Report on

ACTION PLAN FOR CONTROL OF AIR POLLUTION WITH RESPECT TO PM_{10} IN NON-ATTAINMENT CITY OF TAMIL NADU (THOOTHUKUDI)

By

Tamil Nadu Pollution Control Board,
76, Mount Salai, Guindy, Chennai - 32

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About City – Thoothukudi

Thoothukudi is a port city, Municipal Corporation and an industrial city in the Tuticorin (also known as Thoothukudi) District in the Indian State of Tamil Nadu. It is geographically located nearby the Gulf of Mannar, at a latitude of 8°48′N and a longitude of 78°11′E. and about 4 m above the sea level. The city is covering an area of 353.07 km^2 and had a population of 237,830 in 2011. The urban agglomeration had a population of 410,760 as of 2011. The total number registered vehicles as on 31.3.2018 in the Thoothukudi city with state transport authorities is 7,66,793 (Table 1). Major educational establishments in the city include Thoothukudi Medical College, Fisheries College and Research Institute, Marine Training Academy, V.O.C. Arts & Science College, Government Polytechnic College, and Anna University Tuticorin Campus.

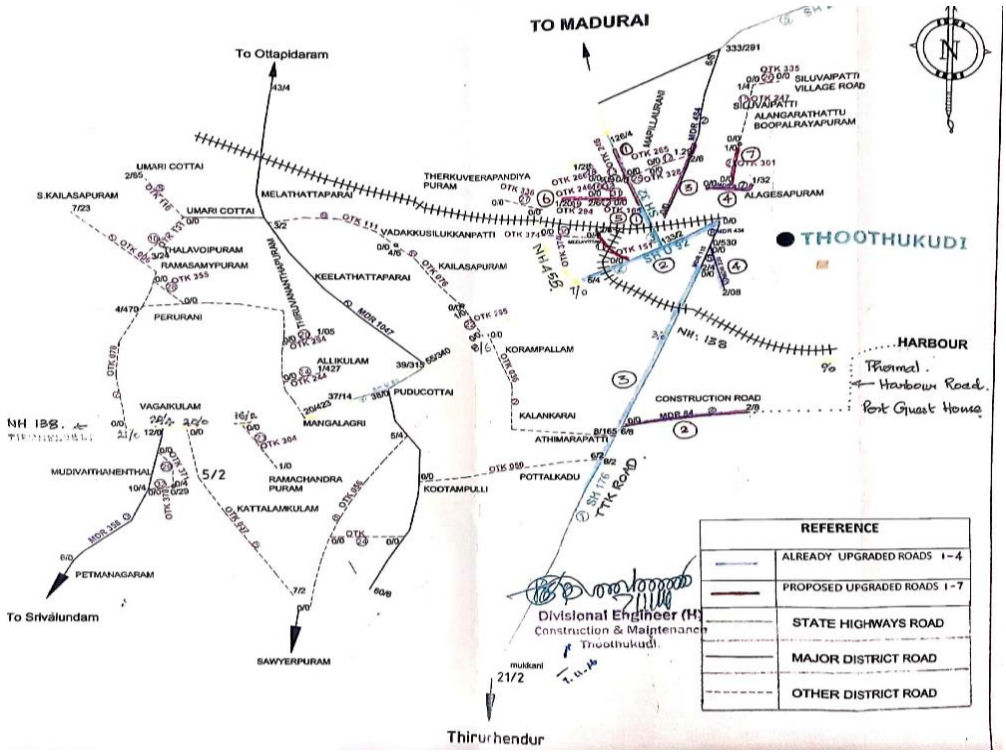

Figure 1 Thoothukudi City Map

Thoothukudi is one of the Fastest growing Major Ports in India, Thoothukudi, is also an "Emerging Energy and Industrial hub of South India"

as a large number of Power plants are located in the coastal city of Thoothukudi. The majority of the people of the city are employed in salt pans, sea-borne trading, fishing, and tourism. A major attraction in the city is Our Lady of Snows Basilica, a 16th-century site. The 21 islands between Thoothukudi and Rameswaram shores in the Gulf of Mannar are noted as the first Marine Biosphere Reserve of India, and have around 36,000 species of flora and fauna. This protected area is called Gulf of Mannar Marine National Park. Our Lady of Snows Basilica festival is celebrated annually during August. This and the Hindu temple festivals are the major festivals of the area. Roadways are the major mode of transport to Thoothukudi, while the city also has rail, air, and sea transport.

