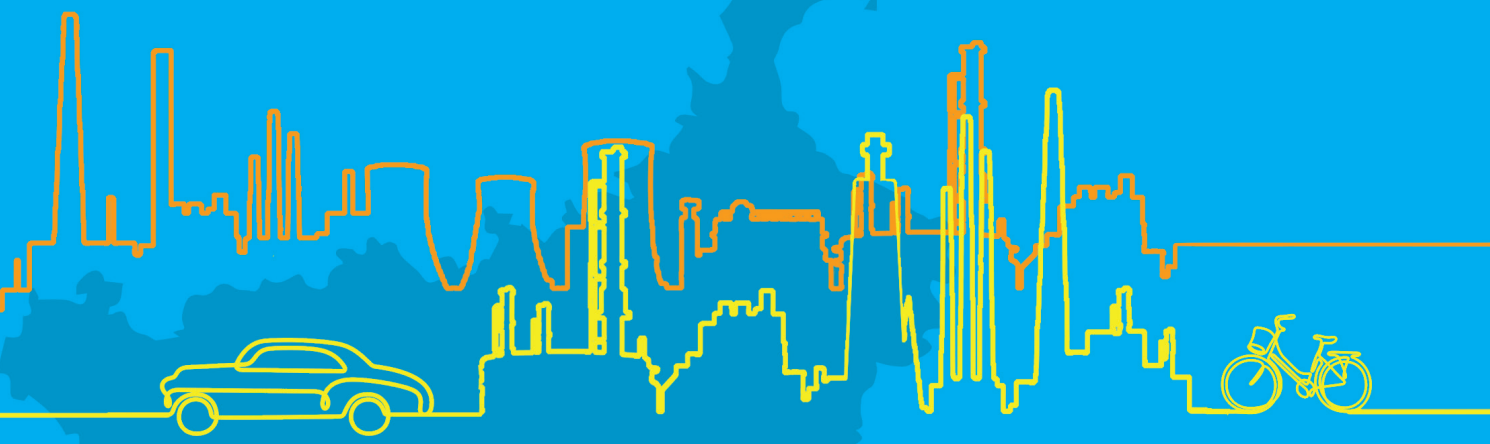
CLEAN AIR ACTION PLAN

BARRACKPORE



Environment Department
Government of West Bengal

2020

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Objective

This is the initiative of the Government of West Bengal (WB) to prepare and implement Comprehensive Clean Air Action Plan to reduce particulate air pollution in non-attainment cities of West Bengal. The Hon'ble National Green Tribunal's (NGT) order dated 6 August 2019 has added six new non-attainment cities in West Bengal namely Howrah, Barrackpore, Haldia, Asansol, Raniganj, and Durgapur to the list of the non-attainment cities. The order has directed, 'Action Plans need to be prepared by States for the additional 20 NACs on the pattern of 102 NACs within three months and after its approval by CPCB within two months, States must initiate time bound action on remediation within next three months.' These cities require to submit the Clean Air Action Plans to the Air Quality Monitoring (AQM) committee within three months of the order. The action plans will be reviewed and examined by a three-member committee to implement the plan. These action plans are being prepared within the broader framework of the National Clean Air Programme (NCAP) that has set a generic target of 20–30 per cent reduction in particulate pollution by 2024.

The Government of West Bengal has set up a three-tier committee to facilitate framing and implementation of the clean air plans:

- Steering Committee for implementation of Committee, WB–led by Chief Secretary
- Monitoring Committee for implementation of Committee, WB–led by Principal Secretary, Environment
- Implementation Committee for NCAP in Kolkata–led by Commissioner, KMC

Multi-sector and integrated clean air action plans have been developed for each of the six non-attainment cities of West Bengal. For best results the plans have considered a larger region around the city to take into account the trans-boundary effect of pollution.

Barrackpore is a small city and municipality town of north 24 Parganas which is within Kolkata Metropolitan Area (KMA). In 2011 Barrackpore city had a total population of 152,783. Barrackpore municipal city covered an area of 10.61 square km. The total population of this subdivision was 4,124,436 out of which the urban population was 3,921,927. Air quality management of this small town will require a regional approach and needs to be integrated with the air quality management of the larger Kolkata Metropolitan Region.

This report is divided into two parts:
Part 1 presents the overview of air quality trends, public health evidence, and challenges in each sector that needs addressing through the action planning process in the city. This multi-sector plan includes review of current challenges and baseline policy action in the concerned sectors of pollution control including industry, power plant, vehicles and mobility, construction activities, waste burning, road dust, solid fuels in domestic cooking, and roadside eateries among others. This has reviewed the available information from existing studies and reports,

official databases, field assessment, and information available from the implementing agencies.

Part 2 lays out the proposed Clean Air Action Plan (CAP) for each city in tabular form that identifies specific measures in each sector, lists agencies responsible for implementation of measures, and the timeline for action. While substantial part of the proposed measures are common and uniform for all the six cities, further customization has been done depending on the nature of the local issues and problems. The framing of the action plans has taken into account several ongoing initiatives of the Government of West Bengal to implement strategies in each sector that have a bearing on the air quality. This has also drawn upon the existing plans as well as the baseline policy measures to have integrated plan for the city.

PART I
OVERVIEW

1. Air quality concern and public health imperative

1.1 Air quality monitoring

Currently, there is one manual monitoring station inside the municipal boundary which is Barrackpore municipality and there are two more stations at Dum Dum and Khardah which are present in close vicinity to the municipal area (see *Table 1: Barrackpore—locations of the ambient air quality monitoring stations and the parameters monitored).* There are no real-time monitoring stations in the city to monitor all key pollutants including particulate matter less than 10 micron size (PM10), particulate matter less than 2.5 micron size (PM2.5), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), Carbon monoxide (CO) and ozone (O_3).

Table 1: Barrackpore—locations of the ambient air quality monitoring stations and the parameters monitored

Station name and location	Parameters monitored
Manual monitoring stations	
Barrackpore Municipality (within Barrackpore municipal boundary)	PM10, PM2.5, SO_2, NO_2, ozone, ammonia, CO, lead, nickel, arsenic, benzene, BaP
Monitoring stations outside Barrackpore municipality	
Dum Dum Telephone Exchange (in close vicinity to municipal boundary)	PM10, PM2.5, SO_2, NO_2, ozone, ammonia, CO, lead, nickel, arsenic, benzene, BaP
Khardah Municipality (in close vicinity to municipal boundary)	PM10, PM2.5, SO_2, NO_2, ozone, ammonia, CO, lead, nickel, arsenic, benzene, BaP

Source: As provided by the West Bengal Pollution Control Board

The frequency of air quality monitoring needs improvement. Particularly in this regard, real-time monitoring of the more harmful particulate matter, less than 2.5 micron size (PM2.5), needs to be monitored daily for action, and is currently not happening in the city.

Currently, there are two air quality data reporting systems. West Bengal Pollution Control Board (WBPCB) website reports data from all the manual stations. The data from manual stations is reported twice a week. CPCB Environment Information System (Envis) Centre reports data from these manual stations on annual basis. One continuous ambient air quality monitoring station for real time monitoring and two manual monitoring stations are scheduled for implementation.

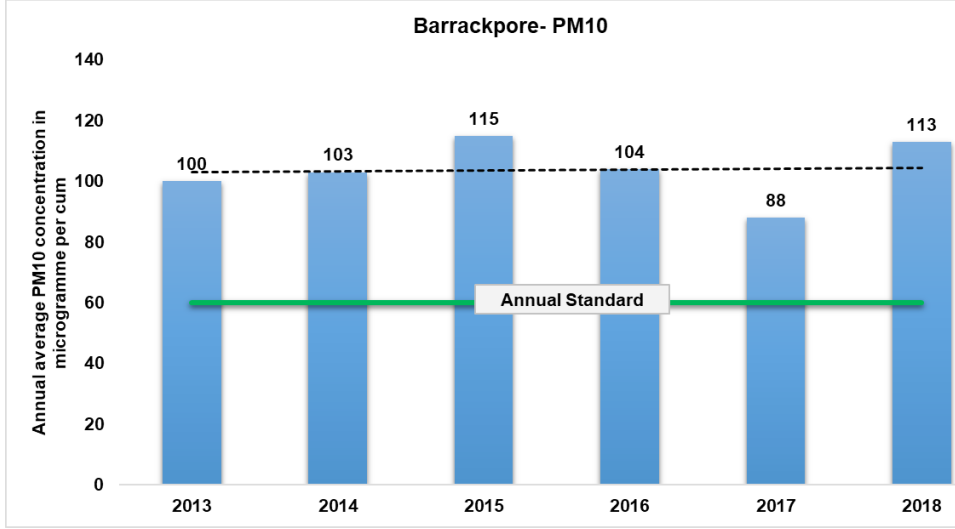
1.2 Status of air quality

Long-term annual average trend in PM10 in Barrackpore

To understand the long-term trends in annual average levels, available PM10 and PM2.5 data has been analyzed for Barrackpore. Data on PM10 and PM2.5 obtained from WBPCB has been used for long- term trend analysis (see *Graph 1A: Barrackpore—long-term trend in annual average level of PM10 concentration and Graph 1B: Barrackpore—long-term trend*

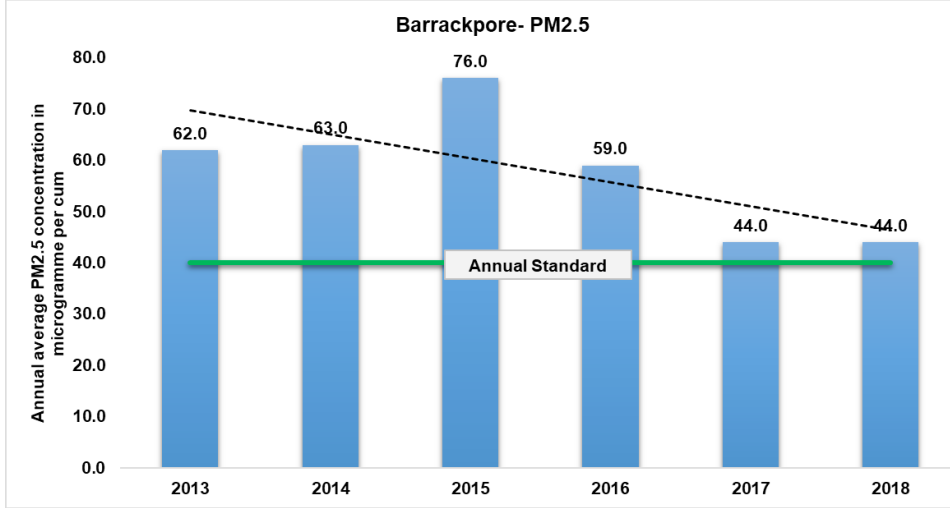
in annual average level of PM2.5 concentration). This shows stable but high levels of PM10 and a declining PM2.5 trend in Barrackpore.

Graph 1A: Barrackpore—long-term trend in annual average level of PM10 concentration (2013–18)



Source: Based on the data provided by WBPCB from Municipality station

Graph 1B: Barrackpore—long-term trend in annual average level of PM2.5 concentration (2013–18)



Source: Based on the data provided by WBPCB from Municipality Station

The city needs to reduce PM10 levels by approximately 41 per cent and PM2.5 by 18 per cent to meet the annual standard. The baseline for this reduction target is taken as 2016–18. As per the US Environmental Protection Agency (USEPA), an annual average of immediate past three years is taken to define the base pollution level. The reduction targets to meet the annual average ambient air quality standards and to sustain this over time are significant. This is expected to define the level of detail and stringency needed in actions towards achieving clean air.

Box 1: National Air Quality Index (NAQI) and daily emergency response

A short-term emergency response is designed to control daily pollution peaks and reduce exposure and associated health risk. Smog episodes largely occur when weather is adverse with calm atmosphere or no wind, cold temperature, and lower mixing height of air that traps air and pollution very close to the ground. This increases exposure drastically. While nothing can be done to control weather, or to remove trapped emissions already present in the atmosphere, short-term policy action can control further loading of emissions and prevent higher smog peaks. This is needed to reduce exposure and protect public health.

The National Air Quality Index and a corresponding health advisory were notified by the Ministry of Environment, Forest and Climate Change (MoEF&CC) in 2015. Based on this index, daily pollutant concentrations are classified and graded as good, satisfactory, moderate, poor, very poor and severe, and colour-coded so that the general public can understand the gravity of the problem. The health advisory has also been framed to indicate the expected health outcomes at varying severity of daily air pollution (see *Table 2: National Air Quality Index of India and Table 3: Health Advisory at different AQI levels in India*).

Table 2: National Air Quality Index of India

AQI category (Range)	PM_{10} 24-hr	$PM_{2.5}$ 24-hr	NO_2 24-hr	O_3 8-hr	CO 8-hr (mg/m^3)	SO_2 24-hr	NH_3 24-hr	Pb 24-hr
Good (0–50)	0–50	0–30	0–40	0-50	0-1.0	0-40	0-200	0-0.5
Satisfactory (51–100)	51—100	31–60	41-80	51-100	1.1-2.0	41-80	201-400	0.5-1.0
Moderately polluted (101–200)	101–250	61–90	81-180	101-168	2.1-10	81-380	401-800	1.1-2.0
Poor (201–300)	251–350	91–120	181-280	169-208	Oct-17	381-800	801-1200	2.1-3.0
Very poor (301–400)	351–430	121–250	281-400	209-748*	17-34	801-1600	1200-1800	3.1-3.5
Severe (401–500)	430+	250+	400+	748+*	34+	1600+	1800+	3.5+

Note: Ambient concentration values of all regulated pollutants are compared with corresponding standards, and an exceedance factor is used for qualitative assessment of air quality. Air quality for a particular pollutant is defined as good, satisfactory, moderate, poor, very poor, and severe if concentration value is < 0.5, between 0.5 and 1.0, >1.0 but <1.5, and >1.5 times the standard value for that pollutant respectively.

