



CLEAN AIR ACTION PLAN

HALDIA



Environment Department
Government of West Bengal

2020



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Contents

Objective	5
Part I: Overview	7
1. Air quality concern and public health imperative	9
1.1 Air quality monitoring	9
1.2. Status of air quality	9
1.3 Public health evidence	13
2. Pollution source profile and baseline policy action	14
2.1 Industry and power plants	14
2.2 Vehicles and mobility	24
2.3 Strategies to reduce tailpipe emissions	26
2.4 Solid waste management	28
2.5 Construction and demolition waste	28
2.6 Suspended road dust	29
2.7 Crop fires	29
PART II: Comprehensive Clean Air Action Plan (CAP) and Graded Response Action Plan	31
Comprehensive Clean Air Action Plan (CAP)	33
Graded Response Action Plan (GRAP)	34
Annexure 1	60
Annexure 2	65
Bibliography	66

Objective

This is the initiative of the Government of West Bengal 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. Haldia is a city and a municipality in Purba Medinipur district in West Bengal. It is a major river port and a major hub of petrochemical industries. The city is considered an industrial belt, and is located approximately 125 kilometres southwest of Kolkata.

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 need 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 State 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. While implementing this action plan, the authorities should also take cognizance of 'Action Plan for Polluted Industrial Areas (PIAs) in West Bengal', that was prepared after the Hon'able NGT issued order dated December 2018 (OA Number 1038/2018).

PART I
OVERVIEW

1. Air quality concern and public health imperative

1.1 Air quality monitoring

Currently, there are four manual air quality monitoring stations and one real-time station in Haldia (see *Table 1: Haldia—locations of the ambient air quality monitoring stations and the parameters monitored*). The real-time monitors 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 (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO) and ozone (O₃). However, real-time monitoring of the more harmful particulate matter, less than 2.5 micron size (PM2.5), is limited. At present, it is happening at only one real-time monitoring location at the MCCPTA chemical plant.

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

Station name and location	Parameters monitored
CAAQMS (automatic monitoring stations)	
Haldia, Haldia	PM10, SO ₂ , NO ₂ , Ozone, CO
Manual monitoring stations	
Bhunia Raichak, Driver's Hut, Bhunia	PM10, PM2.5, SO ₂ , NO ₂
Supermarket Building, Durgachak	PM10, PM2.5, SO ₂ , NO ₂
WBIIIDC Ruchi Soya Ind. Durgachak	PM10, PM2.5, SO ₂ , NO ₂
Bhabanipur	PM10, PM2.5, SO ₂ , NO ₂
Stations managed by respective industries	
Haldia Petrochemicals (Manual)	PM10, PM2.5, SO ₂ , NO ₂
MCCPTA (CAAQMS)	PM10, PM2.5, SO ₂ , NO ₂ , CO
Haldia Petrochemicals (CAAQMS)	CO, O ₃

Source: As provided by the West Bengal Pollution Control Board and WBPCB website

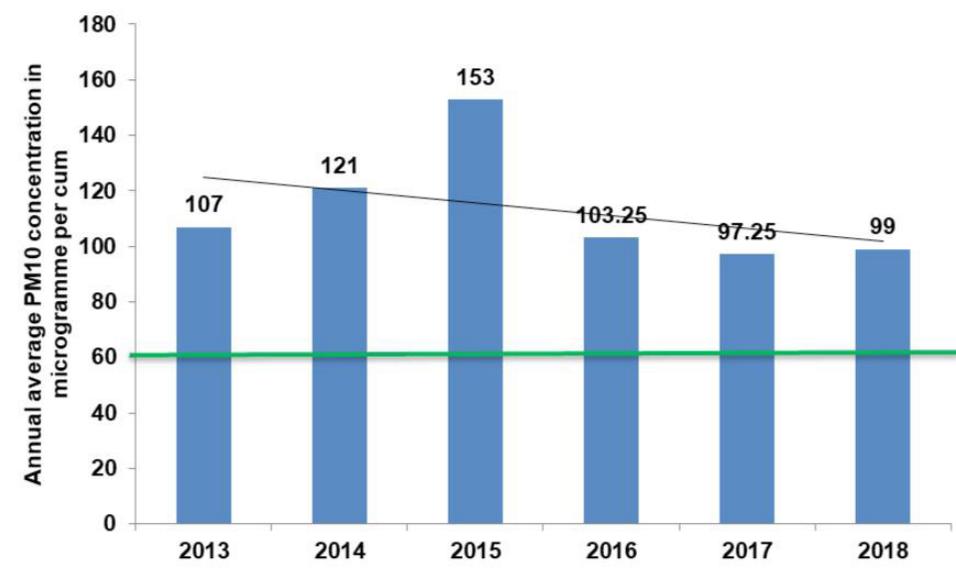
Currently, there are two air quality data reporting systems. West Bengal Pollution Control Board (WBPCB) website reports data from all manual and real-time monitoring stations. The data from manual stations is reported twice a week whereas the data from real-time monitoring stations is reported daily. CPCB provides real-time data from the station named Haldia. PM2.5 is only monitored at MCCPTA. The real-time monitor at Haldia Petrochemicals does not monitor particulate matter.

1.2. Status of air quality

Long-term air quality trend—annual average trend in PM10 in Haldia

To understand the longer-term trends in annual average levels, data from WBPCB was analysed for Haldia (see *Graph 1: Haldia—long-term trend in annual average level of PM10 concentration*). The data set shows a decreasing trend.

Graph 1: Haldia—long-term trend in annual average level of PM10 concentration (2013–2018)

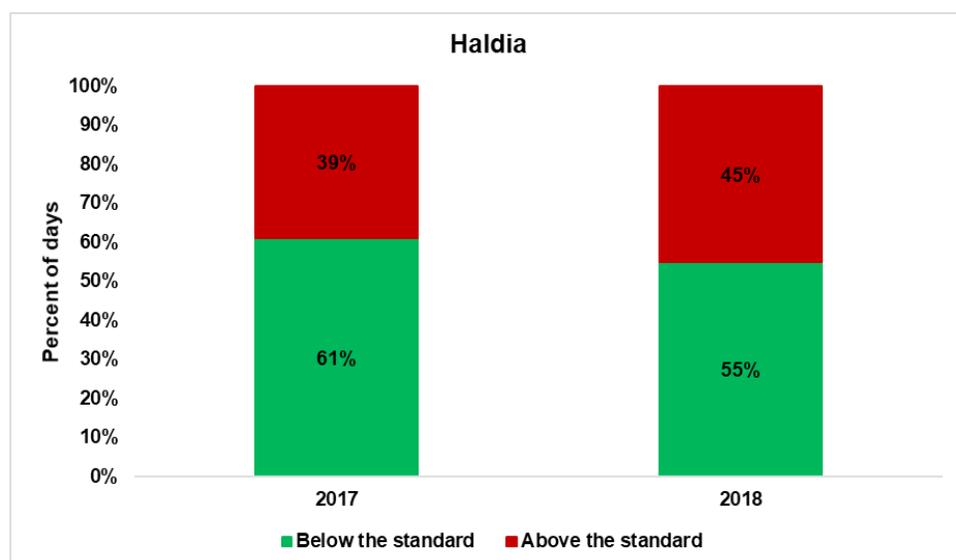


Source: Based on the data provided by WBPCB from WBIDC, Supermarket, Bhunia Raichak and Bhabanipur Stations

The reduction targets to meet the annual average ambient air quality standards and to sustain this over time are significant. Hence, these targets are expected to define the level of detail and stringency needed in actions towards achieving clean air. According to the data of WBPCB, Haldia requires to reduce PM10 concentration by approximately 40 per cent to meet the annual standard. This was calculated using the average PM10 concentration for three consecutive years which was taken as 2016–18.

Daily air quality analysis show close to 45 of days PM10 levels have not met the standards.

Graph 2: Increase in number of days exceeding PM10 standard

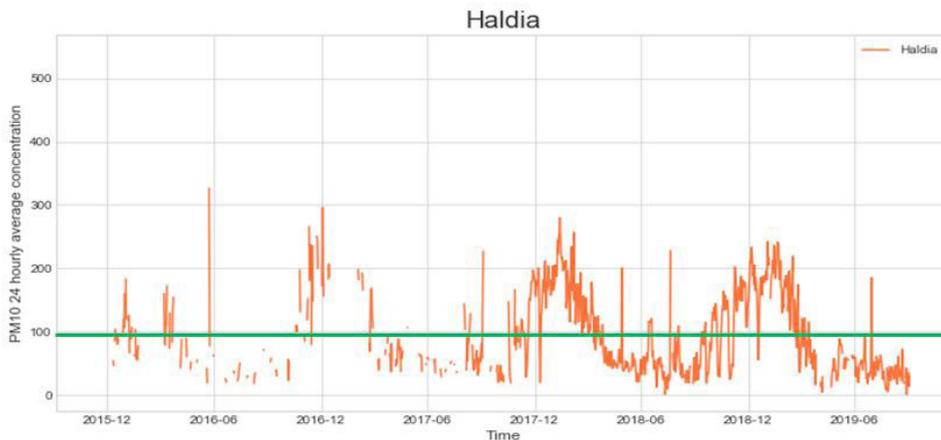


Source: Based on CPCB Air quality data from https://app.cpcbcr.com/AQI_India/

Winter pollution trend

The number of days violating the PM10 standard has increased from 39 per cent in 2017 to 45 per cent in 2018.

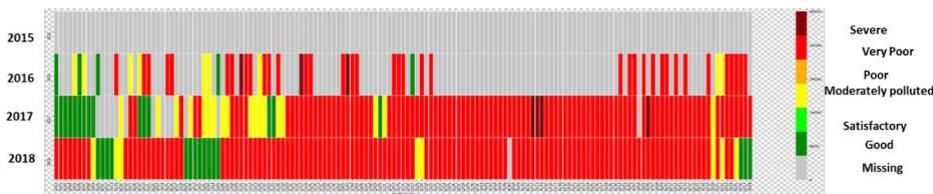
Graph 3: Daily PM10 trend in Haldia (from December 2015 till 03 September 2019)



Source: Based on CPCB air quality data collected from <https://app.cpcbcr.com/ccrl>.

