | 421      | 437↑     |
| SO <sub>2</sub>   | 3                 | 16       | 12       | 21↑      | 25            | 94       | 42       | 40↓      |
| NO <sub>2</sub>   | 60                | 63       | 25       | 91↑      | 49            | 102      | 58       | 94↑      |
| CO                | 333               | 1148     | 1383     | 2000↑    | 993           | 1596     | 1789     | 1573↓    |

Note : All values are in µg/m<sup>3</sup>

Table 4(c): Air Pollutants Profile (Online) at **NSIT**, Dwarka during Deepawali Days

| Pollutants        | Pre-Deepawali Day |          |          |          | Deepawali Day |          |          |          |
|-------------------|-------------------|----------|----------|----------|---------------|----------|----------|----------|
|                   | 05.11.15          | 24.10.16 | 12.10.17 | 01.11.18 | 11.11.15      | 30.10.16 | 19.10.17 | 07.11.18 |
| PM <sub>2.5</sub> | 191               | 118      | 79       | 175↑     | 99            | 457      | 373      | 341↓     |
| SO <sub>2</sub>   | 9                 | 21       | 8        | 29↑      | 30            | 11       | 23       | 19↓      |
| NO <sub>2</sub>   | 27                | 33       | 43       | 36↑      | 33            | 35       | 41       | 39↓      |
| CO                | 980               | 660      | 844      | 1120↑    | 698           | 908      | 1291     | 769↓     |

Note : All values are in µg/m<sup>3</sup>

### Comparison of Meteorology

Comparative meteorology on pre-deepwali day and deepawali day observed during last three years (2016, 2017 and 2018) is presented in Table 5. It reveals that average mixing height on pre-deepawali day was lowest this year. On Deepawali day mixing height was 574 m, however night time mixing height was 142 m. Mean wind speed at Parivesh Bhawan was 1.6 m/sec in both year (2017 and 2018), however the night time wind speed was down to 0.8 m/sec on Deepawali 2018. Lowest average temperature and Relative Humidity was observed on Diwali day 2018 compared to 2016 and 2017. Wind was calm and not favourable for dispersion. The average temperature was also reported lowest this year.

Table 5: 24 hourly averages of meteorological parameters monitored during Deepawali at Parivesh Bhawan

| Parameters            | 2016       |        | 2017       |        | 2018       |        |
|-----------------------|------------|--------|------------|--------|------------|--------|
|                       | Pre-Diwali | Diwali | Pre-Diwali | Diwali | Pre-Diwali | Diwali |
| Mixing Height (m)     | 657        | 492    | 622        | 481    | 468        | 574    |
| Wind Speed (m/s)      | 2.6        | 1.3    | 1.1        | 1.5    | 1.5        | 1.6    |
| Temperature (°C)      | 28.4       | 24.8   | 29.5       | 29.8   | 25.0       | 21.8   |
| Relative Humidity (%) | 38.9       | 56.9   | 44.3       | 47.1   | 55.9       | 41.6   |

## Overall Observation

Average Mixing height on Deepawali day in 2017 and 2018 was in similar range (400 – 600 m). The average wind speed was also similar (1.6 m/sec) in both the years but the wind speed decreased to 0.8m/sec in night of Deepawali day 2018. Significant drop in temperature of about 8°C, reduced wind speed specially during night were two important factors that might have contributed to delayed dispersion because of which higher PM concentration values are reported during night hours.

In the year 2017 deepawali day, the wind direction was from east and southeast while in 2018 the same was from north-west which might have added pollutant load from stubble burning. Contribution of stubble burning in overall PM<sub>2.5</sub> concentration during Diwali this year has been estimated as 10% by IITM. More active fire incidences have been reported this year on Deepawali day (4203) compared to Deepawali 2017 (1702).

Particulate levels started increasing since 9 PM on 7<sup>th</sup> November, and remained quite high during night. The areas represented by monitoring stations at Ashok Vihar, Jahangirpur, Nehru Nagar, Okhla phase II, Rohini, Vivek Vihar and Wazirpur recorded very high Particulate values during 11PM to 06 AM. This may be due to unfavourable conditions coupled with pollutants generated from fireworks. Particulate concentrations were slightly higher this Deepawali as compared to last Deepawali (2017). It may be mentioned that last year Deepawali was observed on October 19<sup>th</sup> whereas this year festival was celebrated on 7<sup>th</sup> November which has different meteorological conditions that govern the dispersion pattern of pollutants. When compared with the average Particulate Matter data during 1<sup>st</sup> to 7<sup>th</sup> November 2017 with the same period this year, the city average particulate concentration for Delhi is lower in 2018.