Source: Ministry of Environment and Forest and Climate Change

Table 3: Health advisory at different AQI levels in India

AQI	Associated health impacts
Good (0–50)	Minimal impact
Satisfactory (51–100)	Minor breathing discomfort to sensitive people
Moderately polluted (101–200)	May cause breathing discomfort to the people with lung disease such as asthma and discomfort to people with heart disease, children and older adults
Poor (201–300)	May cause breathing discomfort to people on prolonged exposure and discomfort to people with heart disease
Very poor (301–400)	May cause respiratory illness to the people on prolonged exposure. Effect may be more pronounced in people with lung and heart diseases
Severe (401–500)	May cause respiratory effects even on healthy people and serious health impacts on people with lung or heart diseases. The health impacts mat be experienced even during light physical activity

Source: Ministry of Environment and Forest and Climate Change

Daily air quality trend

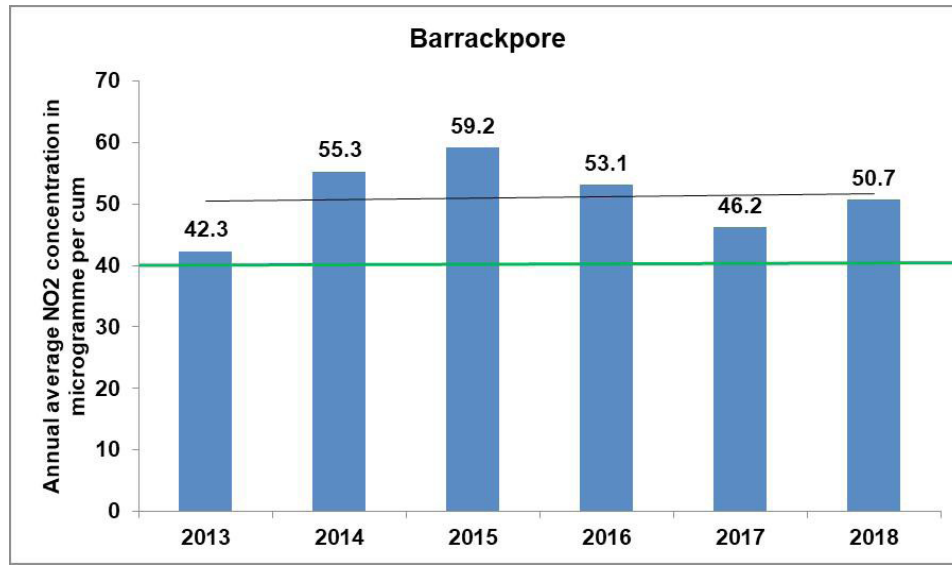
It has not been possible to carry daily analysis of smaller particles of 2.5 micron size (PM2.5) as its monitoring is more recent and only limited data is available from the manual monitors. However, from a health standpoint, this pollutant is more harmful as its particles are very tiny. Pollution profile of the days is expected to change substantially if PM2.5 levels are taken into consideration. Once the short-term actions comes into force, it will become obligatory to carry out daily analysis of 24-hour average concentration of air pollutants to classify days based on the NAQI and implement measures according to the severity of pollution. It may therefore be, helpful to analyze past trends to assess how days so far have been distributed across different NAQI categories of good, satisfactory, moderate, poor, very poor, and severe (see *Box 1: National Air Quality Index and daily emergency response*).

Long-term annual average trend in NO_2 in Barrackpore

Nitrogen dioxide levels will require special attention as these are strongly correlated with motorization and industrialization. Nitrogen oxide also contributes towards ozone formation, which is yet another very harmful gas. Data reported by WBPCB data shows a stable but high trend over time (see *Graph 2: Long-term trend in annual average NO_2 concentration in Barrackpore).* The reduction target for NO_2 levels for the city is approximately 20 per cent based on the data provided by WBPCB. The baseline for setting this target is 2016–18.

Graph 2: Long-term trend in annual average NO_2 concentration in Barrackpore

Data from West Bengal Pollution Control Board (2013–18)



Source: Based on the data provided by WBPCB from Municipality station

1.3 Public health evidence

Local studies on health effect of air pollution are not available for Barrackpore. This report takes on board the larger state-wise evidence as well as global evidences to define the health imperative of air pollution action. According to findings of a recent study published in the *Lancet* journal titled *The impact of air pollution on deaths, disease burden, and*

life expectancy across the states of India: The Global Burden of Disease Study 2017, 94,534 deaths in West Bengal in 2017 can be attributed to air pollution. While the estimated number of deaths attributed to household air pollution is 49,882, those due to ambient air pollution is 38,846. This is indicative of the fact that people in West Bengal are at a greater risk from household air pollution than ambient air pollution. The report also states that life expectancy in West Bengal would increase by 1.7 years if air pollution concentrations were less than the minimum level causing health loss.

The state's first-ever state-level disease burden estimates released by IHME, ICMR, and PHFI in 2017 show that air pollution ranks as the third highest risk factor in West Bengal responsible for premature deaths in the state. In the disease profile of the state, ischaemic heart diseases has been identified as one of the leading causes of loss of productive life years. These diseases are greatly influenced by air pollution. Air pollution is a serious short-term trigger factor for causing early deaths due to heart disease. Hence, long-term clean air planning strategies need to be devised to avert public health emergencies stemming from exposure to high pollution levels.

2. Pollution source profile and baseline policy action

In order to draft the current action plan, the available information on the assessment of pollution sources has been taken into consideration. For the purpose of this report, field visits were organized to identify the key pollution sources in the city. Also, feedback received from concerned regional offices of SPCB. This has helped to map out the key big sources of air pollution. Even though the exact quantification is not possible without the detailed source apportionment and inventory studies that will be carried out in the future—it is possible to define the key measures based on the best practices and also keeping in view the desired reduction target that requires deep cuts in emissions from all sources. The probable sources in the city were emissions from vehicles, industries and waste burning.

2.1 Industry and power plants

The city is known for jute processing. One of the most important arms factory which is Rifle factory is located in Ishapore in Barrackpore. Dry cells produced by Exide, and cables produced by Nicco are other industrial products. There are two red category industries in the city out of which one is Hindustan Aeronautics Limited (HAL). Most industrial units fall in orange category of industries. Jute and engineering factories are concentrated mainly in Naihati, Bhatpara, and Kamarhati and South Dum Dum Municipalities.

Different technologies are being used in the industry sector to curb the pollution. Technology such as bag filter and cyclone are dominant pollution control technologies. The major fuel used by the industries is furnace oil which is very high on sulphur content.

There are no stone crushers and brick kilns in and around the city.

A large number of industries are registered with the West Bengal Pollution Control Board. WBPCB, maintains a record of all regulatory orders, including closure and guidance, on its website. A review of the regulatory orders passed between 2015 and 2017 shows that most industrial set-ups that have boilers or furnaces are equipped with air pollution control systems like electrostatic precipitators (ESPs), cyclones, bag filters and scrubbers, etc. However, there are concerns around enforcement and proper operations of pollution control systems. This will require more rigorous onsite continuous emissions monitoring system (CEMS) for compliance. The major issues raised with industrial pollution is that though the end stack emissions can be controlled and monitored through CEMS, the problem of fugitive emissions is very high during the different processes such as handling, conveying, and storage. Further, quality control and adherence to standards during CEMS installation is important.

Emissions standards and siting policy: Industrial pollution management is governed by the emissions standards fixed by the Central Pollution Control Board. Both existing and new standards will have to be implemented with strong compliance and penal requirement. While the ongoing effort will be strengthened further, the new set of emissions standards that have been framed recently will require immediate

implementation. For instance the new SOx and NOx standards that have been notified by the MoEF&CC for 16 groups of industries following the direction of the Supreme Court on 29 January 2018. Further strengthening of siting policy for industrial units will help to reduce exposure and public health risk in populated areas.

The industrial siting policy in West Bengal clearly states that setting up of any red category industries is not permitted within the municipal areas of Kolkata and Bardhman district except Jamuria industrial estate. But with adequate pollution abatement technologies/system can be however set up outside the KMA and Bardhaman district.

Industrial fuel quality: In addition to improving and advancing the emission control systems in industry, ensuring use of cleaner fuels will provide more systemic solution. Often due to wide difference in pricing of industrial fuels dirty bottom of the barrel fuels like petroleum coke, furnace oil, fuel oil, etc. are widely used. In smaller units unregulated fuels like tyre oil, etc. are used. The WBPCB is considering change over to cleaner fuels like oil or gas to reduce particulate emission load from industrial operations. Industries can switch to coalbed methane natural gas. Since natural gas is expected in March 2020 all polluting units in non-attainment cities must switch to natural gas, as per availability. This is a step in the right direction and in line with the action being taken in other states to control and discourage dirty fuels.

Clean fuel strategy along with stringent emissions control systems will require incentive policy to make a supply plan and infrastructure for cleaner fuels, adopt favourable taxation and pricing policy to make cleaner fuels competitive vis a vis the dirty fuels and help to phase in clean fuels for industries (such as natural gas, electricity, and low-sulphur fuels). Access to natural gas and oil is improving in the state and be leveraged to promote their usage in the industrial sector as much as possible with a proper pricing and regulatory policy. Industries that will be using furnace oil and coal will require stringent emission control system and monitoring.

Dirty fuels are also used in small and unauthorized units without pollution control systems. There are also risks of several unregulated oils like recycled oil, tyre oil, etc. filtering in causing enormous toxic pollution. Therefore notified approved fuels list can help to counter such risks in all sectors. Some cities like Delhi have issued notification on the list of approved fuels that can be used in different sectors.

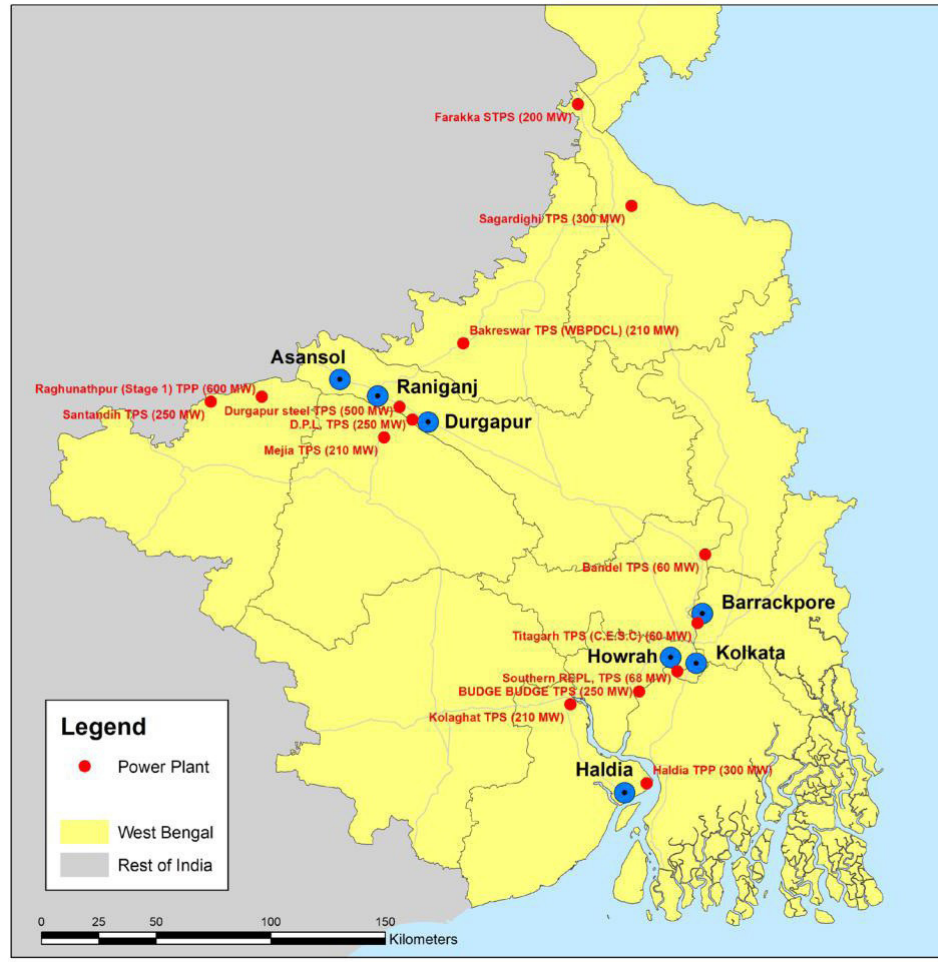
In view of the growing use of heavy furnace oil in the sector it is important to take on board the national level development in this regard for future reference and roadmap. The concerns over the growing use of pet coke and furnace oil in industry that have very high sulphur and heavy metal content have led to the notification on the emissions standards for SOx and NOx following the direction of the Hon'ble Supreme Court. This is needed to enable effective uptake of improved emissions control systems to control these gases. Testing of petroleum coke and fuel oil used for combustion was found to contain as high as 75,000 ppm and 20,000 ppm sulphur respectively.