Mapping of SMOG days

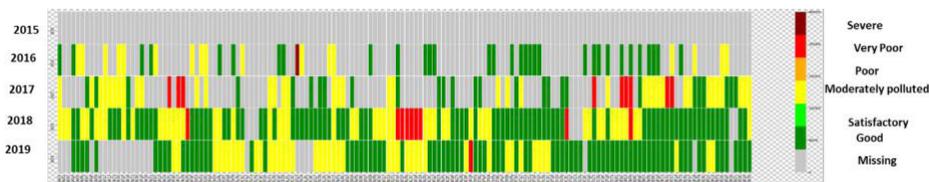
Graph 4: Categorization of PM10 based on AQI categories for winter in Haldia (01 October to 28 February) 2017–2019



Note: X-Axis represents dates of sampling.

Source: Based on CPCB air quality data collected from <https://app.cpcbcr.com/ccrl>.

Graph 5: Categorization of PM10 based on AQI categories for summer in Haldia (01 March to 04 September) 2016–2019



Note: X-Axis represents dates of sampling.

Source: Based on CPCB air quality data collected from <https://app.cpcbcr.com/ccrl>.

Once the short-term actions come 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.

Box 1: National Air Quality Index 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 (NAQI) 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 may be experienced even during light physical activity

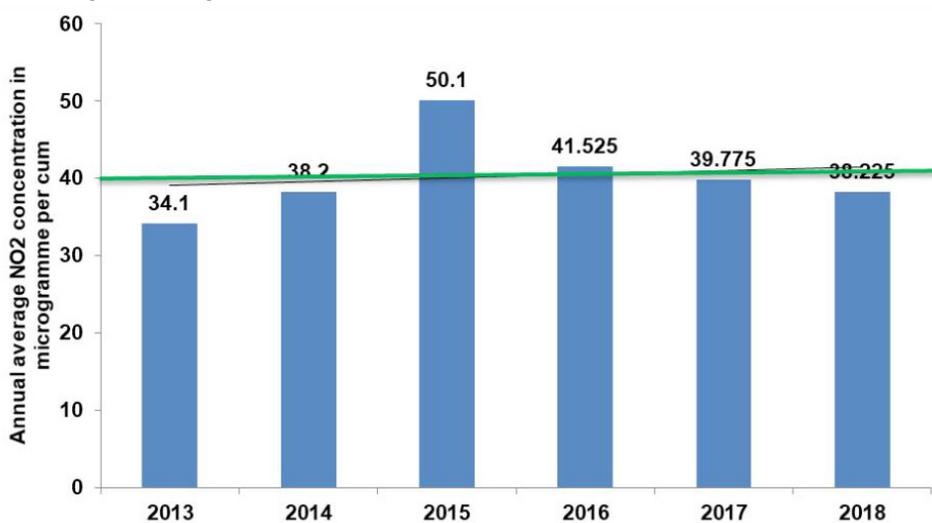
Source: Ministry of Environment and Forest and Climate Change

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.

Long-term annual average trend of NO₂ in Haldia

Data reported by WBPCB shows that the annual average nitrogen dioxide level is stable and is currently meeting the standards (see *Graph 6: Long-term trend in annual average NO₂ concentration in Haldia*). 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 another very harmful gas. NO₂ ambient concentration is currently below the standard.

Graph 6: Long-term trend in annual average NO₂ concentration in Haldia (2013–18)



Source: Based on the data provided by WBPCB from WBIIDC, Supermarket, Bhunia Raichak and Bhabanipur Stations

1.3 Public health evidence

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 have 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 are needed to avert public health emergencies stemming from exposure to high pollution levels.

2. Pollution source profile and baseline policy action

There is currently no official study on source apportionment and source inventory to bring greater precision in the assessment of the pollution profile of the city. Once these studies are carried out in the non-attainment cities, the action plan can be further modified/refined. The action plan therefore proposes detailed source apportionment and source inventory studies.

However, for the purpose of the preparation of this base plan a broad range of information on the gamut of sources in the city is available from the regional offices of the pollution control board and the field inspection.

Also, feedback was received from concerned regional offices of SPCB. This has helped to map out the key big sources of air pollution which are industries, vehicular emissions, road dust, construction activities, etc. 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.

2.1 Industry and power plants

The industries in Haldia belong to diverse fields like petrochemicals, chemicals, refineries, oil and gas, shipping agencies, power, etc. and the city also houses several major factories, including South Asian Petrochemicals Ltd, Indian Oil Corporation Limited (IOCL), Haldia Energy Limited, Exide, Shaw Wallace, Tata Chemicals, Haldia Petrochemicals, India Power Corporation Ltd, Hindustan Lever, Mitsubishi Chemical Corporations, S.J. Constructions and LTC & Co.; other major logistics companies are JAY ROAD CARRIERS which provides affordable logistics across all channels in India. The city has large resources of coal which is the main fuel used by the industries and rice husk is also used. There are three thermal power plants in and around the city. Pet coke is formed and manufactured in the city.

Different technologies are being used in the industry sector to curb the pollution such as electrostatic precipitator (ESP) and bag filters. Individual industries and industrial units will require mapping of the status and operation of the pollution control equipment and to decide their severity of further action. Such efforts are underway.

Industrial pollution control plan and schemes in the state and especially around the targeted non-attainment industrial cities have been framed around the requirements of the designated Critically Polluted areas. Haldia is such a designated Critically Polluted Area. The MoEF&CC through its Office Memorandum dated 13 January 2010 had directed respective SPCBs to prepare Action Plans for each of the Critically Polluted Areas for abatement of pollution. West Bengal Pollution Control Board has prepared separate Action Plan for Haldia area. Based on 'Implementation of Action Plan for critically polluted area (Haldia)' (prepared as of 2015) several action points have been identified and initiated for air pollution control. The plan identifies nine industries in red A category (17 sub-categories), 25 industries in red B category (54 sub-categories) and 90 industries are under orange and green category. WBPCB has taken elaborate action plan since 2010 along with development authority

and Municipal Corporation. This may not be an exhaustive list, however, more action points can be assessed for implementation after an evaluation of current status of implementation. Since Haldia is a Critically Polluted Area due to industrial pollution, this remains a reason for its non-attainment status of NAAQS. 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 with the industrial pollution is that though the end stack emissions can be controlled which also gets monitored through CEMS, the problem of fugitive emissions during the different processes such as handling, conveying and storage continue to persist. Further, quality control and adherence to standards during CEMS installation is important.

Emissions standards and siting/location 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 SO_x and NO_x standards that have been notified by the MoEF&CC for the 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, Howrah MC and Bardhaman district except at the Jamuria industrial estate. However, with adequate pollution abatement technologies/systems, red category industries can be set up outside the KMA and Bardhaman district.

Clean fuel strategy: 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, the dirty bottom of the barrel fuels like petroleum coke and fuel oil, etc. are widely used. In smaller units unregulated fuels like tyre oil, etc. are used. The WBPCB is considering a switch to cleaner fuels like oil or gas to reduce particulate emission load from industrial operations. Some of the industries in the city have already begun using coalbed methane but continuous supply remains a challenge. 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 an incentive policy to make a supply plan and infrastructure for cleaner fuels. Adoption of a favourable taxation and pricing policy to make cleaner fuels competitive vis-a-vis the dirty fuels will aid a gradual shift to 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 may be leveraged to promote their usage in the industrial sector as much as possible with a proper pricing and regulatory policy. Industries using 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 oil like recycled oil, tyre oil, etc. causing enormous toxic pollution. Therefore, a 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 SO_x and NO_x 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 of sulphur respectively. Current transport fuels have 50 ppm sulphur that 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 SO_x and contribute to 'secondary' particulate load. High-sulphur fuels also contain heavy metals, which adds to the toxicity and contamination of the environment. The Supreme Court of India vide order of 24 October 2017 has banned use and sale of petroleum, coke and fuel oil in Haryana, Rajasthan and Uttar Pradesh. Delhi had banned these fuels in 1998.

Table 4: Major Industries in Haldia

Sr. no.	Name of industry	Product
1.	Indian Oil Corporation Ltd., Haldia	L.P.G., Motor Gasoline, Naptha, ATF, MTO, HSD, JBO
		Kerosene, Furnace Oil, Lubes, Bitumen
2.	KoPT/Haldia Dock Complex	Port Services
3.	Tata Chemicals Ltd., Haldia	Industrial phosphate and acids
4.	Exide Industries Ltd., Haldia	Automotive Batteries, Heavy Duty Batteries, Containers
		Special Types of Separators, etc.
5.	Swal Corporation Ltd., Haldia	DimethanateFenithrothion, Ethion, Malathion
6.	MCC PTA India Corpn. Pvt. Ltd., Haldia	P.T.A.
7.	Haldia Petrochemicals Ltd., Haldia	LLDPE, HDPE, Naptha Cracker, etc.
8.	IOCL, Paradip-Haldia Oil Pipeline	Petroleum Storage & Transportation
9.	IOC Petronas Ltd., Haldia	L.P.G
10.	Shamonspat Ltd.	Steel Rolling
11.	Dhunseri Petrochem & Tea Ltd.	PET Resin
12.	Greenways Shipping Agencies Pvt. Ltd.,	Containers Freight Station (CFS)
13.	IOC Ltd., Haldia	Petroleum Storage
14.	Hindustan Petroleum Corporation Ltd.	Petroleum and allied products
15.	Bharat Petroleum Corporation Ltd., Haldia	Petroleum and allied products.
16.	Hindustan Unilever Limited.	Detergents
17.	Marcus Oils & Chemical Pvt. Ltd.	Polyehylene Waxes
18.	Ruchi Soya Industries Ltd.	Edible Oil
19.	Manaksia Ltd.	Aluminum and steel
20.	Sanjana Cryogenic Storages Ltd	Ammonia Storage and handling terminal

Sr. no.	Name of industry	Product
21.	R.D.B. Rasayans Ltd	PP Jumbo Bag and Small Bag
22.	Reliance Industries Limited	Storage & handling Petroleum product
23.	Adani Wilmar Ltd	Edible Oil Refinery
24.	Electrosteel Castings Ltd	Coke Oven Plant, sponge iron plant, power plant
25.	URAL India Ltd	Automobile
26.	K.S. Oils Ltd	Edible Oil Refinery
27.	DPM Net Pvt. Ltd	Fishing net
28.	Hooghly Met Coke & Power Co. Ltd	Coke Oven Plant
29.	Ruchi Infrastructure Pvt. Ltd	3RD Party liquid storage tank terminal

Source: Haldia Development Authority³

Map 1: Location of thermal power plants in West Bengal



Technology roadmap for the industries in Haldia: A literature review was done to see which are the best air pollution control technologies being used in India as well as globally. Since a majority of the industries are a part of the petrochemical sector, details about the exact processes are required to propose solutions.