Background:

Central Pollution Control Board (CPCB) vide its letter dated 1.7.2016, identified Thoothukudi as “Non Attainment City” and issued directions u/s 18(1)(b) of the Air (prevention and Control of Pollution) Act,1981 to ensure the time bound action on various action points so as to improve the air quality of Thoothukudi to conform to the prescribed standards.

To Comply with the directions issued by CPCB, Tamil Nadu Pollution Control Board (TNPCB) has issued directions to the District Environmental Engineer, TNPCB, Thoothukudi and requested to submit an action plan report vide Memo NO TNPCB/Dir(L)/2016 dated 21.12.2016 in consultation with stockholders such as Highway department, Oil companies, Transport authorities, Municipal Corporation and Town Panchayat authority. Accordingly a meeting of the stake holders was conducted by the Joint Chief Environmental Engineer (Monitoring),TNPCB on 9.2.2018 at the O/o DEE, TNPCB, Thoothukudi and the stake holders were requested to furnish the development works related to their departments for the preparation of action plan. It was also decided that the progress made may be reviewed by District administration.

Orders of the Hon'ble National Green Tribunal (PB) vide O.A. No 681 of 2018.

Hon'ble National Green Tribunal (NGT), Principal Bench, New Delhi, in the matter of original application no.681/2018 (News Item Published in the "Times of India" authored by Shri Vishwamohan Titled August – 15" passed an order on 08.10.2018. The paragraph 14 & 15 of this order are relevant to comply. In paragraph 11 of the above order, it is stated that CPCB has identified Thoothukudi city as non attainment city for pollutant PM_{10} parameter exceeding the prescribed annual norms.

That in paragraph 08 of the above order, it is mentioned that CPCB gave presentation before Hon'ble Green Tribunal on 05.09.2018 and the data of air quality from 2011-2015 were considered in the above presentation and thus on the basis of air quality data of CPCB.

In paragraph 15 (i, ii, iii, iv &v) Hon'ble National Green Tribunal has issued following directions:-

i. All the states & Union Territories with Non Attainment Cities must prepare appropriate action plans within 02 months aimed at bringing the standards of air quality within the prescribed norms within 06 months from date of finalization of the action plan.

ii. The Action Plans may be prepared by six-member committee comprising of Directors of Environment, Transport, Industries, Urban Development, Agriculture and Member Secretary, State Pollution Control Board or Committee (AQMC). The AQMC will function under the overall supervision and coordination of Principal Secretary, Environment of the concerned State/Union Territory. This may be further supervised by the Chief Secretaries concerned or their counterparts in Union Territories by ensuring intra-sect oral co-ordination.

iii. The Action Plans may take into account the GRAP, the CAP and the action plan prepared by CPCB as well as all other relevant factors. The Action Plans may be placed before the Committee as directed in direction no.vi. The Action Plan will include components like identification of source

and its apportionment considering sectors like vehicular pollution, industrial pollution, dust pollution, construction activities, garbage burning, agricultural pollution including pollution caused by burning of crop residue, residential and indoor pollution etc. The action plan shall also consider measures for strengthening of Ambient Air Quality (AAQ) monitoring and steps for public awareness including issuing of advisory to public for prevention and control of air pollution and involvement of schools, colleges and other academic institutions and awareness programmes.

iv. The Action Plan will indicate steps to be taken to check different sources of pollution having speedy, definite and specific timelines for execution.

v. The Action Plan should be consistent with the carrying capacity assessment of non-attainment cities in terms of vehicular pollution, industrial emissions and population density, extent of construction and construction activities etc. The carrying capacity assessment shall also lay emphasis on agricultural and indoor pollution in rural areas. Depending upon assessed carrying capacity and source apportionment the authorities may consider the need for regulating number of vehicles and their parking and plying, population density, extent of construction and construction activities etc. Guidelines may accordingly be framed to regulate vehicles and industries in non-attainment cities in terms of carrying capacity assessment and source apportionment.