This is in contrast to the transport fuels that have 50 ppm sulphur and will be further lowered to 10 ppm sulphur in 2020. Fuels containing high levels of sulphur lead to high emission of particulates, gaseous emissions like SOx

and contribute to 'secondary' particulate load. High-sulphur fuels also contain heavy metals, which add to the toxicity and contamination of the environment.

There are several thermal power plants within the airshed of KMDA (see *Map 1: Location of thermal power plants in West Bengal*).

Map 1: Location of thermal power plants in West Bengal



Baseline policy action

Several policy measures have been initiated to address industrial pollution.

- **Stricter location policy** for new industrial units and restriction on setting up of red category industries in municipal area of Kolkata Metropolitan Area and Bardhman district except Jamuria industrial estate. But with adequate pollution abatement technologies/ systems, red category industries can be set up outside the KMA and Bardhman district.

- **Efforts to ensure regulatory compliance** for grossly polluting industries.

- **West Bengal Pollution Control Board notified stricter emission standards** for boilers, ceramic kilns, foundries and rolling mills with effect from 11 May 2001. These emission standards are stricter than national emission standards.

- **Mandatory use of clean fuels:** Replicate Kolkata model of incentivizing small and medium-scale units to improve and replace boilers and coal fired down draft kilns. Create awareness on use of solar energy cities for commercial and industrial application. Incentivize renewable energy practitioners with tax incentives to add to the long term cost effectiveness of solar energy. For electricity requirement, rooftop and community based solar energy should be actively promoted in non-attainment cities for commercial and industrial application. Solar energy is cost effective vis-à-vis other power sources, therefore, for continuous supply solar power storage capacity must be built and this should be linked with West Bengal Government's renewable energy policy.

- **Promote use of LPG in small industries:** Small-scale units should be encouraged to use LPG wherever feasible. Exemption of registration fees may be given after discussions with HPCL.

- **Coal use restricted in industries—**About 67 per cent of the coal-fired boilers and about 73 per cent of the coal-fired ceramic kilns have already been converted to oil-fired ones in KMA.

- **Financial assistance to the small industries** for pollution control by the WBPCB and the state government. The WBPCB is encouraging the industries to go 'beyond compliance' and good performers are honoured with 'environmental excellence awards'. There should be an incentive plan for industry to change and upgrade emission control technologies. Cities must replicate Kolkata model of incentivizing small and medium-scale units to improve and replace boilers and coal fired down draft kilns and replacement/change of dirtier fuels with cleaner fuels.

- **CEMS monitoring and data**: WBPCB, through its online CEMS portal, provides stack emission and effluent discharge information. However, at this stage this information is not available for most industries. This is certainly an opportunity for better management and monitoring of CEMS portal, for the listed industries for improved monitoring.

- **Enforcement of new NOx and SOx standards in the industry:** MoEF&CC has notified new NOx and SOx standards for 16 groups of industries in March 2018. This opens up new opportunity for disciplining industrial emissions and accelerating use of clean fuels.

- **Comprehensive consent mechanism**: All industries of the state are required to go through a comprehensive consent mechanism prior to establishment as well as prior to operation following the transparent 'industrial siting policy' prevalent in the state. Once the industries are established and are operational, they are subject to priority surveillance and monitoring of their environmental performance. All non-compliant industries are subjected to regulatory action.

- In addition, Central emission control regulation Part-3 is to be implemented. An order issued to all state and Union Territory pollution control boards to not issue renewal notices or mention it in the consent to establish or consent to operate document, and to provide all stack monitoring facility to all stacks with boilers in accordance with the order.

- **Data reporting and storage:** A comprehensive and lucid data recording a sharing policy must be drafted for industrial pollution management. This will include a detailed data protocol for recording emissions from industry along with a systematic data maintenance system. This may be uploaded to a central server with limited access to compliance officers.

2.2 Vehicles and mobility

Adequate information is not available regarding the travel pattern, modal share, travel distances, and transportation system in Barrackpore.

Broadly, Barrackpore is connected by rail based and road based transport systems. Bus and railway is the predominant mode of transport that connects Barrackpore to Municipal corporations of Kolkata and Howrah. Within the corporation area it is well served by intermediate para-transit modes (IPTS modes) as Auto, E-rickshaw and taxis. Mobility patterns are expected to be similar to Howrah and therefore, the solutions suggested for other cities can also be replicated in this city. This can include efficient organized para-transit system, pedestrian infrastructure, and promotion of non-motorized transport and zero emissions battery vehicles.

2.3 Strategies to reduce tailpipe emissions

Emissions standards for new vehicles: As per the national roadmap, West Bengal has implemented the Bharat Stage IV (BS IV) emission norms for new vehicles in April 2017 though it was implemented in Kolkata in April 2010. It is scheduled to introduce Bharat Stage VI (BS VI) norms and fuels in April 2020. The BS VI norms are slated to reduce emissions from new vehicles by 80–90 per cent. On-road fleet will also benefit from the introduction of clean BS VI compliant 10 ppm sulphur fuels by April 2020. These emissions standards will come with stronger real-world emissions requirements and management to ensure that vehicles remain low emitting on road. As these new generation vehicles will be equipped with more advanced emissions control system, commensurate improvement in emissions inspection and maintenance will be needed at the city level.

Emission management of on-road fleet: With continuous ageing of vehicles, keeping vehicles low emitting throughout their lifetime on road will require multiple strategies including in-use emissions inspection, monitoring of real world emissions, phase out of old vehicles and scrappage, clean fuel substitution, and control of heavy duty traffic.

PUC programme: The current in-use emissions inspection programme is the Pollution under Control Certificate (PUC) system. Currently, under this programme idling carbon monoxide and hydrocarbon (HC) concentrations are measured in petrol vehicles and smoke density is measured in diesel vehicles. The status of implementation of lambda tests as per the 2004 notification of the Ministry of Road Transport and Highways (MoRTH)—that is needed to maintain the optimum air to fuel

ratio for proper functioning of catalytic converters in petrol cars—is not yet available. Ground assessment shows that there are quality control challenges with regard to the testing methods, calibration of equipment, and overall compliance with the programme.

As the PUC centres are decentralized and limited they need frequent nspection and a robust audit programme to ensure that credible and authentic tests are being done. Such steps have been initiated by the Department of Transport. Steps are needed to further reform the system and also expand the online networking of PUC centres to link with centralized data server for proper audit.

On-road smoky vehicle inspection: City need strong on-road smoky vehicle inspection to identify visibly polluting vehicles and remove them from roads for inspection and repair. A small number of grossly polluting vehicles contribute significantly to the pollution load from on-road vehicles. If these can be identified and addressed substantial emissions reduction is possible.

Advancement in on-road emissions monitoring: Introduction of BS IV and BS VI vehicles with more advanced emissions control systems will require advancement in emissions monitoring of on-road vehicles. The current PUC programme will not be adequate for that. The Ministry of Road Transport and Highways has already sent out an advisory to the State Transport Departments that all vehicles manufactured after 2013 that are equipped with On-board Diagnostic System (OBD) should be checked for malfunctioning light on the dashboard of the vehicle when they come for PUC check. If the light is ON the vehicle should be returned for proper check in workshop for repair. This needs to be implemented in PUC centres immediately. In addition, this system can be further upgraded in PUC centre to check if the OBD itself is functioning properly or has been tampered with. The OBD in vehicles have capacity to sense and record the emissions performance of the vehicles to alert the driver if there is any anomaly. While full scanning of the OBD for such diagnostic exercise can be done in the designated workshops to be identified, PUC centres can do simple tests to ensure if the OBD is functional. This kind of upgradation has become important after the introduction of BS IV and upcoming BS VI emissions standards that will bring more advanced and sophisticated emissions control technologies that cannot be adequately monitored through PUC programme that was designed for older generation of vehicles.

Similarly, the on-road fleet will require more rigorous monitoring for real world emissions to ensure that vehicles do not emit more than they are designed to emit. This may require selective and pilot introduction of on-road remote sensing monitoring to check the emissions as the vehicles are passing by to catch the most grossly polluting vehicles and characterize the fleet emissions.

Regulating movement of heavy-duty vehicles: Yet another area of intervention is the heavy duty vehicle movement through cities that can contribute hugely to the urban air pollution. Usually, cities restrict truck movement during the day and allow them to pass through or do loading and unloading during night. But explicit intervention is needed to design

highway alignment in a way that they bypass the highly populated cities and do not cut across. Truck movement and dust control from loading and unloading will be of special concern in industrial cities and mining areas and will require spatial planning to reduce exposure.

Phasing out of old vehicles: As of now cities in West Bengal except Kolkata do not have age restriction on vehicles. Vehicles of and more than 15 years age are not prohibited from plying within cities. After crossing the 15 years registration time frame, these vehicles are not removed; instead, they are re-registered for a span of another five years. The non-attainment cities require a phase out plan either through age restrictions or tax policy or restrictions on their movement in city centres. The phase out plan will need to be supported by a scrappage policy especially for the old commercial vehicles and buses. Currently, the Union Ministry of Road Transport and Highways is also working in a national scrappage policy. But state level policies are also important for scrappage infrastructure. Recently, Delhi has framed a similar policy. Regulatory and fiscal measures are needed to discourage use of old vehicle vintage meeting very old emissions standards.

2.4 Solid waste management

The municipal Corporation reports that they are managing most of their waste by door to door bucket collection but then there is no segregation of waste at the source. There is no scientific way of treating the waste in the city. There is just one dumping site at Muktapukur (on old Kolkata road), a five acre land where all the waste is dumped. This open landfill site is not equipped with the network of pipes that could drain out the leachate and vent out the methane being generated at the waste dumping site.

Instances of burning on the landfill site are reported to the municipal corporation. Open burning of waste is the common practice in the city. Unfortunately, the absence of alternate waste management practices besides traditional dumping, leading to massive open landfills is not just an aesthetic issue anymore. It is exposing residents of the city to toxic, lethal smoke fumes. Decentralized waste segregation, collection and recycling will have to be the urgent focus of action plan to reduce toxic risk. The following roadmap may be implemented for management of municipal solid waste. Further, successful case studies of cities like Indore and Ambikapur may be studied, to identify potential synergies.

1. Identification of clusters of municipal bodies—A cluster of municipal bodies may be formed with a common waste processing facility. This will bring down costs considerably and also do away with requirement of land in every municipal body

2. The cluster approach would entail additional transportation of solid waste for some municipal bodies

3. Till the cluster approach is implemented, construction of community biogas plants and compost plants should be encouraged.

4. Create an ecosystem of start-ups based on waste-to-energy projects (capacity [waste utilization + power generation], calorific value, and type of waste used)

2.5 Brick kilns

As per the information provided by Bengal brick field owners association in Kolkata, the North 24 Parganas cluster has 800 units. 60 per cent of these units are situated in Bashirhat, 30 per cent in Malencha, and the remaining units are located in Barrackpore and Bongaon. The average production of each unit was found to be 25 lakh bricks per season. Fifty per cent of these units operate on the high draft kiln technology, one unit uses the normal draft kiln technology, and the remaining units employ the fixed chimney technology.

2.6 Construction and demolition waste

With the construction boom and on-going urbanization, generation of construction and demolition waste is on the rise in the city but there is no scientific estimate of the quantum. All the waste is either re-used or directly dumped at the Muktapukur trenching ground.

2.7 Suspended road dust

Unpaved and dug up roads, and suspension of dust due to vehicular movement are significant sources of particulate matter in the city.

As far as the baseline policy action is concerned, urban local bodies have an ongoing programme of street and pavement development. But these will have to be made more holistic and widely implementable in terms of paving, street-scaping, vegetative barriers, and manual and mechanical road sweeping without compromising the pedestrian and vehicular movement. The street design guidelines can holistically help to address these co-benefits. However, it is more important that for any infrastructure project all the concerned agencies need to be made responsible and accountable to adopt dust control measures in terms of keeping dug earth covered, sprinkling of water, and restoring the place according to the predefined street design guidelines within a specified period after completion of projects.

2.8 Crop fires

Urban air quality of cities is also impacted by the pollution at the regional level due to trans-boundary movement of pollution. From that perspective any large-scale open fire in the region can have serious impacts. While the impact of the problem of agricultural stubble burning or crop residues is well known in northern India, it has not been properly evaluated in other parts of India. There is also the aspect of forest fire in the region that requires scrutiny. Pollution from such fires is seasonal and episodic.