Table 5: Best available technology for abating pollution levels in industries: general guidance

Sr. no.	Industry type	Existing technology/process and emission challenges	Strategies for improvement	
			Suggested immediate changes	International BAT (long-term)
1.	Iron and steel (involving processing from ore / integrated steel plants) and or sponge iron units	Installation of coke dry quenching (CDQ); installation of top gas recovery turbine (TRT); introduction of coal dust injection (CDI); waste heat recovery in sinter plant; waste heat recovery at blast furnace stove and use of byproduct fuel for power generation; installation of dolomite plant-dust extraction system (FD cooler and bag filter); use of twin hearth furnace; use of water tower ESP (wet) and ESP (dry)	Direct Reduction Electric Arc Furnace and Pulverized coal injection method	Direct Reduction Iron-making (DRI)
2.	Ferrous and non-ferrous metal extraction >1 MT/hr involving different furnaces through melting, refining, reprocessing, casting and alloy making and including metal extraction	Nothing specific, each industry may have specific processes. Most coal fired boilers have been converted to oil/gas fired driers, preferably with coalbed methane (CBM)	More data/information needed on type of metal being extracted	Generic Process include: Boliden Norzink process for mercury removal, selenium filter, activated carbon, Jeritt Process for removal of other HAPs
3.	Coke making, liquefaction, coal tar distillation or fuel gas making	Most coal fired boilers have been converted to oil/gas fired driers, preferably with coalbed methane	Switch to Coke Dry Quenching System (CDQ), already used by Tata Steel	The Kress Indirect Dry Cooling (KIDC), inert gas blanketing
4.	Cement	Bag filter with ball mill and cyclone separator with coal- fired slag drier	Rotary dry-process kilns, use of alternative fuel such as biomass, refuse derived fuel (RDF), use of additive materials such as fly ash / blast furnace as clinkers	Use of alternative fuel such as rice husk, utilization of red mud as alternative fuel, etc. Consider development of limestone based cement and low carbon cement as a possible long term strategy
5.	Ceramic, refractories having coal consumption >=12 MT / day	Wet scrubber with coal fired DD Kilns furnace. Refractory manufacturing units have switched over to new generation producer gas- fired shuttle kiln, tunnel kiln or push-bat kiln which are much more fuel-efficient kilns for environment friendly operations	Shift to natural gas or CBM, maintain power factor at 0.99, Replacement of Existing Standard Efficiency Motors by Energy Efficient Motors, Install automatic air-fuel ratio system in kiln	Use of spray drying, reduce channelled emissions from hot off-gases by applying electrostatic precipitators or wet dust separators, applying flue-gas cleaning with a fabric filter and spray glazing

Sr. no.	Industry type	Existing technology/process and emission challenges	Strategies for improvement	
			Suggested immediate changes	International BAT (long-term)
6	Steel and steel products using various furnaces like blast furnaces/open hearth furnace/induction furnace/arc furnace/submerged arc furnace/basic oxygen furnace [industries attracting EIA (Notification) 2006 as amended]	Similar to iron and steel (involving processing from ore / integrated steel plants) and or sponge iron units		
7.	Aluminium Smelter	More data/information needed	Control of fluorides by using dry scrubbing system for the smelter gases, controlling pollution and also recycling the fluorides thus affecting economy in the consumption of cryolite and aluminium fluoride.	Use of inert electrodes; Use of wetted cathodes; Multipolar cells; carbothermic reduction; Kaolinite Reduction; Low-Temperature Reduction; Use of Ionic liquids
8.	Industry or process involving foundry operations (foundries having capacity >=5 MT/hr and requiring coal / coke consumption >=500 kg/hr)	Nothing specific, Coal fired boilers have been converted to Oil/Gas fired drier, primarily using CBM	Use of Cupola furnace in place of Induction furnace; Installation of automatic air flow controller/flue gas monitoring to check excess air: Replace conventional cupola with Divided blast cupola; Install LEDs/ magnetic lamps in place of conventional lights.	Use of enclosed conveyors, Use of induction furnaces, use of Cupola furnaces, and direct oxygen induction.
9.	Power generation plant (including Waste to Energy plants >15 MW capacity which attract provisions of EIA Notification, 2006 as amended) [except Wind and Solar renewable power plants of all capacities and Mini Hydel power plant of capacity<25 MW] (Other than Thermal Power Plants)	More data/information needed	More data/information needed on each type of plant to suggest suitable interventions	More data/information needed on each type of plant to suggest suitable interventions

Sr. no.	Industry type	Existing technology/process and emission challenges	Strategies for improvement	
			Suggested immediate changes	International BAT (long-term)
10.	Industrial inorganic gases processing units namely: a) Chemical gases: acetylene, hydrogen, chlorine, fluorine, ammonia, sulphur dioxide, ethylene, hydrogen sulphide, phosphine [filling/refilling of CO2 gas]; b) Hydrocarbon gases: methane, ethane, propane	More data/information needed	Use of bag filters, as recommended by CPCB	More data/information needed on each type of plant to suggest suitable interventions as each gas has multiple optimum processes
11.	Manufacturing of glass (bulb, lamp, optical lens, etc.) using coal / wood fired kiln including manufacturing of lead glass	Installation of wet scrubber with producer gas plant. Coal fired boilers have been converted to Oil/Gas fired drier (preferably with CBM which is available within accessible distance).	Use of wet scrubbers and fabric filters. National Glass Works, Asansol has installed producer gas based regenerative furnace which is less polluting and enhances fuel efficiency; may be replicated across other units.	Low loss vacuum pumps, e.g., dry vacuum pumps; Totally enclosed belt conveyors; enclosed forming chambers; use of granular raw materials preferred to fine powders; use of baghouses, venturi scrubbers, ESPs
12.	Any industry / industrial activity (irrespective of category), having solid fuel fired boiler / Thermic Fluid Heater (TFH) irrespective of capacity or oil / gas fired boiler >5 TPH	Coal fired boilers have been converted to Oil/Gas fired drier. (Preferably with CBM which is available within accessible distance).	More granular data/information needed on nature of industries to suggest strategies	More granular data/information needed on nature of industries to suggest BATs
13.	Manufacturing of lubricating oils, grease and petroleum based products	More data/information needed	More data/information needed	More data/information needed
14.	Manufacturing of explosives, detonators, fuses including management and handling activities [including manufacturing of safety match]	More data/information needed on present interventions	Specific Industry EHS Standards	More data/information needed to suggest BATs
15.	Basic chemicals and electro chemicals and its derivatives including manufacturing of acid	More data/information needed on present interventions	Specific Industry EHS Standards	More data/information needed to suggest BATs

Sr. no.	Industry type	Existing technology/process and emission challenges	Strategies for improvement	
			Suggested immediate changes	International BAT (long-term)
16.	Saw mills	More data/information needed on present interventions	Use of cyclones and bag filters to collect fine particulates. The sawdust storage bin or hopper discharge bay to be enclosed on three sides, and a flexible plastic or canvas chute attached to the discharge outlet to prevent unnecessary free fall of the dust into the storage bay. No open burning of wood wastes and residues is allowed.	Buffalo Turbine debris blower, use of fluid/atomized mist for airborne dust suppression, use of cyclones and bag filters to collect fine particulates. Use of solar kiln dryers.
17.	Wire drawing and wire netting [including bailing straps, wire drawing by cold process only]	More data/information needed on present interventions	More data/information needed	More data/information needed
18.	Thermal Power Plants	More data/information needed on present interventions	Standard Industry EHS guidelines	More data/information needed
19.	Forging of ferrous and non-ferrous metal (using oil or gas fired furnaces)	Nothing specific, coal fired boilers to be converted to Oil/ Gas fired drier (preferably with CBM which is available within accessible distance).	More data/information needed as there are techniques for different steps and for different metals	More data/information needed as there are techniques for different steps and for different metals
20.	Rolling mill (gas fired) and cold rolling mill	More data/information needed on present interventions	Pickling of carbon steels, Modification of choice of acid as hydrochloric acid gives rise to only about ¼ of the quantity compared to sulphuric acid, which is reported to be still more commonly used	Use of mechanical mist eliminators, packed scrubber for absorptive gas cleaning , lowering bath temperature during pickling

Several policy measures have been initiated to address industrial pollution.

Thus, the baseline policy action includes:

- **Stricter location policy** for new industrial units and restriction on setting up of red category industries in municipal area of Kolkata Metropolitan Area and Bardhaman district except Jamuria industrial estate. But with adequate pollution abatement technologies/systems, red category industries can be set up outside the KMA and Bardhaman 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 in cities for commercial and industrial application. Incentivize renewable energy practitioners with tax incentives, single window clearances, etc, to add to the long-term cost effectiveness of solar energy. Rooftop and community based solar devices to be encouraged, as envisaged in West Bengal Renewable Energy Policy.
- **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'.
- **Promote use of LPG in small industries:** As per data received from West Bengal Industrial Development Cooperation, a total of 20,180 domestic LPG connections were issued as of October 2019 by Hindustan Petroleum Cooperation Limited in Haldia. This is a welcome move and small-scale units in Haldia should also be encouraged to use LPG wherever feasible. Exemption of registration fees may be given after discussions with HPCL.
- **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. Further, quality control and adherence to standards during CEMS installation is important.
- **Enforcement of new NOx and SOx standards in the industry:** MoEF&CC 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 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 stack monitoring facility to all stacks with boilers in accordance with the order.
- **Data reporting and storage:** A comprehensive and lucid data recording and 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. For Haldia,

a specific questionnaire may be prepared for the petrochemical hub after discussion with stakeholders.