The Principal Secretary, Environment & Forests Department has convened a meeting on 6.12.2018 with the stake holders and action plan for the abatement of air pollution in Thoothukudi city was discussed. On the basis of the discussion, the action plan was submitted to CPCB on 14.12.2018. As ordered by the NGT, an Air Quality Monitoring Committee (AQMC) was also formed vide G.O. No 20(D) dated 10.1.2019 for the preparation and submission of action plan for Thoothukudi town. Based on the letter dated 12.2.2019 received from CPCB Delhi, a revised action plan was prepared

focussing the key action points which were not addressed in the earlier action plan to improve the air quality at Thoothukudi city.

Present status of Ambient Environment

The major source of air pollution at Thoothukudi city is Road Dust, Vehicular Emission, Construction activities, Industrial emission, etc. Tamil Nadu Pollution Control Board is regularly monitoring the Ambient Air Quality at Thoothukudi through three manual NAMP stations installed in and around the city as well as one Continuous Ambient Air Quality Monitoring Station (CAAQM).

The Table 1 indicates the vehicle population details of Thoothukudi city.

Table 1 Vehicular details of Thoothukudi City

Details of vehicles	**Total number**
Number of Private Vehicles (Car/SUV/MUV)	59,350
Number of Private Vehicles (Two wheelers)	6,75,113
Number of Commercial Vehicles	26,661
Number of Auto rickshaws	5,669
Total Number of vehicles registered in Thoothukudi as on 31.3.2018	7,66,793

* Source: Regional Transport Office, Thoothukudi

There are 940 Industries functioning in the Thoothukudi District as shown in Table 2.

Table 2 Industries Details of Thoothukudi District

City	**Large (in Nos)**			**Medium (in Nos)**			**Small (in Nos)**		
Thoothukudi	Red	Orange	Green	Red	Orange	Green	Red	Orange	Green
	42	19	5	5	17	0	248	462	142
Total - **940**									

* Source: TNPCB

TNPCB is regularly monitoring the air quality of the City through three manually operated Ambient air quality monitoring stations functioning under National Ambient Air Quality Monitoring (NAAQM) Project funded by CPCB under the Ministry of Environment, Forest and Climate Change (MoEF&CC), Govt. of India. The Ambient Air Quality of Thoothukudi city is being monitored at 3 stations and monthly average of PM_{10}, $PM_{2.5}$, SO_2 andNO_2 levels are regularly analysed and sent to CPCB. One number of Continuous Ambient Air Quality Monitoring Station at Melavittan (CAAQM) is also functioning and the data generated are being sent to TNPCB. Three Monitoring Stations Located in Thoothukudi City under the National Ambient Air Quality Monitoring project funded by Central Pollution Control Board are namely

A. **TNPCB Office, SIPCOT Complex**, this monitoring station covers Air Pollution from industries located in and around SIPCOT complex, South East of M/s.Vedanta Limited, Copper Smelter unit and M/s.V.V.Titanium Pigments (P) Ltd., This monitoring station is being operated in two days in a week.

B. **AVM Jewellery Building** station is located in North Cotton road, adjoining West Cotton road, which is main road of Thoothukudi City. This station covers commercial activities, which includes residential area. This monitoring station is functioning two days in a week. This monitoring station is nearer to seashore area (500M from sea).

C. **Raja Agency Building** is located in Harbour Express Highway Road leading to Thoothukudi Port Trust. Thoothukudi Thermal Power Plant is located 1KM East side of this station. This monitoring station covers air pollution from Thoothukudi Thermal Power Plant and Transport activities in the Harbour Road. This Monitoring Station is functioning two days in a week

The results of the Monitoring Stations indicated that $PM_{2.5}$, SO_2 andNO_2 are within the prescribed limit but the Particulate matter of 10-micron size (PM_{10}) as main air pollutant which is higher than the prescribed limit (60 ug/m^3 for annual average) (Fig 1). Hence it is identified as one of the Non-

attainment cities of PM_{10}. In this regard, Hon'ble NGT has instructed State Pollution Control Board to chart out the Action plan for controlling Respirable Dust Matter (PM_{10}).