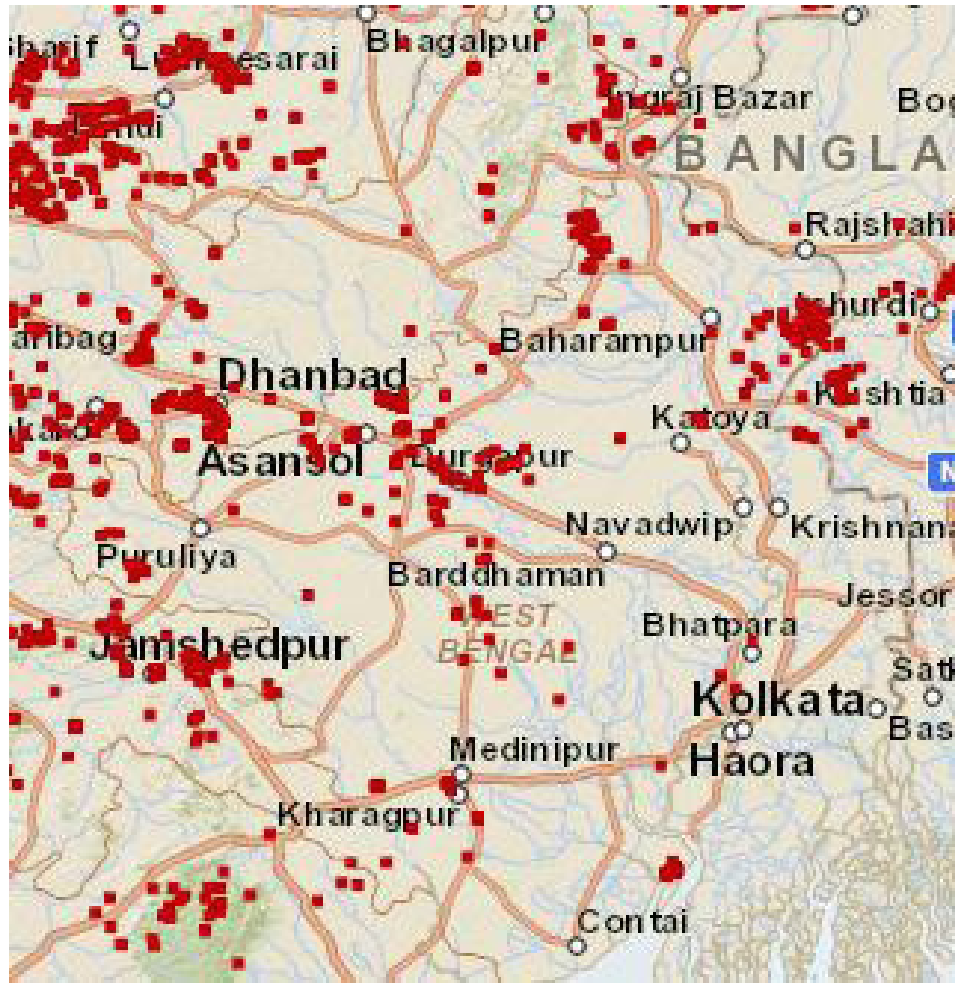
The satellite image of NASA shows large numbers of open fire in West Bengal in the months of October and April. Fires in March–May may be attributed to seasonal changes, as well as to naturally occurring forest fires. During these months the geographic distribution of fires also changes, with many more fire incidences detected in central and central-eastern West Bengal, coinciding with river flood plains. The timing of these fires also coincides with deterioration in the urban air quality of cities in West Bengal, which may be within the influence zone of these fires.

Such incidents are expected with growing mechanization of agriculture. The harvesters leave behind stubble on the field. As farmers find it expensive to hire labourers to cut it, easiest way to dispose it off is to burn it. In northern India—Punjab, Haryana and Uttar Pradesh—this problem is being

addressed through in-situ management in which incentives are being given to the farmers to procure machines that can help to mulch the stubble while sowing the seeds. This does not require burning and also addresses the short time window that the farmers have to sow the next crop. In addition to this several business models for reuse and recycling of straw are also being thought of that include power generation, pellets for industrial boilers, and other products. But this matter will require immediate attention.

In the case of northern India, special policies are in place to incentivize farmers to adopt technologies that help to mix and mulch the crop residue to soil instead of burning. Methods of utilizing this agricultural residue as a feedstock for other commercial ventures are also being explored. It is possible to introduce similar models to West Bengal which can be prevent the problem of crop burning and open fire. Even farmers will have to be sensitized and made aware that—as studies of Agricultural Research Institute, Pusa in Delhi have shown—that such large-scale burning actually destroys the micro-nutrients in the soil and affects soil fertility.

Snapshot of cumulative fire incidences/spots during April 2019



Source: NASA Firemapper

PART II

COMPREHENSIVE CLEAN AIR ACTION PLAN (CAP) AND GRADED RESPONSE ACTION PLAN (GRAP)

Comprehensive Clean Air Action Plan (CAP)

Against the backdrop of the challenges outlined in each sector, this pollution source-wise comprehensive action plan has been developed for Barrackpore. Keeping in view the air pollution reduction targets in the city, detailed strategies have been identified to indicate the nature, scale, scope, and depth of action needed for effective reduction to make an impact over time. In view of this, instead of listing only broad action points, detailed indicators and action points have been included for all sectors to guide implementation.

This plan has integrated and built on the on-going action and action plans of the state government in each sector that are already underway. Action plan has also been improved further based on emerging good practices. In several sectors good practices have emerged that need to be leveraged and aligned to meet the clean air objective. This creates a good template for upscaling and replication in other cities. This action plan has integrated all ongoing efforts to chart the roadmap.

Special care has been taken to ensure that sufficient indicators are included in the plan itself to indicate the nature and scope of the strategies outlined for each sector that are needed for implementation to make an effective impact. For instance, often it is not clear how different aspects of transportation and urban planning are linked with air pollution control. It is important to ensure that clean air action plan ensures convergence of planning for road building, public transport infrastructure and non-motorized transport planning to guarantee that people-oriented design is integrated all across to prevent lock in of pollution in the infrastructure itself. Similarly, actions in renewable energy sector, urban forestry and a plethora of clean energy and industrial emissions management strategies have been integrated.

Alignment of inter-sectoral action will be critical to leverage the available resources of funding for maximum impact. In all sectors—transport, industry, power plants, construction industry, municipal solid waste management, air quality monitoring, road building and traffic management—budgetary resources have been earmarked for investment, or, investments from other private or bilateral sources are coming in. If these investments are better informed and aligned with this clean air action planning process and objective, significant change at a scale is possible.

This plan also opens up the opportunity for developing fiscal strategies based on polluter pay principle to generate additional resources for funding of the plan. For instance, in other cities such as Delhi, fiscal measures such as environment compensation charge on trucks, big diesel cars and diesel fuel have helped to create dedicated funds that are now available for pollution control efforts. Such measures can be adopted to top up the resource needs in addition to the state and central government funding. In areas where the action depends on private sector participation and investments the detailed guidelines under this plan can guide such investment. This plan has identified the agencies responsible for implementation of each action point and has also indicated the timeline for implementation. This can be monitored for reporting and compliance.

Graded Response Action Plan (GRAP)

Based on the National Air Quality Index Graded Response Action Plan has been framed for daily response to air quality changes. This has predefined the set of measures to be taken for different air quality categories—satisfactory, moderate, poor, very poor, severe, and emergency. Once notified these measures will come into force automatically. Available data shows that in most non- compliant cities, barring hotspot areas in industrial cities, the daily levels vary between moderate to poor; sometime touching the very poor level. The GRAP measures will be implemented accordingly. GRAP also includes the advisory for people to take precaution for self-protection.

For proper implementation and oversight the high-powered committee will coordinate with the city level authorities in each of the six non-compliant city for direction, compliance monitoring, and reporting. Each concerned department in a city will appoint a high level officer as a nodal official for coordination, implementation, and periodic reporting.

COMPREHENSIVE CLEAN AIR ACTION PLAN (CAP)

Source-wise clean air action plan and compliance strategy for Barrackpore to meet clean air standards. The following table indicates the short, medium and long-term action along with agencies responsible.

1. AIR QUALITY MONITORING AND ASSESSMENT

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
Short-term priority action				
1.1	Refer to IS:5182 (Part 14), 2000 on recommended minimum number of stations, population-wise (also mentioned in Guidelines for Ambient Air Quality Monitoring, CPCB, 2003); the population according to Census 2011 of Barrackpore is 100,055 and the main city has one manual monitoring station at Barrackpore Municipality. Based on the new criteria given by CPCB in 2019, the Barrackpore municipal area requires one CAAQM station and two manual stations. Among all twelve pollutants to be monitored, special focus is needed on PM2.5 and ozone monitoring. Use of air quality sensors at probable hotspots to complement air-quality monitoring (based on CPCB/ MoEF&CC guidelines) may be explored. The grid plan should be representative of population distribution and land use including residential, commercial, industrial, roadside and sensitive areas. This may include hot spots such as near traffic areas like Chidiya Mor and landfill sites such as Muktapukur (on old Kolkata road).	Nodal agency: WBPCB, supported by CPCB	6-12 months	1.8 crore
1.2	Use air quality information provided by satellite-based monitoring to complement ground-based air quality monitoring and also unmonitored areas. This is useful to identify agricultural burning and forest fires, regional pollution, etc that have impact on urban air quality. West Bengal has begun satellite based assessment. The program must be extended for Barrackpore.	WBPCB, CPCB, IMD	6-12 months	To be finalized
Medium-term action				
1.3	Develop capacity for pollution forecasting for implementation of graded response action plan. This will also require monitoring of weather data and support from IMD and IITM, Pune under MoES. For e.g., introduction of SAFAR to Barrackpore.	MoES, Department of Environment, WBPCB supported by CPCB, IMD	1 year	To be finalized

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
1.4	Set up daily air quality public information dissemination system based on National Air Quality Index and health advisory. Further develop online reporting of daily and annual data for all pollutants and pollution forecasting on SPCB website. Set up system for dissemination of information to public through website and local media.	WBPCB, CPCB, IMD,	1 year	Regular activity
1.5	Commission a source apportionment and pollution inventory study for the city to capture source-wise contribution and seasonal variations in source contribution. Assessment of carrying capacity to be carried out as well. Additionally, the study must assess regional impacts by setting up a mechanism to assess trans-boundary emissions.	WBPCB	6 months	3 crore
1.6	Set up rural and peri-urban air quality monitoring to assess the airshed/ influence area. The National Clean Air Programme from the Union Ministry of Environment and Forest and Climate Change has recommended rural air quality monitoring.	WBPCB & CPCB	6 months	1.6 crore
1.7	Assess application of low-cost sensor-based monitors in areas that are not being monitored to create baseline local data to inform local area action.	WBPCB & CPCB	6 months	To be finalized
1.8	Research studies including emission inventories and source apportionment, health impact studies, exposure impacts, carrying capacity assessment of air shed and regional impacts, hot spot assessments and other relevant studies may be undertaken to further refine and inform the action plan: Government to support research works/scientific studies by academic/research institutions. Expertise will be sought from various institutions to develop protocols for assessment of the research proposals.	WBPCB, DoE, West Bengal State Council for Science and Technology	2 years	1.5 crore
1.9	Database management for implementation of action plan: Data collection, sharing and analysis protocol must be set up for effective implementation of clean air action plan. Prepare detailed data protocol for systematic recording of emissions data from industries and other sources.	WBPCB, DoE in coordination with all relevant departments	1–2 years	Regular activity

2. INDUSTRIES

Sr. no.	Action points	Agency responsible	Timeline
2.1	Implementation of SOx and NOx standards notified by MOEF&CC on 29 January 2018 for 16 categories of industries in and around the city – as applicable. Ensure compliance through regular testing & CEMS enabled monitoring – as applicable by industry types.	WBPCB	6 months
2.2	Implement existing standards for PM and ensure compliance through regular testing & CEMS enabled monitoring. (see action 2.4) – as applicable. Also take precautions for minimizing fugitive emissions through the preparation of a checklist for industrial zones and units, for each specific type of industry. Carry out regular inspection.	WBPCB, Department of Commerce, Industries and Enterprise	3 months
2.3	Prepare a clean fuel policy and provide incentives for clean fuels for the state: Notify approved fuels. Promote relatively cleaner fuels like gas (coalbed methane, natural gas, etc.) and electricity. Discourage fuels with very high sulphur and heavy metals like furnace oil, pet coke, tyre oil, etc. (except where petcoke is used as feedstock like cement, etc.). Need for a favourable taxation and pricing policy to make cleaner fuels more competitive.	WBPCB, Department of Commerce, Industries and Enterprise	6 months
2.4	Identify the units that need to install CEMS - as applicable. Ensure calibration and working of CEMS in all industries in the urban airshed or area of influence and provide information to monitoring agencies to take appropriate action. Specify the mechanism for quality control and quality assurance of CEMS data and ensure that data is available online as per a specific format and the reported data is compared with applicable prescribed limits and not the older standards. Compliance checking to be enforced routinely to prevent tampering with the CEMS30. This needs to be done for industrial sectors including sponge iron and cement units, iron and steel industries jute and rice mills. etc.	WBPCB, Department of Commerce, Industries and Enterprise, MSME	6 months
2.5	Identification of cumulative impact of industrial emissions and prescription of more stringent pollution control action for targeted industries. (To identify industries for time bound action to strengthen emissions control systems.)	WBPCB, Department of Commerce, Industries and Enterprise, MSME	6 months
2.6	Identification and implementation of fugitive emission control measures in ancillary units, material transfer and handling and emissions during industrial processes. Informal industrial units will require stringent monitoring.	WBPCB, Department of Commerce, Industries and Enterprise, MSME	6 months
2.7	Enforce restrictions on operations of intensively polluting industries within urban airshed zones during high pollution periods.	WBPCB, Department of Commerce, Industries and Enterprise, MSME	6 months
2.8	Strengthen the current siting policy for industries to be notified in future, in order to address Barrackpore-wide air quality issues	WBPCB, Department of Commerce, Industries and Enterprise	1 year
2.9	Prepare and implement local area action plan for pollution hotspots and strict enforcement of air pollution control measures in all industries, including those located in unauthorized areas. Build schedule for inspection of areas of concern and reporting.	WBPCB, Department of Commerce, Industries and Enterprise, MSME	1 year