Table 6: Generic Guidance to Reduce Fugitive Emissions from Key Industries in West Bengal

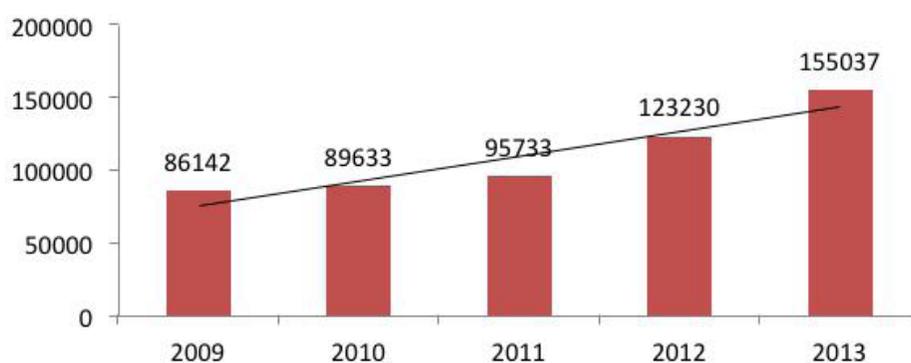
Sr. no.	Industry type	Key sources of fugitive emissions	Suggested strategies for reduction
1.	Cement	Limestone and coal crushers, vents and tunnels in raw mill and coal mill sections, clinker silo vents, vents in clinker silos, surge bins and cement silos. Packing machines (silos to cement bags). Non process emissions from roads, internal transfers, raw material stockpiles and product stockpiles.	Use of DSS, bag filters on all vents. All transfer points to be fully enclosed, windbreak walls or greenbelt on three sides of open stock piles. Dry fly ash to be transported by closed tankers. Fly ash to be removed immediately after drying. Provisions for dust extraction arrangement for packing machines to be made. All silo vents to be provided with a bag filter type system to vent out the air borne fines. All roads on which vehicle movement of raw materials or products takes place to be paved. Use of mobile road cleaners and use of tarpaulin covers for open stock piles to be made mandatory.
2.	Parboiled and regular rice mills (waste water generation ≥ 100 KLD or fuel ≥ 12 MTD or both)	Open storage bins, de-stoner machines, different stages of lifting and discharging of paddy /rice through bucket elevators, aspirators used for husk removal, boiler ash conveyance from boiler to trolley, uncovered and unprotected disposal sites, rice graders in the milling section, leakages in the ducts/flanges from boiler to stack.	Ash generated in furnace to be manually taken out in pits. Storage of rice husk only in closed areas. Cyclone cum bag-filters in pre-cleaning areas. Dust extraction systems for de-stoners, paddy weighing machines, paddy separator / huller and aspirators. Blowing of husk in storage areas to be done in a closed room. During transportation of husk through vehicles, it should be covered from all sides with tarpaulin to prevent wind blowing of husk. During loading & unloading of ash, water to be sprayed periodically to keep the ash heap in wet condition so that top layer remains wet thereby prevent blowing of ash particles due to wind. Mill location to be in line with CPCB guidelines (away from highways). The industry to carry out thick plantation of spreading crown trees all along the boundary wall of the plant. For large rice mills, a green belt of 3 m width shall be developed. For other rice mills, at least 2 rows of trees shall be developed along the boundary wall of plant.
3.	Iron & steel (involving processing from ore / integrated steel plants) and/or sponge iron units AND Steel and steel products using various furnaces like blast furnaces / open hearth furnace / induction furnace / arc furnace / submerged arc furnace / basic oxygen furnace [industries attracting EIA (Notification) 2006 as amended]	Loading/unloading of granular raw materials, leakage from coke oven battery doors, lids and gas off-takes, pushing of coke, quenching of coke, crushing and screening of slag, tapping of molten metal and slag, charging of furnace, pressure relief devices in gas/ vapour service.	Use of hoods and enclosure for all process equipment, use of covered or enclosed conveyors and transfer points, hooding of emission controls of the blast furnace tapping operations and discharge of molten metal and slag, covering of ladles containing molten metal, Scrap Management Program for the prevention or minimization of contaminants in steel scrap and other feed materials, enclosures for emission controls of the charging and tapping operations. Minimizing the number of flanges by welding piping connections wherever possible and using appropriate sealing for flanges and valves, wet quenching of coke as opposed to conventional quenching, use of larger oven chambers and regulation of pressure within oven chambers.

2.2 Vehicles and mobility

Vehicle registration growth and motorization

Due to the lack of vehicle registration data at the municipality level, Purbi Medinapur district average for vehicular growth has been taken into consideration. The vehicle registration growth rate of the district observed in the year 2012–13 is 25.8% which is higher compared to other district in West Bengal viz. Howrah (12.8%), North 24 Parganas (16.26%) and, Pashchim Burdwan (3.76%).

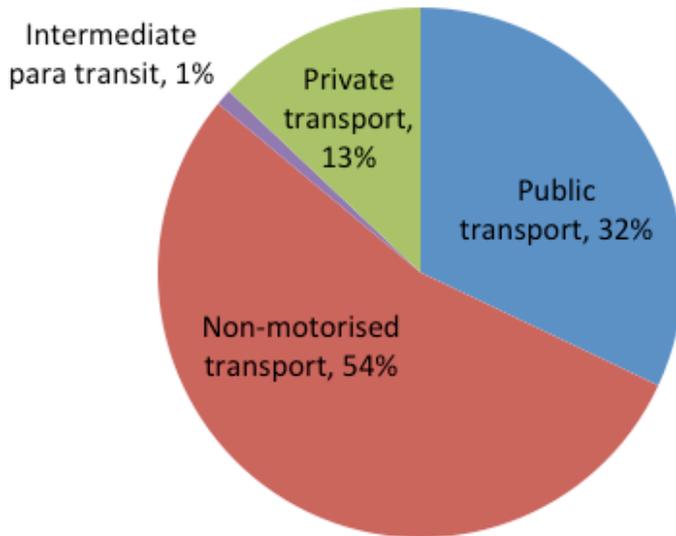
Graph 7: Vehicle registration growth



Source: Statistical handbook 2013, Department of Planning & Statistics, Government of West Bengal

Trip pattern: Due to the absence of modal share at the municipality level, Purbi Medinapur district average has been taken into consideration. From Graph 8, it can be inferred that NMT and public transport are predominant mode of transport followed by private and Intermediate Para Transit (IPT).

Further narrowing into Old Haldia Planning area of which Haldia municipality is a part, walking and cycling are also the predominant mode of transport for different trip purposes such as workplace, school, market, health facilities, etc. Out of overall trips, work, education, recreation and access to bus stop shows highest concentration ranging within 1–2 km, followed by health trips within range of 2–5 km and access to rail station within range of 5–10 km. The amount of daily expenditure for travel is minimal or zero as majority of trips are performed by walk or cycle.

Graph 8: Modal share of Purba Medinapur district

Source: Statistical Handbook 2013, Department of Planning and Statistics, Government of West Bengal

Public transport and Intermediate Para Transit (IPT)

According to the Annual Report 2018–19 of South Bengal State Transport Corporation (SBSTC), out of the total bus fleet 50 buses have been earmarked to pass through Haldia and out of which 47 buses run daily on road and have covered an effective km of 43.4 lakhs.

Everyday from 5.00 am to 9.30 pm, local and super-fast buses are available from Kukrahati to Township, Haldia via Chaitanyapur, Sutahata, Manjushree and Durgahak. Super-fast government and private buses are also available from Haldia Township to Mecheda via Ranichak, Brajalchak, Kapasberia, Nandakumar, Neemtouri, Radhamoni by which tourists reach prime location in minimum time.

Haldia central bus stand and Kukrahati bus stand are the bus stands in Haldia. The former is located within Haldia Post Township area and the latter is located adjacent to Kukrahati jetty facility. A new regional level bus terminal facility of five acres has been proposed by the Haldia Development Authority at Bhabanipur near City Centre and adjacent to NH-41. Out of the five acres of land 2.5 acres of land is being allotted to South Bengal State Transport Corporation for their depot.

A large volume of passenger movement takes place via ferry transit services in Haldia. The catchment area which is being catered by the ferry transit movement include Howrah, Kolkata, southern parts of Kolkata Metropolitan Area, South 24-Parganas, Nandigram and other parts in Purba Medinipur.

Road accidents and road safety

According to the Superintendent of Police, Purba Medinipur, the number of road accidents in Purba Medinipur district has increased from 579 in 2010 to 729 in 2013.

Urban mobility issues

Traffic congestion is a major problem in Haldia municipality due to tremendous growth of vehicles. It occurs mostly on narrow roads during peak hours of the day (i.e. 10–11 am and 5–6 pm) at places such as near bus stands, schools, colleges and different offices. The problem of traffic congestion is further catalyzed because of the haphazard on-street parking of vehicles especially motor cycles and bicycles. Despite larger share of walk and cycles trips for various trip purposes, the municipality lacks proper non-motorized transport (NMT) infrastructure.

In Purba Medinipur district, there is co-existence of both the public and private transportation. The existing public transport system is in very poor condition; hence, people have to depend on private transport.

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 only 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 aging 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. 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. Subsequently, tighter PUC norms for BS VI vehicles have also been notified.

At the national level under the direction of the Supreme Court order, the Ministry of Road Transport and Highways is setting up the system to link PUC certificate with the annual vehicle insurance to ensure full compliance with the programme. Such methods and more are needed at the state level to ensure that everyone turns up for the PUC tests.

Since the PUC centres are decentralized and limited, they need frequent inspections and robust audit programmes 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: The city needs 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 and repair. This needs to be implemented in PUC centres immediately. In addition, this system can be further upgraded in PUC centres to check if the OBD itself is functioning properly or has been tampered with. The OBD in vehicles has 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, as is being discussed in Delhi, 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: Another area of intervention is the heavy duty truck movement through cities that can contribute hugely to the urban pollution. Usually, cities restrict truck movement during the day and allow them to pass through or do loading and unloading during night. But explicit interventions are needed to design highway alignment in a way that they bypass the highly populated cities and do not cut across them. 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: Currently, cities in West Bengal except Kolkata do not have age restriction on vehicles. Vehicles more than 15 years of age are not prohibited from plying within cities. After crossing the 15 years registration time frame, these vehicles are not removed and instead 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. However, 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

Since 2007, the Haldia municipality has given contract to Ramky for managing the waste in the city. The municipality reports that approximately 80 MT per day of solid waste is generated in the city. There is one scientific landfill and composting site in the city at Purba Srikishanpur which will last for 30 years.

Any instance of natural burning on the landfill site is reported to the municipal corporation. Open burning of waste is minimum 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 also 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 bio-gas 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. Construction and demolition (C&D) waste

With the construction boom and on-going urbanization, generation of construction and demolition waste is on the rise in Haldia but there is no scientific estimate of the quantum. All the waste is either reused or directly dumped at the Purba Srikishanpur landfill site. State policy on Construction and Demolition waste management is under preparation as per C&D Guideline 2016.

2.6 Suspended road dust

Unpaved and dug up roads, and suspension of dust due to vehicular movement are a significant source of particulate matter in Haldia municipality.

As far as the baseline policy action is concerned, urban local bodies have an ongoing programme of street and pavement development. But these will

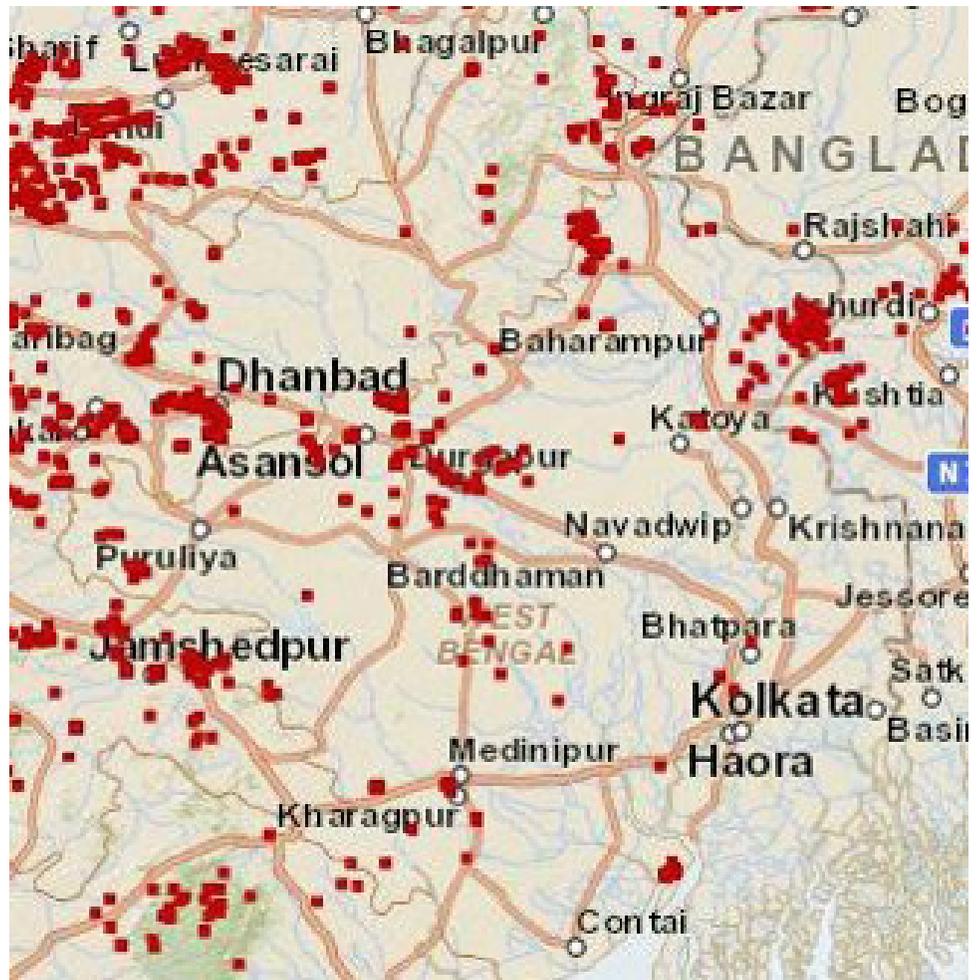
have to be made more holistic and widely implementable in terms of paving, street-scaping, vegetative barriers and manual and mechanical road sweeping without compromising the pedestrian and vehicular movement. The street design guidelines can holistically help to address these co-benefits. However,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

2.7 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 fires in West Bengal in the months of October and April. While fires in March–May may be attributed to seasonal changes, as well as to naturally occurring forest fires, the same cannot be said for fires in October and April. 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.

The following snapshot showcases the cumulative fire incidences/spots during October 2018.



PART II

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

Comprehensive Clean Air Plan (CAP)

Against the backdrop of the challenges outlined in each sector, this pollution source-wise comprehensive action plan has been developed for industrial town of Haldia. 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 overtime. 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 Haldia 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	As per the IS:5182 (Part 14), 2000 on Recommended minimum number of stations population-wise (Also mentioned in Guidelines for Ambient Air Quality Monitoring, CPCB, 200329), Haldia does fulfil the criteria of minimum number of real-time monitoring station (one) as well as four manual monitoring stations (according to Census 2011, the population of Haldia municipality is 2,00,827). All twelve pollutants to be monitored for Haldia, special focus is needed on PM2.5 and ozone monitoring. Use air quality sensors at probable hotspots to complement air-quality monitoring (based on CPCB/MoEF&CC guidelines).	Nodal agency: WBPCB, supported by CPCB	6-12 months	1.5 crore for replacement of existing old CAAQMS by new one
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/forest fires, regional pollution, etc. that have impact on urban air quality. At present only traditional methods are used and they need to be upgraded.	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 dates and support from MOES, IMD, and IITM, Pune. Programs like SAFAR may be expanded for the city.	MOES, IMD, Department of Environment, WBPCB supported by CPCB, and IITM, Pune,	18 months	To be finalized
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 the SPCB website and local media. The SPCB website is to be updated regularly.	WBPCB, CPCB, IMD	1 year	Regular activity
1.5	To conduct a source apportionment and emission inventory study, to capture source-wise contribution and seasonal variations in source contribution., also to assess regional impacts by setting up a mechanism to assess trans-boundary emissions. The carrying capacity measurements are to be carried out as well. The WBPCB is to select a relevant institution to commission the study.	WBPCB and Department of Environment	18 months	3 crore

Sr. no.	Action points	Agency responsible	Timeline	Financial outlay
1.6	The National Clean Air Programme (NCAP) from the MoEF&CC has recommended rural air quality monitoring. Adopt air shed approach towards monitoring to address rural and peri-urban air quality and influence area.	WBPCB & CPCB	2 years	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 for area specific action.	WBPCB & CPCB	1 year	To be finalized
Long-term action				
1.8	Research studies including detailed emission inventories and source apportionment, health impact studies, exposure impacts, carrying capacity assessment of airshed 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, WB 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
Short-term priority action			
2.1	Implement SOx and NOx standards notified by MOEF&CC on January 29, 2018 for 16 categories of industries in and around the city. Ensure compliance through regular testing & CEMS enabled monitoring. Identify the units that need to implement new standards.	WBPCB	6 months
2.2	Implement existing standards for PM and ensure compliance through regular testing & CEMS enabled monitoring. Also take precautions for minimizing fugitive emissions through the preparation of a checklist for industrial zones and units, and regular inspection based on field survey and inventory exercise.	WBPCB, Department of Commerce, Industries and Enterprises, MSME	3 months
2.3	Explore the scope of having a clean fuel policy and provide incentives for clean fuels for the state. Identification of approved and non-approved fuels. Promotion of relatively cleaner fuels like gas 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). Assessment of need for a favourable taxation and pricing policy to make cleaner fuels more competitive, as currently there are no restrictions on fuels. Incentivize replacement of boilers and switch to cleaner fuels. Clean fuel strategy needed for smaller units that have no emission control measures.	WBPCB, Department of Commerce, Industries and Enterprises, MSME	6 months
2.4	<p>Identify the units that need to install CEMS. Implement CEMS across all targeted and applicable polluting industries.</p> <p>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.</p> <p>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.</p> <p>Compliance checking to be enforced routinely to prevent tampering with CEMS.</p> <p>This needs to be done for industrial sectors including petrochemicals, sponge iron and cement units, iron and steel industries and jute and rice mills.</p>	WBPCB, Department of Commerce, Industries and Enterprises, MSME	6 months
2.5	Identification of cumulative impact of industrial emissions and prescription of more stringent pollution control action for industries. Units which have high load should have industry specific upgradation in technology, emission control system and switch to clean fuels (as mentioned in BAT section).	WBPCB, Department of Commerce, Industries and Enterprises, 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. Hold quarterly inspections for the same.	WBPCB, Department of Commerce, Industries and Enterprises, MSME	6 months
2.7	Enforce restrictions on operations of intensively polluting industries within urban airshed zones during high pollution periods. Check for the status of Air Pollution Control Devices for these units.	WBPCB, Department of Commerce, Industries and Enterprises, MSME	6 months

Sr. no.	Action points	Agency responsible	Timeline
Medium-term action			
2.8	Strengthen the current siting policy for industries to be notified in future, in order to address city-wide air quality issues. Further restrict expansion and diversification of polluting units. Enforce the current siting policy with utmost stringency.	WBPCB, Department of Commerce, Industries and Enterprises, MSME	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 Enterprises, MSME	1 year
2.10	Strengthen the current siting policy for industries to address area-wise air quality problems. Restrict expansion and diversification of old polluting units that are near residential areas until robust pollution control devices have been installed and are routinely inspected.	WBPCB, Department of ICE and MSME	1 year
2.11	Training and awareness program for onsite emergency preparedness and environmental issues for industrial workers.	WBPCB, Department of ICE and MSME	1 year
2.12	Construction of paved roads around all major industrial estates. Installation of dust suppression system. Provision for water sprinkling and dust mitigation. Till date HDA has constructed 15 km of industrial paved road within the Municipality area and work for paving of 14 km road is in progress.	WBPCB, Department of ICE and MSME, HDA, Haldia Municipality.	1 year
2.13	Development of adequate green belt around all major industrial estates by planting at least 1000 saplings. Local Industries have been requested for plantation and an area of 5000 sqm plantation has been covered by them. HDA has invited tender for plantation of 5000 saplings including its maintenance for 1 year.	WBPCB, Department of ICE and MSME, HDA	1 year
2.14	Inspection of bag filters wherever installed, replacement of older bag filters and overhauling of ESPs when applicable.	WBPCB, Department of ICE and MSME, HDA	1 year
2.15	Specific for petrochemical units: Installation of new desulphurization units, old heaters and burners to be replaced with low NOx burners, natural gas to be used as fuel in heaters to reduce stack emission.	WBPCB, Department of ICE, petrochemical companies operating in the area	1-2 years