Sr. no.	Action points	Agency responsible	Timeline
2.10	Training and Awareness Program for onsite emergency preparedness and environmental issues.	WBPCB, Department Of Industries, Commerce and Enterprise	1 year
2.11	Construction of paved roads around all major industrial belts and estates. Installation of dust suppression system. Provision for water sprinkling and dust mitigation.	WBPCB, Department Of Industries, Commerce and Enterprise, ADDA	1 year
2.12	Development of Adequate greenbelt around all major industrial estates by planting 1000 saplings.	WBPCB, Department Of Industries, Commerce and Enterprise, ADDA	1 year

3. BRICK KILNS, HOT-MIX PLANTS & STONE CRUSHERS

Sr. no.	Action points	Agency responsible	Timeline
Short-term priority action			
3.1	There are brick kilns in close vicinity of the city. Enforce restrictions on operations of brick kilns within urban airshed zones during high pollution periods; allow only those Brick kilns that comply with rectangular zig-zag design with induced draft or those with improved technology. Initiate phasing out of traditional brick kilns.	L&LR Department WBPCB, Department of Commerce, Industries and Enterprise, MSME	6 months
3.2	Relocate hot-mix plants to areas outside Barrackpore boundaries. Shut down small and mobile hot-mix plants.	Barrackpore municipality, WB PWD, NHAI and other road operating agencies	Immediately
Medium-term action			
3.3	Convert all brick kilns to rectangular design zigzag technology–from FCBT natural draft kilns to induced draft kilns with rectangular zigzag design.	L&LR Department WBPCB, Department of Commerce, Industries and Enterprise, MSME	1 year
3.4	Prescribe design specifications for improved kilns and ensure compliance checking. Ensure conversion has actually taken place. Ensure provision of infrastructure in terms of viewing platform and chimney emission testing point for compliance.	CPCB, MoEF&CC WBPCB, Department of Commerce, Industries and Enterprise, MSME	1-2 years
3.5	Remove stone crushers that are close to the city; adopt stringent dust control measures and greening.	District Administration, Commerce, Industries and Enterprise, MSME	1 year
3.6	Establish a protocol for using cleaner fuels and technology for asphalt mixing and minimizing the number of hot-mix plants.	MoRTH, MoEF&CC, municipal corporation, WB PWD, NHAI and other road operating agencies	2 years

4. THERMAL POWER PLANTS

Sr. no.	Action points	Agency responsible	Timeline	
4.1	Power plants standards notified in 2015 for PM, SOx and NOx should be met by 2022. WBPCB, plant management		2022	Actions to comply with standard in 2022 have already begun
4.2	Titagarh Thermal power Station – 240 MW. Retire all 4 units of 60 MW. The 37 year old station is run by CESC Limited. The power station committed to retiring its units in the Regional Phase-in plan meeting conducted by Central Electricity Authority in 2017-18.	WBPCB, WBERC, WBSLDC, DISCOM CESC WBSLDC, CESC WBPCB WBERC, DISCOM CESC	2020	Power station under reserve shut down. The management has decided to close these units.
4.2.1	Step 1: Prepare phase-in plan in consultation with WBSLDC and DISCOM		By Feb 2020	
4.2.2	Step 2: Collect phase-in plan with milestones		By June 2020	
4.2.3	Step 3: Approval from regulatory agency		By June 2020	
4.2.4	Step 4: Dismantling and Closure		By December 2020	
4.3 Fugitive emissions				
4.3.1	Coal handling: Issue modified consent condition and direct storage of coal in enclosed space. Collect bank guarantee and timeline from power station to implement measures to enclose coal handling area.	WBPCB	By March 2020; By 20 June 2020	
4.3.2	Fly ash management: Form a committee and set terms of reference (ToRs) for inspection and improve fly ash management and utilization in the thermal power stations. Allow only bulk container transport of fly ash – issue notice. Inspect fly ash pond and roads leading to the pond, audit the need for any improvement in the fly ash pond structure. Collect plans from power station to improve fly ash utilization. Collect bank guarantee and timeline from power station to implement measures.		By March 2020; By June 2020; By October 2020	
4.4 Fuel quality improvement				
Advice use of low sulphur coal (coal with sulphur content less than 0.2 per cent), co-firing of coal with biomass. On availability of natural gas switch-over coal-based power stations to natural gas-based power stations.				

5. ACTION TO REDUCE VEHICULAR EMISSIONS

Sr. no.	Action points	Agency responsible	Timeline
Medium-term action			
5.1	Ensure on-schedule implementation of BS VI fuel and emission standards on April 1, 2020. Ensure that only BS VI compliant vehicles are registered from this date. Supreme Court order of October 24, 2018 has directed that no vehicle that is not BS VI compliant can be registered from April 1, 2020. The city is fully prepared to comply the order of Hon'ble Apex Court.	Transport department	Ongoing
5.2	ALTERNATE CLEAN FUEL POLICY FOR VEHICLES		
Medium-term action			
5.2.1	Expand gaseous fuel programme: Auto rickshaws and local taxis (as applicable) may move to LPG/electricity. Explore introduction of CNG for buses when city gas distribution is available. Replace diesel three wheeler & taxi fleets with fleet on alternative fuels. Expand gas refuelling infrastructure for delivery and use. GAIL is expected to expand natural gas grid to West Bengal. Prepare roadmap to be linked to that. Around 5573 LPG driven Auto rickshaws operate in Barrackpore.	Transport department, Department of Energy, MoPNG	2-3 years
5.2.2	Expedite transition to electric mobility: • Target electrification of new vehicles fleet in specific segments using a mixture of mandates and subsidies as part of the state level EV policy. • Seek to drive rapid adoption of Battery Electric Vehicles (BEVs) in a manner where they contribute to 25% of all new vehicle registrations by 2023. Build on state government policies and that of the central government - NEMMP & FAME. • 100% exemption of duty/tax on electricity tariff for an initial period of 5 years for EV manufacturers (vehicle and battery). • Encourage battery operated auto-rickshaws / intermediate para transit vehicles. • Target provision of public and private EV charging stations as part of the state level EV policy. • Design special tariff at commercially viable rates for charging stations to encourage and enable government agencies and private players to set up charging stations at standardized rates. • Incentives by way of capital subsidy for the first lot of 100 fast charging stations to facilitate ease of adoption. • Integrate EV charging space in public areas, shared spaces, commercial buildings, institutions etc. • Plan infrastructure and institutional framework for used battery processing, re-use, recycling, and disposal. Include mandate based incentives in the form of lower road taxes, motor vehicle taxes and registration charges, preferential licensing and permit system, modification of building by-laws for charging systems, preference in low emissions zone, special parking provision etc. • Designated parking spaces for commercial electric vehicles with exempted parking fees for EVs. • Provision of dedicated on-street parking spaces for commercial and personal electric vehicles; exemption of parking fees for EV parked in those dedicated spaces. • Identify and notify commercial areas with high footfall and good public transport and goods transport connectivity to pedestrianize supported by zero emission battery-operated vehicles: Priority may be accorded to battery-operated para-transit as feeders and for last mile connectivity. Ensure organized deployment to reduce congestion. • To encourage rapid adoption of Battery Electric Vehicles in commercial segments, it is being contemplated to do away with permit system and also exempting 100% of motor vehicles tax for initial 5 years.	Transport department, Department of Power & NES, DHI, NITI Aayog	1 year

Sr. no.	Action points	Agency responsible	Timeline
5.2.3	Explore the feasibility of generating biogas from waste and sewage to run buses in cities.	Transport Department, Department of Power & NES, oil marketing companies	1 year
5.2.4	Need favorable fiscal measures to promote clean fuels and vehicles and zero emissions vehicles.	Department of Transport, Power & NES and Finance	1 year
5.3	EMISSION CONTROL MEASURES FROM ON-ROAD VEHICLES		
5.3.1	Assess and implement adequate number of PUC centres for emissions testing of on-road vehicles. Strengthen periodic auditing and over-sight of PUC centres and calibration of equipment and third-party checks. There are 12 PUC centres which are operational and all are web linked to the Vahan Server. Ensure air to fuel ratio (Lambda testing) is carried out for BS IV and BS VI vehicles. Periodic audit and calibration of machines to be done by officials.	MoRTH, Transport Department	6 months to 1 year
5.3.2	Link PUC certificates with mandatory third-party insurance or adopt other methods to ensure 100 per cent compliance. Ensure real-time updates for all WB registered vehicles with the VAHAN database for compliance. Develop a mechanism for ensuring that no vehicle is allowed to ply without valid PUC certificate.	Transport Department, MoRTH	Immediately
5.3.3	Improve and enforce PUC programme: Universal linking of PUC centres with remote server already carried out to eliminate manual intervention in PUC testing be taken forward for stringent enforcement of the programme. Implement testing of all notified PUC norms notified so far for all genre of technology including BS VI vehicles.	Transport Department	Immediately
5.3.4	Upgrade in-use emissions testing for petrol and diesel vehicles by using additional methods of screening such as remote sensing.	MoRTH, ARAI, Transport Department	1 year
5.3.5	Advancement of the system: Integrate on-board diagnostic (OBD) system fitted in new vehicles with vehicle inspection. As per the MORTH advisory PUC centres have to check malfunctioning indicator light on dash boards of vehicles. If the light is found on vehicles to be sent back for testing in authorized workshops. This may be enforced. Additionally, PUC centres need to check if the OBD is functioning properly. Also keeping in view that BS VI vehicles will roll from April 2020, there is need for system upgradation for more effective screening of on-road vehicles. It is recommended that remote sensing measurements of on-road emissions be introduced. Carry out training programs and auditing of PUC centres to check for preparedness for BS VI norms.	Transport Department	6 months to 1 year
5.3.6	Enforcement of law against visibly polluting vehicles: remove them from road, impose penalty, and launch extensive awareness drive against polluting vehicles.	Transport Department, Traffic Police	Ongoing
5.3.7	Set up modern centralized vehicle inspection centres for upgraded emissions, fitness and road worthiness tests for commercial vehicles and diesel vehicles. Such centres may be set up at a regional scale so that Barrackpore along with several municipalities and urban agglomeration in the region may leverage it. One pilot is under advanced stages of development at Behala, Kolkata. It is contemplated to develop another such automated vehicle testing centre at Nilgunge, Barrackpore.	Transport Department, MoRTH	1 year

Sr. no.	Action points	Agency responsible	Timeline
5.4	Scrappage Policy: Phase out old vehicles with the help of age cap and age-linked road tax policy. Set up scrapping infrastructure for scientific dismantling and disposal of old vehicles. Set up recycling units that are authorized with proper guidelines.17,872 vehicles are older than 15 years of age and have been removed from operations. At present 15 seized vehicles are awaiting scrapping on completion of statutory process.	Transport Department, MoRTH, CPCB	1 year
5.5	Freight Transportation		
5.5.1	Use of off-peak passenger travel times to move freight and restrict the entry of heavy vehicles into cities during the day to continue. Adopt freight master plan to organize freight movement and logistics.	District and local administration, Municipal Corporation, Transport Department, Traffic Police	Within 6 month
5.5.2	Provide truck rest areas/parks along national and state highways to prevent entry of trucks into cities during peak hours. Use of off-peak passenger travel times to move freight and restrict the entry of heavy vehicles into cities during the day to continue. Current initiatives may be strengthened further.	PWD, NHAI	Within 6 months
5.5.3	Introduce age and emission standards-based restrictions on the operations of commercial vehicles within the city.	NHAI, District and local administration	Within 6 months
5.5.4	Check overloading: Use weigh-in-motion bridges / machines (WIM) and weighbridges at entry points to the city to check the payload of commercial vehicles. As per the CMVR, a penalty of 10 times the applicable rate for overloaded vehicles is applicable. Two weigh in motion bridges have been made operational for the city of Kolkata and suburbs including Barrackpore. This may be taken forward.	District and local administration, Transport department, Traffic Police	Within 6 months
5.5.5	Create management systems for loading and unloading of goods in city areas.	District and local administration, Transport department	6 months
5.5.6	Ensure fitness and road worthiness of trucks and compliance to set standards is adopted and enforced. Important for industrial cities. Carriage of loads in excess of permissible ceiling comes under punishable offense.	Transport Department	6 months
5.5.7	Rationalize share of high capacity trucks for long-distance freight transport of material instead of smaller trucks.	NHAI, District and local administration	Within 6 months
5.5.8	Diversion of truck traffic: Check feasibility of diversion of non-destined trucks into the city. Alternate routes need to be identified if possible. Pave all roads to control fugitive dust emissions.	District and local administration, Transport department, Traffic Police	Within 6 months
5.5.9	Radio frequency identification tag (RFID) based toll or entry tax collection: install RFID based toll collection system and link it with VAHAN database. This will enable lesser congestion at entry gates, also by using this technology vehicle identification by vintage, emission norm compliance, etc. will be easier. KMDA can adopt such measures to make toll collection cashless and regulate entry based on age. This also allows scope of introducing environment pollution charge at the entry point. NHAI has implemented toll plazas in national highways.	District and local administration, Transport department, Traffic Police	1 year

Sr. no.	Action points	Agency responsible	Timeline
5.5.10	Develop urban freight consolidation centres in relation to location of warehouses relative to suburban areas. Freight management should include freight logistics and freight master plan. This must align terminals, cold storage and freight corridors.	District and local administration, Transport department	1 year
5.5.11	Prepare a freight master plan: Prepare a detailed logistic plan which includes detailed assessment of freight connectivity, requirement of dedicated fright corridor and allied freight infrastructure such as logistic park / truck terminals, cold storage facilities, warehouses, etc.	Transport Department, Railways	1-3 year
5.6	Prepare an action plan to check fuel adulteration and random monitoring of fuel quality. To ensure that periodic routine and surprise fuel testing is done for all transport and non-transport fuels. For this an action plan needs to be prepared in consultation with oil companies and ministry of petroleum and natural gas.	ICE, MoPNG, Oil marketing companies	6 months
5.7	EMISSION CONTROL AT REFUELLING STATIONS:		
	Install vapor recovery systems in refuelling outlets to reduce benzene and VOC emissions in cities. CPCB has issued direction for installation of Stage I and Stage II vapour recovery system in all retail outlets with capacity 3000 kilolitre and more in 46 million plus cities by December 2017. Retail outlets across the city should comply with this.	Transport department, State Oil Coordinator	1 year

6. URBAN MOBILITY

Sr. no.	Action points	Agency responsible	Timeline
6.1	PUBLIC TRANSPORT SYSTEM		
Short-term action			
6.1.1	Improve existing public transport service infrastructure for access by installing Bus Queue Shelters, Bus Post sign, etc.	WBTC, Barrackpore Municipality	6 months
Medium-to long-term action			
6.1.2	Strengthen the city bus system for connectivity. Augmenting city bus services (frequency, routes, buses) through demand assessment and rationalization.	WBTC	18 months
6.1.3	Facilitating multi-modal integration at major transit locations (like railway stations) to ensure smoother transition between modes.	Barrackpore Municipality, WBTC, NBSTC, Eastern Railway, Kolkata Metro Rail Corporation Ltd., RTO(PVD), Traffic Police	18 months
6.1.4	To strengthen and prioritize movement of public transport consider bus priority measures. Moreover, major arterials roads with adequate available width should have bus priority lanes too.	Transport Department, WBTC, NBSTC, Traffic Police, Barrackpore Municipality	1 year
6.2	INTERMEDIATE PARA TRANSIT (IPT)		
Short-term action			
6.2.1	IPT in the region operates on route permit and fixed fares. There are earmarked parking arrangements at interchange points/major junctions. There should be terminal points and pick up/drop off nodes identified for IPT services in and around existing major public transport services (bus/rail) such that it becomes an organized service and compliments major modes.	Transport Department, Traffic Police, Barrackpore Municipality, RTO (PVD)	6 months
6.2.2	Facilitate IPT driver training, standard licensing procedures, and safety measures in operation.	RTO (PVD), Transport Department, Traffic Police	6 months
6.2.3	Enforce IPT service providers to abide by latest emission standards (i.e. Bharat Stage IV and upcoming Stage VI). There should be training on importance of using unadulterated fuel, its effects and impacts as a part of registration and annual fitness checks.	RTO (PVD), Transport Department, Traffic Police	6-12 months
6.2.4	E-rickshaw plying in the city should also follow standard process of registering, followed by driving training and safe operation. 6000 auto are plying in this region.	RTO, Traffic Police	6 months
Medium term action			
6.2.5	Prepare a policy framework for future IPT development, with specific consideration on regulating numbers of IPT modes, restricting vehicles more than15 years old from plying and laying down rules for service improvement.	KMDA, RTO (PVD)	1-3 years
6.3	ADOPTATION OF ELECTRIC MOBILITY		
Short term action			
6.3.1	Prepare an incentive based (financial) electric rickshaw scheme for the quicker adaptation of electric mobility in the city. - Incentive for de-registering ICE based IPT (Auto)	KMDA, Transport Department, RTO (PVD)	6-12 months
6.3.2	Promote electric auto-rickshaws as feeder services to the bus services to facilitate first and last mile connectivity by - Provision of parking / terminal points, etc. - Faster registration process at RTO	Transport Department, WBTC, Barrackpore Municipality, RTO (PVD)	6 months

Sr. no.	Action points	Agency responsible	Timeline
6.3.3	Provision of dedicated parking space for electric rickshaws/ vehicles.	KMDA, Transport Department, Barrackpore Municipality	6-12 months
6.3.4	Take initiative to develop electric ecosystem such as charging infrastructure, better tariff regime, etc.	KMDA / Electricity department	1 year
6.4	ROAD DESIGN		
6.4.1	Non-motorized transport and safe access		
6.4.1.1	Prepare and implement plans for developing an NMT network. This should include following action – as applicable: • Pedestrian infrastructure shall be designed based on the Indian Road Congress (IRC): 103-2012 • Target specific lengths of footpaths to be completed in a phased manner and cover the entire city. • Upgrade pedestrian crossing at least every 250 m, with pedestrian signals and signages. These should preferably be at grade. • Identify network to develop cycle tracks. • Make safety audit of walking infrastructure mandatory. • Provide roadside public docking space for bicycles. • Make encroachment of NMT lanes punishable offence under the current provision of law. • Dedicated municipal budget shall be made for making streets safe. **Reference:** Indian Road Congress (IRC): 103-2012	KMDA, Barrackpore Municipality, PWD	1-3 years
6.5	MULTI-UTILITY ZONES (MUZ)		
6.5.1	Taking cognizance of the proposed land use map for Barrackpore Municipality, MUZ is recommended on existing as well as proposed major and minor arterial roads. It will help in organizing centralized development of activities along the G.T. road. All the stationary elements on the street shall be organized in a dedicated space which results in obstruction free streets. This should include the following elements. • It shall have dedicated space provision for bus stops, tree plantation, street furniture, auto rickshaw stands, parking, hawkers, public toilets, information kiosks, underground and overhead utility services like electricity, water, telephone, gas, etc. • Space provision for all the street elements shall have to be done by activity mapping, surveys and stakeholder consultations. • A minimum width of 1.8 m shall be maintained for MUZ. **Reference:** Urban Street Design Guidelines Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre prepared by Delhi Development Authority.	KMDA, Barrackpore Municipality, PWD	1–3 years
6.6	COMPACT CITY DEVELOPMENT SHALL BE ADOPTED TO REDUCE DISTANCES AND IMPROVE ACCESS		
Medium- to long-term action			
6.6.1	Compact urban form for any new development to create higher density to shorten travel distances, discourage usage of personal vehicles.	KMDA, Barrackpore Municipality	12 months
6.6.2	In new development areas facilitate adequate transport connectivity to enhance accessibility to major centres (jobs, education, commercial, etc.).	KMDA, Barrackpore Municipality	12 months

Sr. no.	Action points	Agency responsible	Timeline
6.6.3	Ensure mixed landuse development in new development along mobility corridors.	KMDA, Barrackpore Municipality	12 months
6.6.4	Introduce parking maximum to discourage uncontrolled parking.	KMDA, Barrackpore Municipality	12 months
6.6.5	Ensure high-density street network and interconnected green spaces to encourage walkability in new development areas.	KMDA, Barrackpore Municipality	12 months
6.7	MAINTENANCE AND MANAGEMENT OF PARKING PLACES RULES: Implement Parking Area Management Plan (PAMP) as a demand management tool. PAMP will demarcate legal parking area (on-street and off-street), cap parking and also prevent illegal parking. PAMPs to be prepared in consultation with local stakeholders, planning bodies/departments. PAMP should include the following parameters among others:		
6.7.1	Demarcate the emergency vehicle route on all public roads within the neighborhood. Demarcate on ground wherever legal on-street parking is being provided for based on the local area plan.	KMDA, Barrackpore Municipality	6 months
6.7.2	Ensure no parks and green areas are converted to parking.	KMDA, Barrackpore Municipality	6 months
6.7.3	Where shared Multilevel Parking facility is provided demarcate ingress-egress plan and ensure that no major disruption occurs on main thoroughfare traffic. Also indicate pedestrian circulation plan.	KMDA, Barrackpore Municipality	6 months
6.7.4	Eliminate free parking and introduce effective variable parking charges based on duration of parking and 'user pay' principle as per the National Urban Transport Policy. Similar measures can be undertaken in Barrackpore.	KMDA, Barrackpore Municipality	6 months
6.7.5	Do not allow gross-cost basis annual or monthly lump sum payment for parking in commercial areas. Annual passes allow unlimited use and do not reduce demand.	KMDA, Barrackpore Municipality	6 months
6.7.6	Physically demarcate legal parking areas. Equip them with metering systems, proper signage, IT for information on parking availability to reduce cruising time and on-street management.	KMDA, Barrackpore Municipality	6 months
6.7.7	Develop a methodology for parking pricing in residential areas and other major trip attracting areas (commercial, institutional, etc.) in order to discourage misuse of urban land and reduce inflated parking demand - Pricing should encourage usage of designated parking spaces - Rationalize usage of on-street parking - Rationalize short term vs long term parking	KMDA, Barrackpore Municipality	1-3 years
6.7.8	Penalty for illegal/wrong parking, esp. parking within the emergency lanes and non-designated areas to be prohibitive.	KMDA, Barrackpore Municipality	1-3 years
6.7.9	Bundle existing and planned public parking facilities and on-street and off-street parking (including multi-level) facilities for management by a single agency/operator. New stand-alone parking only sites need to be integrated with parking area management plan of the area.	KMDA, Barrackpore Municipality	1-3 years
6.7.10	Multilevel parking structure shall be equipped with smart technology such as real-time information on vacant parking slots, smart meters, etc.	KMDA, Barrackpore Municipality	1-3 years
6.7.11	Earmark a part of parking revenue for local area improvement that includes footpaths, public amenities and parking facilities within the PAMP area.	KMDA, Barrackpore Municipality	1-3 years

Sr. no.	Action points	Agency responsible	Timeline
6.7.12	Explore introduction of residential parking permit for regular parkers for use of public parking space and these may be monitored, as appropriate.	KMDA, Barrackpore Municipality	1-3 years
6.7.13	In order to optimize utilization of land, ensure that in all new projects (e.g. commercial, institutional, housing, etc.), at least 50% of the available parking spaces are made available for shared parking facility.	KMDA, Barrackpore Municipality	1-3 years
6.7.14	Ensure in the parking contractual agreement that the revenue sharing model is dynamic and flexible, allowing for flexibility in charging and varied usage and rates of the parking spaces; specify the investment that the contractor will have to make for up gradation of the PAMP area including metering, ITS application for commuter information, and signage.	KMDA, Barrackpore Municipality	1-3 years
6.7.15	Plan and implement parking provision for buses, commercial vehicles and IPT-NMT modes, and for the differently abled.	KMDA, Barrackpore Municipality	1-3 years
6.8	TRAFFIC MANAGEMENT		
Short-term action			
6.8.1	Conduct a third party / independent audit of geometry of all city roads and intersections and provide specific solutions.	Traffic Police	6 months
6.8.2	Conduct audit of all intersections and install functional traffic signals at all major intersections.	Traffic Police	6 months
6.8.3	Enforce lane driving through heavy fining.	Traffic Police	6 months
Medium-to long-term action plan			
6.8.4	Prepare Traffic Impact Assessment (TIA) guidelines and permit new developments based on the formulated TIA guidelines.	Traffic Police / KMDA	1 year
6.8.5	Prepare traffic management plan for special days, i.e. during Durga Puja festival / during urban flood situation.	Traffic Police, KMDA, Barrackpore Municipality	1 year
6.9	TRAFFIC IMPACT ASSESSMENT		
Medium-to long-term action plan			
6.9.1	Permit new developments based on the impact of traffic on the surrounding transport infrastructure and neighborhoods.	Barrackpore Municipality / SEIAA	1-3 years
6.9.2	Make necessary infrastructure augmentations based on traffic impact assessments and levy costs to the developer, if needed and possible.	Barrackpore Municipality, Traffic police	1-3 years
6.10	FINANCING OF URBAN TRANSPORT		
Medium-to long-term action plan			
6.10.1	Create dedicated and ring-fenced urban transport fund for meeting Urban Transport needs by adopting innovative financial instruments to mobilize local resources.	Transport Department, Barrackpore Municipality	1-3 years
6.10.2	Rationalization and reallocation of funds from road capacity augmentation projects towards public transit systems and complete streets.	Transport Department	1-2 years

Sr. no.	Action points	Agency responsible	Timeline
6.10.3	Encourage involvement of the private sector in activities such as operation and maintenance of road infrastructure, parking facilities, vehicle testing and certification facilities, repair facilities, construction and management of terminal facilities among others. Regulatory monitoring will be required for quality control, quality assurance and performance guarantee. The private sector will be involved in providing public transport services, but under well-structured procurement contracts along with strong supervision of their service level and compliance strategy.	Transport Department, Barrackpore Municipality	1-3 years
6.11	DATA ON URBAN COMMUTE		
Medium-to long-term action plan			
6.11.1	Regular update of the database and information would be one of the important tasks. This will require standardization of database for recording of travel and transport related activities to be able to assess travel activities—generation of daily number of trips, nature of travel demand, and share of different travel modes, average trip distance, and changes in modal share.	Transport Department, Barrackpore Municipality	1-3 years

7. GENERATOR SETS

Sr. no.	Action points	Agency responsible	Timeline
7.1	Ensure that only those DG sets that meet the standards in terms of emission or design of chimneys / exhaust and acoustic enclosures are allowed to operate. Also verify and check whether design specifications are followed.	Police, WBPCB, Municipal Corporation	6 months
7.2	Curtail use of DG sets in social events by providing temporary electric connections. Also restrict use of DG sets during high pollution episodes.	WBPCB and Municipal Corporation	6 months
7.4	Alternate power systems should be promoted in cell towers and use of DG sets discouraged.	Department of Power and NES, Distribution Companies	1 year
7.5	Leverage rooftop solar programme to reduce dependence on DG sets.		1 year
7.6	Ensure access to quality electricity supply.		1-2 years