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 zigzag 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 Enterprises, MSME	6 months
3.2	Explore the scope of relocation of all hot-mix plants to areas outside municipal boundaries. Shut down small and mobile hot-mix plants.	Haldia MC, WB PWD, NHAI and other road operating agencies	Immediately
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 Enterprises, 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 Enterprises, MSME	1 year
3.5	Remove stone crushers that are close to the city; adopt stringent dust control measures and greening.	Department of Commerce, Industries and Enterprises, MSME, WBPCB	1 year
3.6	Establish a protocol for using cleaner fuels & technology for asphalt mixing and minimizing the number of hot-mix plants.	MoRTH, MoEF&CC, AMC, WB PWD, NHAI and other road operating agencies	2 years

4. ACTION TO REDUCE VEHICULAR EMISSIONS

Sr. no.	Action points	Agency responsible	Timeline
Medium-term action			
4.1	<p>Emission And Fuel Quality For New Vehicles</p> <p>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. Fully prepare to comply with the order of Hon'ble Apex Court.</p>	Transport department	Immediately
4.2	ALTERNATIVE CLEAN FUEL POLICY FOR VEHICLES		
Medium-term action			
4.2.1	<p>Expand gaseous fuel programme: Move auto rickshaws and local taxis to gaseous fuels. Replace diesel three wheeler & taxi fleets with fleet using gaseous fuels such as LPG. Expand gaseous fuel refuelling infrastructure for delivery and use. Around 200 LPG driven auto rickshaws operate in Haldia city. Depending on the availability of CNG, attempts will be made to target buses.</p>	Transport department, Department of Energy, MoPNG	1-2 years
4.2.2	<p>Target medium and short-term goals for electrification of new vehicles fleet in specific segments using a mixture of mandates and subsidies. Also align with state level electric vehicle policy as and when available, e.g.:</p> <ul style="list-style-type: none"> • 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. • Provision of additional state subsidy for procurement of commercial electric vehicles. • 100 per cent exemption of duty/tax on electricity tariff for an initial period of 5 years for EV manufacturers (vehicle and battery). • Encourage retrofitting of auto-rickshaws to EV IPT. • 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. • Plan infrastructure and institutional framework for used battery processing, re-use, recycling and disposal. • Introduce mandate-based incentives in the form of lower road taxes, motor vehicle taxes and registration charges, preferential licensing and permit system, modification of building bylaws, creation of low emissions zones, special parking provision, etc. • Introduce provision for parking minimum in bylaws for new development to encourage EV adoption amongst user; subject to change in accordance with relevant future Government EV policy. • 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. • Designated parking spaces for commercial electric vehicles with exempted parking fees for EVs. • Legalize domestic charging of e-rickshaws: to control power theft due to illegal charging and eradicate informal proliferation of units. • Build on the policies of the central government—NEMMP. <p>FAME to make West Bengal a hub for electric mobility.</p> <p>Under FAME-II electric buses are to be introduced in the city within the next one year. To facilitate 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.</p>	Transport department, Department of Power & NES, DHI, NITI Aayog	1 year

Sr. no.	Action points	Agency responsible	Timeline
4.2.3	Exploring 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
4.3.4	Introduce favourable fiscal measures to promote clean fuels and vehicles and zero emissions vehicles.	Department of Transport, ICE and Finance	1 year
4.4	EMISSION CONTROL MEASURES FROM ON-ROAD VEHICLES		
Short-term priority action			
4.4.1	Plan and implement adequate number of PUC centres for emissions testing of on-road vehicles. Strengthen periodic auditing and oversight of PUC centres and calibration of equipment and third party checks. At present 12 PUC centres are operational in Haldia City.	MoRTH, Transport Department	6 months to 1 year
4.4.2	Link PUC certificates with mandatory third-party insurance for vehicles to ensure 100 per cent compliance or any other method. Develop a mechanism for ensuring that no vehicle is allowed to ply without valid PUC certificate. Ensure real-time updates for all WB registered vehicles with the VAHAN database for compliance. Any kind of transaction with respect to the motor vehicle done in e-Vahan is allowed only if the third party insurance is complied with.	Transport Department, MoRTH	Immediately
Medium-term action			
4.4.3	Improve and enforce PUC programme: Universal linking of PUC centres with remote server that has been carried out to eliminate manual intervention in PUC testing to be used to further strengthen the programme. This has been in effect since April 2019. Implement testing of all notified emissions parameters including Lambda testing for petrol cars as notified by MoRTH in 2004. Also upgrade the PUC norms for BS VI vehicles in all PUC centres.	Transport Department	Immediately
4.4.4	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
4.4.5	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; 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 a 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 for preparedness for BS VI.	Transport Department	6 months to 1 year
4.4.6	Enforcement against visibly polluting vehicles: remove them from road, impose penalty, and launch extensive awareness drive against polluting vehicles.	Transport Department, Traffic Police	1 year
4.4.7	Set up modern centralized vehicle inspection centres for upgraded emissions, fitness and road worthiness tests for commercial vehicles and diesel vehicles. One pilot project is under advanced stages of development at Behala, Kolkata. It is contemplated to develop another such automated vehicle testing centre at Nilgunge, Haldia and in Durgapur SBSTC premises. Create similar facility to cater to Haldia.	Transport Department, MoRTH	1 year

Sr. no.	Action points	Agency responsible	Timeline
4.5	Phase out old vehicles and vehicle 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.	Transport Department, MoRTH, CPCB	1 year
4.6	Vehicle labelling or sticker programme: The July 26, 2018 directive of the Supreme Court has approved the MoRTH's Colour Coded HSRP Hologram Stickers. This programme to come into effect on 1 April 2019, across the country, will require each vehicle, both old and new, to be provided with colour coded non-tamperable High Security Stickers, along with the number plates. At a later date, older and polluting vehicles may be discouraged in city centres or earmarked low emissions zones by using these stickers for identification of vehicles. The process of fitment and retro fitment of color coded High Security Number Plate (HSRP) with Hologram Stickers and tamper proof is being implemented since 1st April, 2016. Align this action with notification from the Ministry of Road transport and Highways as and when they become available.	Transport Department, MoRTH, CPCB	As per MoRTH notification
Short-term action			
4.7.1	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, e.g. Urban Local Bodies	Within 6 month
4.7.2	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.	PWD, NHAI	Within 6 months
4.7.3	Introduce age and emission standards-based restrictions on the operations of commercial vehicles within the city. Install procedures and monitoring equipment to ensure better quality and more efficient vehicles operate on the roads.	NHAI, District and local administration	Within 6 months
4.7.4	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 within KMA area.	District and local administration, Transport Department, Traffic Police	Within 6 months
4.7.5	Create management systems for loading and unloading of goods in city areas. At present, there are a few existing major loading and unloading places in the city.	District and local administration, Transport Department	6 months
4.7.6	Ensure fitness and road worthiness of trucks and compliance to set standards is adopted and enforced. Important for industrial cities. Central Motor Vehicles Rules have specified Safe Axle Weight and Gross Vehicle Weight for different make and model of Goods Vehicles. Carriage of loads in excess of permissible ceiling comes under an enforceable offence.	Transport Department,	6 months
Medium to long term action			
4.7.7	Promote high capacity trucks for long-distance freight transport of mining material instead of smaller trucks.	NHAI, District and local administration	Within 6 months
4.7.8	Diversion of truck traffic: Check feasibility of diversion of non-destined trucks into the city. Alternate routes need to be identified and improved to ensure that non-destined commercial traffic does not enter the city.	District and local administration, Transport Department Traffic Police	Within 6 months

Sr. no.	Action points	Agency responsible	Timeline
4.7.9	Radio frequency identification tag (RFID) based toll or entry tax collection: install RFID based toll collection system and also link it with VAHAN database. This will enable lesser congestion at toll gates. By using this technology vehicle identification by vintage, emission norm compliance, etc. will also be easier. Development Authorities 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.	District and local administration, Transport department, Traffic Police	1 year
4.7.10	Develop urban freight consolidation centers in relation to location of warehouses relative to suburban areas.	District and local administration, Transport department	1 year
4.7.11	Prepare a freight master plan: Prepare a detailed logistic plan which includes detailed assessment of freight connectivity, requirement of dedicated freight corridor and allied freight infrastructure such as logistic park/truck terminals, cold storage facilities, warehouses, etc.	Transport Department, Railways	1-3 years
4.8	Fuel quality testing to check adulteration: 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 need to be prepared in consultation with oil companies and ministry of petroleum and natural gas.	ICE/ MoPNG, Oil marketing companies	6 months
4.9	Install vapour recovery systems in fuel refuelling outlets to reduce benzene and VOC emissions in cities. CPCB has issued direction for installation of Stage I and Stage II vapor recovery system in all retail outlets with capacity 3000 kiloliter 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