8. OPEN BURNING (INCLUDING SOLID WASTE AND AGRICULTURAL RESIDUES)

Sr. no.	Action points	Agency responsible	Timeline
8.1	Enforce a complete ban on garbage burning in the entire region. Evolve a monitoring mechanism for this. Take stringent action against open burning of biomass, leaves, tyres, etc. to control such activities.	Municipal Corporation, Development Authority, Resident Welfare Associations, WBPCB	6 months
8.2	Ensure proper collection of horticulture waste (biomass) and composting-cum-gardening approach; municipal zonal offices should be responsible for controlling burning of leaves and garbage on roads / parks. All horticulture agencies should have compost pits in parks. Implement strong public outreach programme to promote household and community-based composting systems (composting pits, shredders, etc.). There are large open grounds and houses with compounds with tree cover that cause extensive leaf litter. Open burning of leaves must stop.		6 months
8.3	Decentralized waste management for hotels, apartments, institutions as per Solid Waste Management Rules, 2016. Implement provisions of Solid Waste Management Rules, 2016 to implement penal provisions to spot fine on waste burning. Strictly ban open burning of hazardous industrial waste.		6 months
8.4	Use of satellite-based monitoring as well as mobile spot check squads for enforcement by locating the position of the fires on the fields.	Municipal Corporation, Metropolitan Development Authority, RWAs, State Police Department, WBPCB GIS cell	6 months
8.5	Proper management of landfill sites at Muktapukurto (on old Kolkata road) to prevent spontaneous fire. Further dumping of waste at open landfill sites should be restricted.		
8.6	Adopt roadmap for zero landfill policy to promote decentralized waste segregation, reuse, and recycling.		
8.7	With good decentralized and segregated waste management system in place, waste-to-energy plants will not be needed in the city. In case any location requires such a plant, strong siting policy should be adopted to keep it away from habitation including neighbourhoods of low-income groups. Strict implementation of emissions norms, use of state-of-the-art technology, and provision of real-time emissions data to SPCB.	Municipal Corporation, Metropolitan Development Authority, RWAs, State Police Department, WBPCB GIS cell	6 months

9. COMMON BIOMEDICAL TREATMENT FACILITY

Sr. no.	Action points	Agency responsible	Timeline
9.1	Augment infrastructure for biomedical waste collection and implementation of emission norms for incinerators if any and examine the feasibility of less polluting alternatives in compliance to biomedical waste treatment rules.	WBPCB, Municipal Corporation, incinerator facility operators	6 months
9.2	Implement CEMS for incinerators and provide data on emissions on an open platform progressively.		6 months
9.3	Develop a siting policy for biomedical incinerators.	WBPCB, supported by Municipal Corporation	6 months

10. COOKING FUELS AND OPEN EATERIES

Sr. no.	Action points	Agency responsible	Timeline
10.1	A targeted programme to be implemented for 100 per cent coverage of households by distribution of LPG/PNG in all non-compliant cities. Most of the eateries run on LPG. Unauthorised eateries have to be considered for conversion.	District and local administration	1-2 years
10.2	In low-income neighborhoods, as well as roadside eateries, dhabas, restaurants, etc. promote and give access to LPG and electricity. Mandate and link commercial license to clean fuels.	Dept. of power and NES, municipal corporation, urban local bodies	1-2 years

11. ROAD DUST

Sr. no.	Action points	Agency responsible	Timeline
Short-term action			
11.1	Sprinkling of recycled water (without compromising other uses); introduce water fountains at major traffic intersections, wherever feasible. Adopt dust control measures for dug up areas.	District and local administration, PWD, Road owning agencies	6 months
11.2	Phase-in mechanical / vacuum-based street sweeping wherever feasible; introduce wet / mechanized vacuum sweeping of roads.		6 months
Medium- to long-term actions			
11.3	Implement truck loading guidelines; use of appropriate enclosures for haul trucks; gravel paving for all haul routes.	Department of Transport, Traffic Police	1-2 years
11.4	Maintain pothole-free roads for free flow of traffic to reduce emissions and dust.	Municipal corporation, District and local administration	1-2 years
11.5	Increase green cover in the region. Undertake greening of open areas, gardens, community places, schools, and housing societies.	Barrackpore Municipality, local bodies, RWAs	1-2 years
11.6	Enforcement of air pollution control in concrete batching (use of water spray and wind breakers, bag filter at silos and enclosures, hoods, curtains, etc.) or use of clean alternative technologies.	WBPCB, Road Owning Agencies, Department of industries	1-2 years
11.7	Adopt street design guidelines for paving of roads and footpaths (hard and soft paving) with vegetative barriers. Mandate restoration according to the guidelines after the completion of all infrastructure projects.		1-2 years

12. CONSTRUCTION DUST

Sr. no.	Action points	Agency responsible	Timeline
Short-term action			
12.1	Adopt and implement dust control measures for all types of construction—buildings and infrastructure. Adopt preventive measures as mentioned in CPCB guidelines. Construction agencies to be made liable. Impose penalty for non-compliance.	Municipal corporation	6 months
12.2	Undertake control measures for fugitive emissions from material handling, conveying and screening operations through water sprinkling, curtains, barriers and dust suppression units. Introduce steeper penalties for non-compliance. Needs enforcement.	Municipal corporation/ Urban Local Bodies	6 months
12.3	Enforce restrictions on construction activities within urban airshed zones during high pollution period.	Municipal corporation, WBPCB	6 months
12.4	Notify rules to segregate construction and demolition waste. Provide a network of decentralized C&D waste segregation and collection sites across the city.	Municipal corporation	1-2 years
12.5	For material handling, construction and demolition, it should be obligatory on part of the developers to provide evidence of debris on-site recycling and/or disposal at designated sites.	Municipal corporation	1-2 years
12.6	Set up facilities to recycle construction and demolition waste. Mandate certain percentage of the material for new construction to be recycled construction waste. Implement provision of Central regulations for construction and demolition waste management rules 2016. Set up facilities for recycling of C&D waste	District and local administration, Municipal corporation	1-2 years

13. EPISODIC EVENTS

Sr. no.	Action points	Agency responsible	Timeline
13.1	Measures to control forest fires and biomass/crop residue burning: Use satellite based monitoring and on-ground enforcement to control such burning episodes. So, an assessment needs to be carried out to identify the reasons and kind of technological and fiscal measures needed to curtail the fires. This is part of regional action.	WBPCB, Agriculture, and allied department, District and local administration	Ongoing
13.2	Firecrackers: regulate and control its usage including restrictions on timing as per the Supreme Court and CPCB and PESO guidelines.	District and local administration, Police Department, WBPCB, RWAs, Supported by Chief Controller of Explosives, Petroleum and Explosive Safety Organization (PESO)	Ongoing

14. RENEWABLE ENERGY

Sr. no.	Action points	Agency responsible	Timeline
14.1	West Bengal has solar energy policy. As per the policy, it is mandatory for all housing societies having a total contract demand of 500 KW to install solar rooftop systems to meet at least 1.5 percent of their total electrical load. This should be further strengthened and implemented. This should be linked with transition from diesel genset to solar power. Electric public transport can also be linked with solar power plans to shift to zero emission target. Identify and target institutional/industrial and residential consumers for faster adoption. Identify open areas in the city where solar power generation is possible.	WBREDA, Department of Power and NES, District and local administration	1-2 years
14.2	WB RE policy requires commercial and industrial establishments with more than 1.5 MW of contract demand to install solar rooftop systems to meet at least 2 per cent of their total electrical load. This should be further strengthened and implemented. This should be linked with transition from diesel genset to solar power. Identification of the mandated entities to encourage adoption through awareness camps and introduce relevant penalties in case of non-compliance.	WBREDA, Department of Power and NES, District and local administration	1-2 years
14.3	Introduce a stand-alone scheme for state run institutions—schools, colleges, hospitals, etc. that meet the criteria and facilitate adoption through a state tender; the tenders must be based on the aggregate demand and must occur at defined intervals to ensure developer participation.	WBREDA, Department of Power and NES, District and local administration	1-2 years
14.4	Facilitate uptake of solar PV on existing residential households and commercial establishments (for example: where there is a lack of rooftop space or single grid-connection for multiple houses) by introducing encouraging regulatory measures such as virtual and group metering.	WBREDA, Department of Power and NES, District and local administration	1-2 years
14.5	Introduce an online portal where prosumers can apply for solar rooftop, interact with installers, and track the installation process [to check delays at discom and SNA's end]—inspections, grid connection and subsidy disbursal.	WBREDA, Department of Power and NES, District and local administration	1-2 years
14.6	Setup a Solar Command Centre (SCC) within the WBREDA that provides guidance, facilitate redressals, and acts as a watchdog for solar rooftop adoption, especially tracking progress under schemes and mandates (including renewable purchase obligation).	WBREDA, Department of Power and NES, District and local administration	1-2 years

15. URBAN GREENS AND FORESTS

Sr. no.	Action points	Agency responsible	Timeline
15.1	Avenue plantation along roads with more traffic. Urban planning to integrate urban greens (parks, district forests, etc.) and urban forests in the Master Plans of the cities and all infrastructure development and urban redevelopment projects. At least 15-20 percent of the new urban redevelopment projects should be set aside for urban green and tree cover. Urban planning to provide for green roofs and vertical greens linked to infrastructure development. Green walling with plantations around dust generators and to act as dust barriers—to be integrated with the urban forestry and forest policy.	Forest, Municipality, PWD, NHAI	1 year

16. IMPROVE TRAINING AND CAPACITY

Sr. no.	Action points	Agency responsible	Timeline
16.1	Training and skill development will be required of public officials and other public functionaries for planning and management and execution of the plan. This will also require extensive capacity building in all sectors and infrastructure planning.	West Bengal State Council for Science and Technology, Department of Personnel and Training, District and local administration,	Ongoing

17. NEED FOR PUBLIC AWARENESS AND COOPERATION

Sr. no.	Action points	Agency responsible	Timeline
17.1	Organizing deeper public engagement and forums for public consultation for public understanding of the nature of solutions needed to address the complex problem of sustainable industrial development and urban mobility. Formation of a public grievance redressal portal for redressal of public complaints on air pollution along with a supervisory mechanism for its disposal in a time-bound manner.	West Bengal State Council for Science and Technology, WBPCB, District and local administration	Ongoing

A draft graded response action plan has also been prepared which shall be finalized as and when the air quality forecasting is available and the emission sources are ranked on basis of SA study. In addition, the finalization of GRAP also requires reconciliation with IMD forecasted data on air quality. It is already noted that the observed air quality is grossly different from the IMD forecasts. This draft plan is attached only as a specimen, which may also need further refining based on SA study and current year's experiences on air quality management:

GRADED RESPONSE ACTION PLAN (GRAP) FOR REDUCING AIR POLLUTION IN NON-ATTAINMENT CITIES OF WEST BENGAL

The proposed graded measure approach for each pollution source according to the Air Quality Index (AQI) categories includes appropriate measures for each level of pollution (PM10 / PM2.5). While the comprehensive clean air action plan must be implemented round the year, the GRAP measures are meant to be temporary measures for duration of smog episodes and are implemented according to the severity of the air pollution levels. Once the levels come down and stabilize, measures are withdrawn. The objective of the GRAP is to prevent pollution from getting worse when adverse weather conditions trap and spike pollution. A GRAP has been prepared, which may be implemented as and when required and when severe conditions are forecasted.

The proposed GRAP includes set of measures to be implemented with greater vigour and stringency to prevent and avoid high level of air pollution in cities. This is linked to the national air quality index that categorizes daily air quality as good, satisfactory, moderate, poor, very poor, severe, and emergency. All actions suggested for each category are cumulative and add up to the level of emergency as air quality worsens. For implementation of GRAP, the scientific Task Force under WBPCB will advise the District Level monitoring committee on the daily pollution levels and forecasting based on real-time monitoring. Accordingly, the Committee may issue notices to the city authorities to implement the pre-defined action. Each implementing department will appoint a nodal officer to facilitate implementation. The action notified for moderate and poor categories that are largely about stringent enforcement in different sectors can become default action for continuous implementation throughout the year. Additional measures meant for very poor and severe may be notified when such situation develops especially during calm and inversion conditions.