5. URBAN MOBILITY

Sr. no.	Action points	Agency responsible	Timeline
5.1	PUBLIC TRANSPORT SYSTEM		
Short-term action			
5.1.1	Improve the existing public transport service infrastructure by installing Bus Queue Shelters and Bus Post sign as per appropriate guidelines.	WBTC, Haldia Municipality	6 months
Medium-to long-term action			
5.1.2	Strengthen the city bus services for connectivity to Haldia. Augmenting city bus services (frequency, routes, buses) through demand assessment and rationalization.	West Bengal Transport Corporation	18 months
5.1.3	Facilitating multi-modal integration at major transit locations to ensure smoother transition between modes. At present auto/e-rickshaws operate to provide last mile connectivity from nearest bus nodes, rail heads, etc. However, there is a need to identify a few transit modes in the city and organize the existing informal services by infrastructure integration (i.e. provision of spaces/bays/exact locations) for better movement.	Haldia Municipality, WBTC, NBSTC, Eastern Railway, Kolkata Metro Rail Corporation Ltd., RTO(PVD), Traffic Police	18 months
5.1.4	To strengthen and prioritize movement of public transport over other modes, Bus priority measures should be taken on major intersections. Intersections should be identified and the ones on major arterials should be prioritized earlier. Moreover major arterials roads with adequate available width should have bus priority lanes too.	Transport Department, WBTC, NBSTC, Traffic Police, Haldia Municipality	1 year
5.2	INTERMEDIATE PARA TRANSIT (IPT)		
Short-term action			
5.2.1	IPT in the region operates on route permit and fixed fares. There are earmarked parking arrangements at interchange points/major junctions. Additionally, 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, Haldia Municipality, RTO (PVD)	6 months
5.2.2	Facilitate IPT driver training, standard licensing procedures and safety measures in operation.	RTO (PVD), Transport Department, Traffic Police	6 months
5.2.3	Auto registration is allowed on compliance of latest emission standards. There should be training on importance of using unadulterated fuel, its effects and impacts on society as a part of registration and annual fitness checks.	RTO (PVD), Transport Department, Traffic Police	
5.2.4	E-rickshaw plying in the city should also follow standard process of registering, followed by driving training and safety in operation. At present there are 80 e-rickshaws in the city.	RTO, Transport, Traffic Police	6 months
Medium term action			
5.2.5	Prepare a policy framework for future IPT development, with specific consideration on regulating numbers of IPT modes, restricting vehicles more than 15 years old from plying and laying down detailed steps for diesel to electric conversion.	Development Authorities, RTO (PVD)	1-3 years
5.3	ADOPTION OF ELECTRIC MOBILITY		

Sr. no.	Action points	Agency responsible	Timeline
Short term action			
5.3.1	Prepare an incentive based (financial) electric rickshaw/auto/taxi scheme for the quicker adoption of electric mobility in the city.	DEVELOPMENT AUTHORITIES, Transport Department, RTO (PVD)	6-12 months
5.3.2	Promote e-rickshaws and electric auto-rickshaws as feeder services to the bus services to facilitate first and last mile connectivity by: <ul style="list-style-type: none"> - Provision of parking/ terminal points, etc. - Faster registration process at RTO - Conversion of existing ICE based IPT (auto) to e-rickshaw 	Transport Department, WBTC, Haldia Municipality, RTO (PVD)	6 months
Medium Term			
5.3.3	Prepare regulatory mechanism for provision of dedicated parking space for electric rickshaws/vehicles.	DEVELOPMENT AUTHORITIES, Transport Department, Haldia Municipality, Port Authority	1 year
5.3.4	Take initiative to develop electric ecosystem such as charging infrastructure, better tariff regime, etc.	DEVELOPMENT AUTHORITIES/Electricity Supply agencies, Transport Department	1 year
5.4	ROAD DESIGN		
Medium to long term action			
5.4.1	Non-motorized transport and safe access		
5.4.1.1	Prepare and implement plans for developing an NMT network. This should include following actions: <ul style="list-style-type: none"> • 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	DEVELOPMENT AUTHORITIES, Haldia Municipality, PWD	1-3 years
5.5	MULTI-UTILITY ZONES (MUZ)		

Sr. no.	Action points	Agency responsible	Timeline
5.5.1	<p>Taking cognizance of the proposed land use map for Haldia Municipality, MUZ is recommended on existing as well as proposed major and minor arterial roads. 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:</p> <ul style="list-style-type: none"> • 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 stake holder consultations. • A minimum width of 1.8 m shall be maintained for MUZ. <p>Reference: Urban Street Design Guidelines Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre prepared by Delhi Development Authority.</p>	Development Authorities, Haldia Municipality, PWD	1–3 years
5.6	COMPACT CITY DEVELOPMENT SHALL BE ADOPTED TO REDUCE DISTANCES AND IMPROVE ACCESS		
Medium- to long-term action			
5.6.1	Compact urban form in new development to create higher density along major corridors to shorten travel distances, discourage usage of personal vehicles and hence reduce carbon footprints.	Development Authorities, Haldia Municipality, Transport Department	12 months
5.6.2	In new development areas (low density or urban sprawl), facilitate adequate transport connectivity to enhance accessibility to major centres (jobs, education, commercial, etc.). Enhancing accessibility in compact development will reduce distance and in turn discourage adoption of cars and encourage usage of sustainable modes (bus, cycle, NMT, walk) to transit nodes.	Development Authorities, Haldia Municipality, Transport Department	12 months
5.6.3	Ensure mixed land use development along mobility corridors.	Development Authorities, Haldia Municipality, Transport Department	12 months
5.6.4	Introduce parking maximum to discourage usage of cars.	Development Authorities, Haldia Municipality, Transport Department	12 months
5.6.5	Ensure high-density street network and interconnected green spaces to encourage walkability in new development areas.	Development Authorities, Haldia Municipality, Transport Department	12 months
5.7	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.		
Short Term Action			
5.7.1	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.	Development Authorities, Haldia Municipality, Transport Department	6 months
5.7.2	Ensure no parks and green areas are converted to parking.	Development Authorities, Haldia Municipality, Transport Department	6 months
5.7.3	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.	Development Authorities, Haldia Municipality, Transport Department	6 months
5.7.4	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.	Development Authorities, Haldia Municipality, Transport Department	6 months

Sr. no.	Action points	Agency responsible	Timeline
5.7.5	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.	Development Authorities, Haldia Municipality, Transport Department	6 months
Medium to long term Action			
5.7.6	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.	Development Authorities, Haldia Municipality, Transport Department	6 months
5.7.7	Develop a methodology for parking pricing in residential areas and other major trip attracting areas (CBD, commercial, institutional, etc.) in order to discourage misuse of urban land and reduce inflated parking demand <ul style="list-style-type: none"> - Pricing should encourage usage of designated parking spaces - Rationalize usage of on-street parking - Rationalize short term vs long term parking 	Development Authorities, Haldia Municipality, Transport Department	1-3 years
5.7.8	Penalty for illegal/wrong parking esp. parking within the emergency lanes and non-designated areas to be prohibitive.	Development Authorities, Haldia Municipality, Transport Department	1-3 years
5.7.9	Bundle existing / 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 are mostly not required since parking is permitted in all use zones.	Development Authorities, Haldia Municipality, Transport Department	1-3 years
5.7.10	Multilevel parking structure shall be equipped with smart technology such as real-time information on vacant parking slots, smart meters, etc.	Development Authorities, Haldia Municipality, Transport Department	5 years
5.7.11	Earmark a part of parking revenue for local area improvement that includes footpaths, public amenities and parking facilities within the PAMP area.	Development Authorities, Haldia Municipality, Transport Department	1-3 years
5.7.12	Introduce residential parking permit for regular parkers for use of public parking space and these may be monitored.	Development Authorities, Haldia Municipality, Transport Department	1-3 years
5.7.13	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.	Development Authorities, Haldia Municipality, Transport Department	1-3 years
5.7.14	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 upgradation of the PAMP area including metering, ITS application for commuter information, and signage.	Development Authorities, Haldia Municipality, Transport Department	1-3 years
5.7.15	Plan and implement parking provision for buses, commercial vehicles and IPT-NMT modes, and for the differently abled.	Development Authorities, Haldia Municipality, Transport Department	1-3 years
5.8	TRAFFIC MANAGEMENT		
Short-term action			
5.8.1	Conduct a third party / independent audit of geometry of all city roads and intersections and provide specific solutions.	Traffic Police	6 months
5.8.2	Conduct audit of all intersections and install functional traffic signals at all major intersections.	Traffic Police	6 months
5.8.3	Enforce lane driving through heavy fining.	Traffic Police	6 months

Sr. no.	Action points	Agency responsible	Timeline
Medium-to long-term action plan			
5.8.4	Prepare Traffic Impact Assessment (TIA) guidelines and permit new developments based on the formulated TIA guidelines.	Traffic Police/ DEVELOPMENT AUTHORITIES	1 year
5.8.5	Prepare traffic management plan for special days, i.e. during Durga Puja festival / during urban flood situation.	Traffic Police, DEVELOPMENT AUTHORITIES, Haldia Municipality	1 year
5.9	TRAFFIC IMPACT ASSESSMENT		
Medium-to long-term action plan			
5.9.1	Permit new developments based on the impact of traffic on the surrounding transport infrastructure and neighborhoods.	Haldia Municipality/SEIAA	1-3 years
5.9.2	Make necessary infrastructure augmentations based on traffic impact assessments and levy costs to the developer, if needed and possible.	Haldia Municipality, Traffic police	1-3 years
5.10	FINANCING OF URBAN TRANSPORT		
Medium-to long-term action plan			
5.10.1	Create dedicated and ring-fenced urban transport fund for meeting Urban Transport needs by adopting innovative financial instruments to mobilize local resources including land value capture and polluter pay principle and resources from private participation.	Transport Department, Haldia Municipality	1-3 years
5.10.2	Rationalization and reallocation of funds from road capacity augmentation projects towards public transit systems and complete streets.	Transport Department	1-2 years
5.10.3	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, Haldia Municipality	1-3 years
5.11	DATA ON URBAN COMMUTE		
Medium-to long-term action plan			
5.11.1	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, Haldia Municipality	1-3 years

6. GENERATOR SETS

Sr. no.	Action points	Agency responsible	Timeline
Short-term priority action			
6.1	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. Verify and check whether design specifications are followed and only thereafter the genset is to be allowed to operate.	Police, WBPCB, Haldia Municipality	6 months
6.2	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 Haldia Municipality	6 months
Medium-term action			
6.3	Alternate power systems should be promoted in cell towers, and use of DG sets discouraged.	Department of power and NES, Power Distribution Companies	1 year
6.4	Leverage rooftop solar programme to reduce dependence on DG sets.		1 year
6.5	Ensure access to quality electricity supply.		1-2 years