Moderate to poor Poor - When PM2.5 levels are between 91-120 microgramme per cum or PM10 levels are between 251-350 microgramme per cum; Moderate - When PM2.5 is between 61-90 microgramme per cum or PM10 is between 101-250 microgramme per cum	
Action to be taken	**Agency responsible**
Stringently enforce/stop garbage burning in landfills and other places and impose heavy fines on person responsible	Municipal Corporations
Close/stringently enforce all pollution control regulations in brick kilns and industries	State Pollution Control Board
Stringently enforce pollution control in thermal power plants through Pollution Control Board monitoring	State Pollution Control Board
Do periodic mechanized sweeping on roads particularly in roads with heavy traffic and water sprinkling every two days	Municipal Corporations, Traffic Police, PWD
Strict vigilance and no tolerance for visible emissions – stop plying of visibly polluting vehicles by impounding or heavy fine	Department of Transport, Traffic Police
Stringently enforce rules for dust control in construction activities and close non-compliant sites	District Administration, Police
Deploy traffic police for smooth traffic flow at identified vulnerable areas	Traffic Police
Divert non-destined truck traffic	Municipal Corporations, Traffic Police
Strictly enforce Supreme Court orders on firecrackers	SPCB, District Administration in consultation with Chief Controller of Explosives, Petroleum and Explosive Safety Organization (PESO); Police
Ensure fly ash ponds are watered every alternate day during summer months (March-May)	Plant in charge of Power Plants
Information dissemination, social media, mobile apps should be used to inform people about the pollution levels, contact details of control room, enable them to report polluting activities/sources to the concerned authorities, and actions that will be taken by government based on the level of pollution.	State Pollution Control Board, District Administration

Very Poor When PM2.5 levels are between 121-250 microgramme per cum or PM10 levels are between 351-430 microgramme per cum	
Action to be taken	**Agency responsible**
Control use of diesel generator sets by improving electricity supply	State Pollution Control Boards
Restrict parking and enhance parking fee by 3-4 times in commercial areas to reduce usage of personal vehicles	Municipal Corporations
Augment public transport services by increasing frequency and ensure adequate para transit services	Department of Transport, State Transport Corporation
Stop use of coal/firewood in hotels and open eateries	Municipal Corporations
Alert in newspapers/TV to advise people with respiratory problems and cardiac patients to avoid polluted areas and restrict outdoor movement	Municipal Corporations, Resident Welfare Associations
Alert in newspapers/TV to advise people with respiratory problems and cardiac patients to avoid polluted areas and restrict outdoor movement	State Pollution Control Board

Severe When PM2.5 levels are above 250 microgramme per cum or PM10 levels are above 430 microgramme per cum	
Action to be taken	**Agency responsible**
Close brick kilns, hot-mix plants, stone crushers and other highly polluting units or as applicable locally	State Pollution Control Board, District Administration, Police
Shut down / minimize operation of polluting coal based power plant if the plant is not complying with emission standards.	State Pollution Control Boards
Intensify public transport services. Introduce differential rates to encourage off-peak travel	Transport Department, State Transport Corporations
Increase frequency of mechanized cleaning of road and sprinkling of water on roads. Identify road stretches with high dust generation.	All road owning agencies including Municipal Corporations, Public Works Department and National Highway Authority of India
Restrict movement of trucks inside the coal field mine areas	State pollution control board, Department of steel and mines

Severe + or Emergency When PM2.5 levels cross 300 microgramme per cum or PM10 levels cross 500 microgramme per cum (or 5 times above the standard) or persist for 48 hrs or more	
Action to be taken	**Agency responsible**
Stop entry of diesel truck traffic into city (except essential commodities)	Traffic Police, Municipal Corporations
Stop construction activities	Pollution Control Board, Municipal Corporations
Introduce some form of vehicle restraint measures for private vehicles based on license plate numbers, or introduce low emissions zones in the city to stop entry of polluting vehicles (old and ageing and polluting diesel vehicles etc). For this purpose introduce sticker system as per MoRTH guidelines to indicate fuel and date of manufacture of vehicles	Transport Department, Traffic Police
State Pollution Control Board Task Force to take decision on any additional steps including shutting of schools	

Action to be taken by public

While the National Air Quality Index and health advisory will inform people about the dangers of exposure, people are also expected to take precautionary measures to protect themselves. Suggested actions by public are listed below:

Level according to AQI	Action
Very poor, severe and emergency	Those suffering from heart diseases, asthma, and other respiratory disease may consider avoiding undue and prolonged exposure
	Schools to suspend all outdoor activities and sport events
	Report visible emissions from vehicles, industries, power plants, garbage burning, and other non compliances to the respective control rooms
	Do not use diesel and kerosene generators
	Maintain vehicles properly (PUC certificate, replace car air filter, maintain right tyre pressure)
	Minimize unnecessary travel, use public transport & avoid using private vehicles

INSTITUTIONAL MECHANISM FOR IMPLEMENTATION OF GRAP

In order to implement and monitor progress of the proposed actions, a district level monitoring committee is proposed, which will also provide for the institutional mechanism for implementation. The committee may co opt members if situation demands.

Air Quality Monitoring network design criteria

Population (Census 2011)	Minimum No. of manual station under NAMP	Minimum no of proposed CAAQMS	Total
1,00,000- < 5,00,000	1-Background 2-Residential/ Commercial	1-Residential	4
5,00,000- <10,00,000	1-Background 2-Residential/ Commercial	1-Residential 1-Traffic dominant area 1- Commercial	6
10,00,000- <50,00,000	1-Background 2-Residential/ Commercial	2-Residential 1-Traffic dominant area 1- Commercial 1-Industrial area	8
≥50,00,000	1-Background in upwind direction 1-Background in down wind direction 2-Residential/ Commercial	4-Residential 3-Traffic dominant area 3- Commercial 2-Industrial area	16

Annexure 1

Department of Environment
Government of West Bengal
5th Floor, PraniSampad Bhavan, Bidhan nagar -106

No. /1194 /EN/T-IV-8/01/2019 Date: 19 /06/2019

NOTIFICATION

Whereas, air pollution is a serious concern,

Whereas, the Ministry of Environment Forest and Climate Change, GoI has launched National Clean Air Programme on 10th January 2019 and requested for constitution of Steering Committee, Monitoring Committee, Implementation Committee through communication dated 24.04.2019

Whereas, Kolkata has been identified as the 'Non-attainment city' in West Bengal under NCAP

Whereas, a weekly monitoring committee has been constituted for review of air quality and monitoring during winter months in Kolkata through notification vide memo no 2799/EN/T-IV-8/001/2015 dated 22.12.2017

Whereas, Comprehensive Action Plan (CAP) has already been prepared as per Hon'ble NGT order for Kolkata

Whereas, a monitoring committee AQMC (Air Quality Monitoring Committee) has been constituted as per order of Hon'ble National Green Tribunal (PR) in connection to OA 681/2018 vide memo no EN/3678/(1-10)/3C-38/2018 date 05.12.2018

Now, therefore, Governor is pleased to constitute the following Steering committee, Monitoring Committee, Implementation Committee as follows:

1) **Steering Committee for Implementation of National Clean Air Programme in West Bengal**

- Chief Secretary **Chairman**
- Additional Chief Secretary /Principal Secretary, Transport Department
- Additional Chief Secretary /Principal Secretary, Department of Urban Department and Municipal Affairs
- Commissioner, Kolkata Police
- Commissioner, Howrah Police
- Member Secretary, West Bengal Pollution Control Board
- Additional Chief Secretary/Principal Secretary, Department of Environment **Convener**

The Committee shall provide overall guidance for NCAP as applicable in West Bengal and review it on quarterly basis.

2) **Monitoring Committee for Implementation of National Clean Air Programme in West Bengal**

The roles and responsibilities of AQMC, which has been constituted vide *notification 3678/EN/(1-10)/3C-38/2018 dated 05.12.2018 (copy attached as Annexure A)* is extended also to monitor the NCAP in West Bengal and also to function as:

"Monitoring Committee for Implementation of National Clean Air Programme" in West Bengal under the Chairmanship of Additional Chief Secretary/Principal, Department of Environment. The Committee shall monitor NCAP as applicable in West Bengal closely and meet on monthly basis.

3) **Implementation Committee for Implementation of National Clean Air Programme in West Bengal**

The roles and responsibilities of weekly monitoring committee, which has been constituted vide *notification 2799/EN/(1-10)/T-IV-8/001/2015 dated 22.12.2017 (Copy attached as Annexure B)*, is extended also for daily monitoring and implementation of the NCAP in Kolkata and also to function as:

"Implementation Committee for National Clean Air Programme in Kolkata" under the Chairmanship of Commissioner, Kolkata Municipal Corporation. The committee shall be responsible for day to day monitoring and implementation of NCAP as applicable in Kolkata and meet on regular basis.

All three committees may co-opt subject specialist(s) from reputed scientific/technical institution, concerned government department/organization/civil society or Non Governmental Organization, if situation demands.

Sd/-

Chief Secretary
Government of West Bengal

Copy forwarded for kind information to:

No. /1194 / (13) /EN/T-IV-8/01/2019 Date: 19 /06/2019

1. Additional Chief Secretary, Industry, Commerce & Enterprises
2. Additional Chief Secretary, Micro, Small and Medium Enterprises & Textile Department
3. Principal Secretary, Department of Environment
4. Principal Secretary, Department of Urban Department and Municipal Affairs
5. Secretary, Agriculture Department
6. Commissioner, Kolkata Municipal Corporation
7. Secretary, Transport Department
8. Commissioner, Howrah Municipal Corporation
9. Commissioner, Kolkata Police
10. Commissioner, Howrah Police
11. Member Secretary, West Bengal Pollution Control Board
12. Shri Prabir Kr Barai, Senior Scientist, West Bengal Pollution Control Board
13. Sr. PS to Chief Secretary

(Niraj Singhal)
Chief Environment Officer
Environment Department

Department of Environment

Government of West Bengal

Notification

No. EN/3678(….)/3C-38/2018 Date: 05/12/2018

Whereas air quality of Kolkata has not attained National Ambient Air Quality Standards (NAAQS)

And whereas the Hon'ble Principal Bench in its order dated the 8th October, 2018 has directed the State Government to constitute an Air Quality Monitoring Committee (AQMC) for preparation of an appropriate action plan for attaining NAAQS

Now therefore, a ten member AQMC is constituted for preparation of Air Quality Action plan for Kolkata for attaining NAAQS with following members:

- Additional Chief Secretary, Environment ***Chairperson***
- Secretary or his nominee, Transport
- Secretary or his nominee, Urban Development &Municipal Affairs (UD&MA)
- Secretary or his nominee, Industry, Commerce & Enterprise
- Secretary or his nominee, Micro Small and Medium Enterprises (MSME)
- Secretary or his nominee, Agriculture
- Commissioner or his nominee, Kolkata Police
- Commissioner or his nominee, Kolkata Municipal Corporation (KMC)
- Member Secretary, West Bengal Pollution Control Board (WBPCB)
- Chief Environment Officer, Environment ***Convenor***
-

The nominee of any department should be a senior level officer at least in the rank of Joint Secretary/ Joint Commissioner/ Director

The Committee shall start functioning with immediate effect and shall submit the action plan to Central Pollution Control Board by 31.12.2018.

Sd/-
Chief Secretary
Government of West Bengal

Department of Environment
Government of West Bengal

No. 12799 /EN/T-IV-8/001/2015 Date 22 /12/2017

NOTIFICATION

Whereas, the cities of Kolkata and Howrah are exposed to air pollution

Whereas, air quality of Kolkata and Howarh are of serious concern

Whereas, air pollution worsens every winter

Whereas, level of air pollution is already showing deteriorating impact

Whereas, the situation demands collaborative effort and intensified action

Now, therefore, the following committee is hereby constituted for weekly monitoring and follows up of status of air quality and initiation of action to control air pollution

Committee for weekly monitoring of air quality situation, mitigation action and follow up

- Commissioner, Kolkata Municipal Corporation *Chairman*
- Commissioner, Howrah Municipal Corporation
- Representative of Transport Department
- Representative of Kolkata Police
- Representative of Howrah Police
- Prabir Kr Barai, Senior Scientist, West Bengal Pollution Control Board Convenor

The Committee shall review the status of area wise air quality on weekly basis. They shall monitor constructions sites, which are not properly following the guidelines for arresting emission from construction sector; the vehicles, which are not following emission norms; roadside dust suspensions; burning of coal or wood in restaurants, eateries and industries; and other actions recommended in the short term action plan. They shall initiate and take corrective action to improve air quality.

The Committee shall submit a weekly report to the Chief Secretary, Government of West Bengal.

The Committee shall hold the weekly meetings up to end of March 2018.

21/12/17
Chief Secretary
Government of West Bengal

Page 1 of 2

Annexure 2

Government of West Bengal
Environment Department
Prani Sampad Bhavan, 5th floor, L.B-2,Sec-lll, Salt Lake, Kolkata-700106

NOTIFICATION

No. *EN/137/T-IV-8/01/2019* Kolkata.16.01.....2020.

Whereas, the Ministry of Environment Forest and Climate Change, GoI has launched National Clean Air Programme (NCAP) on 10th January 2019 and requested for constitution of Steering Committee through communication dated 24.04.2019

Whereas, different municipalities in different districts are being identified as the 'Non-attainment city' in West Bengal under NCAP

Whereas, District Level Committees (DLC) are to be constituted as per order of Hon'ble National Green Tribunal (PR) in connection to OA 681/2018 for NACs

Whereas, Comprehensive Action Plan (CAP) has already been prepared as per Hon'ble NGT order for Kolkata and other6 NACs, namely: Howrah, Haldia, Durgapur, Asansol, Ranigunge, Barrackpore

Now, therefore, In compliance with the aforesaid directions of the Hon'ble National Green Tribunal, Principal Bench New Delhi, the Governor is pleased to constitute DLCs for districts of West Bengal with NACs (except Kolkata) comprising of the following members-

1. Representative of the District Magistrate of respective districts of West Bengal - member
2. Representative of the Superintendent of Police of respective districts of West Bengal - member
3. Regional Officer of West Bengal Pollution Control Board of respective districts of West Bengal - member
4. Representative of the Chairman of the District Legal Service Authority (DLSA) - member.

The committee will function under the under the overall supervision and coordination of the District Magistrate of the respective districts of West Bengal.

By Order,
Sd/-

Chief Secretary to the Government of West Bengal

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Additional reading:

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Environment Department
Government of West Bengal
2020