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

S. no.	Action points	Agency responsible	Timeline
Short-term priority action			
7.1	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. West Bengal Solid Waste Management Limited provides the service of garbage collection from specific points.	Haldia Municipality, Development Authority, Resident Welfare Associations, WBPCB	6 months
7.2	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 in the city with considerable tree cover that cause extensive leaf litter. Open burning of leaves must stop. West Bengal Solid Waste Management Limited provides the service of garbage collection from specific points.		6 months
7.3	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. West Bengal Solid Waste Management Limited provides the service of garbage collection from specific points.		6 months
7.4	Use of satellite based monitoring as well as mobile spot check squads for enforcement in case burning is spotted.	Haldia Municipality, Metropolitan Development Authority, RWAs, State Police Department, WBPCB	6 months
7.5	Proper management of landfill sites at Kalipahari to prevent spontaneous fire. Further dumping of waste at open landfill sites should be restricted. Currently being managed by the municipality.		
7.6	Adopt roadmap for zero landfill policy to promote decentralized waste segregation, reuse and recycling.		
7.7	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 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.	Haldia Municipality, Metropolitan Development Authority, RWAs, State Police Department, WBPCB	6 months

8. COMMON BIOMEDICAL TREATMENT FACILITY

Sr. no.	Action points	Agency responsible	Timeline
Short-term priority action			
8.1	Implement emission norms for incinerators and examine the feasibility of less polluting alternatives in compliance with biomedical waste treatment rules.	WBPCB, Haldia Municipality, incinerator facility operators	6 months
8.2	Implement CEMS for incinerators and provide data on emissions on an open platform progressively.		6 months
8.3	Develop a siting policy for biomedical incinerators.	WBPCB, Supported by Haldia Municipality.	6 months

9. COOKING FUELS AND OPEN EATERIES

Sr. no.	Action points	Agency responsible	Timeline
Medium to long term action			
9.1	A targeted programme to be implemented for 100 per cent coverage of households by distribution of LPG/PNG in all non-compliant cities.	Department of Power & NES, District and local administration	1-2 years
9.2	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 & NES, Municipality, urban local bodies	1-2 years

10. ROAD DUST

Sr. no.	Action points	Agency responsible	Timeline
Short-term action			
10.1	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
10.2	Phase-in mechanical / vacuum-based street sweeping wherever feasible; introduce wet / mechanized vacuum sweeping of roads.		6 months
Medium- to long-term actions			
10.3	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
10.4	Maintain pothole-free roads for free flow of traffic to reduce emissions and dust.	Municipality, District and local administration	1-2 years
10.5	Increase green cover in the region. Undertake greening of open areas, gardens, community places, schools and housing societies.	Municipality, local bodies, RWAs	1-2 years
10.6	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 clean alternative technologies.	WBPCB, Road Owning Agencies, Department of industries	1-2 years
10.7	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

11. CONSTRUCTION DUST

Sr. no.	Action points	Agency responsible	Timeline
Short-term action			
11.1	Adopt and implement dust control measures for all types of construction - buildings and infrastructure. The preventive measures as mentioned in CPCB guidelines. Construction agencies to be made liable. Impose penalty for non-compliance.	Municipality	6 months
11.2	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. Haldia Municipality to ensure for private and commercial building.	Municipality / Urban Local Bodies	6 months
11.3	Intensify surveillance on construction activities within urban airshed zones during high pollution period	Municipality and WBPCB	6 months
Medium- to long-term action			
11.4	Notify rules to segregate construction and demolition waste. Provide a network of decentralized C&D waste segregation and collection sites across the city.	Municipality	1-2 years
11.5	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.	Municipality	1-2 years
11.6	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, Municipality	1-2 years

12. EPISODIC EVENTS

Sr. no.	Action points	Agency responsible	Timeline
12.1	Measures to control forest fires/biomass/crop residue burning: Use satellite based monitoring and on-ground enforcement to control such burning episodes. 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.	Agriculture and allied Department , District and local administration	Ongoing
12.2	Firecrackers: regulate and control their 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 Petroleum and Explosive Safety Organization (PESO)	Ongoing

13. RENEWABLE ENERGY

Sr. no.	Action points	Agency responsible	Timeline
Medium- to long-term action			
13.1	West Bengal has a 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, also the electric public transport can 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 & NES, District and local administration	1-2 years
13.2	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. Identify the mandated entities to encourage adoption through awareness camps and introduce relevant penalties in case of non-compliance.	WBREDA, Department of Power & NES, District and local administration	1-2 years
13.3	Introduce a stand-alone scheme for state run institutions - schools, colleges, hospitals, etc. that meet the criteria and facilitate their adoption through a state tender; the tenders must be based on the aggregated demand and must occur at defined intervals to ensure developer participation.	WBREDA, Department of Power & NES, District and local administration	1-2 years
13.4	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 & NES, District and local administration	1-2 years
13.5	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 & NES, District and local administration	1-2 years
13.6	Setup a Solar Command Centre (SCC) within the WBREDA that provides guidance, facilitates 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 & NES, District and local administration	1-2 years

14. URBAN GREENS AND FORESTS

Sr. no.	Action points	Agency responsible	Timeline
Medium-term action			
14.1	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 also to be dust barriers to be integrated with the urban forestry and forest policy. HDA has developed three new parks with green coverings. Plan for green roof and vertical greens are being taken up. Haldia Municipality may take necessary action for enforcement of creation of greens on roof top and green walling for private and commercial buildings.	Forest Department, HDA, NHAI, PWD, Haldia Municipality	1 year

15. IMPROVE TRAINING AND CAPACITY

Sr. no.	Action points	Agency responsible	Timeline
15.1	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

16. NEED FOR PUBLIC AWARENESS AND COOPERATION

Sr. no.	Action points	Agency responsible	Timeline
16.1	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 their disposal in a time bound manner.	West Bengal State Council for Science and Technology, WBPCB, District and local administration	Ongoing

17. MINING

Sr. no.	Action Points	Agency responsible	Timeline
Short-term action			
17.1	Establishment of Continuous Ambient Air Quality Monitoring Stations.	West Bengal Industrial Development Corporation (WBIDC), WBPCB, ICE, MSME	6 months
17.2	Covering of trucks even for internal transport of coal in coal fields area. Implement measures for effective dust suppression during mining and allied activities such as crushing, loading, unloading, blasting, etc.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	6 months
17.3	Dust suppression system: sprinkling of hydrophilic solvents so that water can be attracted and dust can be suppressed. Chemicals such as CaCl ₂ , MgCl ₂ , sodium silicate can be used as wetting agents.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	6 months
17.4	Constant electronic surveillance to enforce water sprinkling.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	6 months
17.5	All the transportation roads, either temporary or permanent in nature should be blacktopped/concreted with proper drainage facility.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	6 months
17.6	Provide wind-barriers along the coal-transport road, wherever, the transport road is within 500 m of any habitation area.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	6 months
17.7	Installation of Closed Conveying Systems for transport of coal from pithead to railway siding.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	6 months
17.8	Provisions of Vertical Greenery System for Coal Stockyards	West Bengal Industrial Development Corporation (WBIDC), WBPCB	6 months
17.9	Maintain pot hole-free roads for free flow of traffic to reduce emissions and dust.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	6 months
Medium to long-term action			
17.10	Deployment of adequate number of surface miners. The surface miners are usually fitted with built-in dust suppression system and eliminates, drilling, blasting and sizing coal.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	1 year
17.11	Commissioning of adequate number of silo loading facility at railway sidings to achieve minimum 80 per cent rail dispatch of coal through silo loading.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	1 year
17.12	Dust extraction system—This includes network of suction heads and ducting connected to wet wall cyclone for separating dust from the air stream. Air outlet of cyclone collectors will have to be connected, so as to discharge clean air to atmosphere and collected dust from the cyclone shall be disposed off suitably. All related provision of the SPCB action plan for critically polluted area should be implemented.	West Bengal Industrial Development Corporation (WBIDC), WBPCB	1 year

18. THERMAL POWER PLANTS

Sr. no.	Action points	Agency responsible	Timeline	Current status
	Power Plant standards notified in 2015 for PM, NOx and SOx should be met by 2022. Power plants are responsible to enforce strategies for NOx reduction	WBPCB, Power Plant management	2022	Actions to comply with standards have already commenced.
18.1	Haldia Thermal power Station – 600 MW The power station has two units of 300 MW commissioned in 2015.	WBPCB	2022	Power Station is operating at 85-90 per cent plant load factor. Feasibility study under way to meet new norms.
	Step 1: Collect major milestone plan/Gantt chart for FGD installation, NOx control and measures to meet water norms. Prepare and notify a plan for NOx control.		By Feb 2020	
	Step 2: Prepare action plan for monitoring at relevant intervals, issue notice to collect a suitable bank guarantee amount – 1 per cent of the project cost		By June 2020	
	Step 3: Collect bank guarantee, engineering documents – for FGD, NOx control and measures to meet water norms		By October 2020	
	Step 4: Ensure civil works are completed		By June 2021	
	Step 5: Performance and guarantee (PG) test for FGD be initiated		By June 2022	
	Step 6: Dust suppression system: sprinkling of hydrophilic solvents so that water can be attracted and dust can be suppressed. Chemicals such as CaCl, MgCl ₂ , sodium silicate can be used as wetting agents in all hauling roads.		By June 2022	
FUGITIVE EMISSIONS				
18.2	Coal Handling: A. Issue modified consent condition and direct storage of coal in enclosed space. B. Collect bank guarantee and timeline from power station to implement measures to enclose coal handling area	WBPCB	A. By March 2020 B. By June 2020	
18.3	Fly ash management A. 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. B. 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. C. Collect bank guarantee and timeline from power station to implement measures.	WBPCB	A. By March 2020 B. By June 2020 C. By October 2020	
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.			

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	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 respectivecontrol 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 usingprivate vehicles

INSTITUTIONAL MECHANISM FOR GRAP 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. /194 /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/-

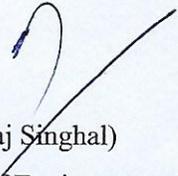
Chief Secretary
Government of West Bengal

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. 1279 /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 Howrah 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

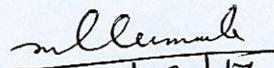
Committee for weekly monitoring of air quality situation, mitigation action and follow up

- 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

Annexure 2

Government of West Bengal
Environment Department
Prani Sampad Bhavan, 5th floor, L.B-2, Sec-III, 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 other 6 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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**Environment Department
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