In general, air pollution due to Particulate Matter is caused due to the re-suspension of road dust, emission from vehicles, D.G.sets, construction activities, burning of domestic fossil fuels, open burning of solid wastes, transportation of construction materials such as sand, soil etc., without cover and emissions from brick kilns. In Thoothukudi City, the potential sources of PM_{10} are Road Dust, vehicular emission, Industries, Open Biomass burning especially in night time bakeries etc., as shown in the Photographs given in the Annexure II.

The observed yearly average of PM_{10} Value for three monitoring station under NAMP at Thoothukudi City for the period 2011-2018 is given in the Table 3. and in Fig 2. The annual average limit for PM_{10} is 60 $\mu g/m^3$.

Table 3 Annual average of PM_{10} values in Thoothukudi city

Year	Raja Agencies	AVM Buildings	SIPCOT
2011	178	53	88
2012	132	81	112
2013	115	92	100
2014	102	67	74
2015	105	67	84
2016	190	91	118
2017	240	124	162
2018	109	93	92

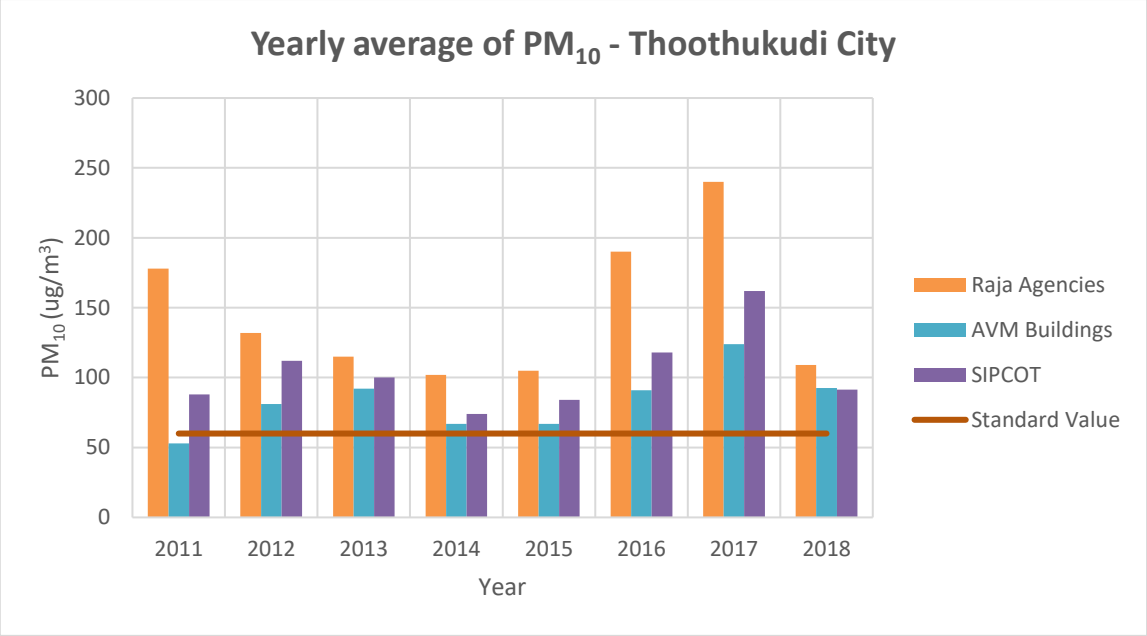

Figure 2 Observed yearly average of PM_{10} values in Thoothukudi AAQ Stations

The observed monthly average of PM_{10} Value for three monitoring station under NAMP at Thoothukudi City for the period Apr 2017- Feb 2019 is given in the Table 4 and in Fig 3.

Table4 Monthly average of PM_{10} values in Thoothukudi city

Month	Raja Agency			AVM Building			SIPCOT		
	Max	**Min**	**Avg**	**Max**	**Min**	**Avg**	**Max**	**Min**	**Avg**
Apl	155	95	**127**	110	41	**83**	164	42	**112**
May	138	59	**108**	116	52	**80**	120	52	**82**
June	167	124	**143**	120	81	**102**	134	61	**97**
July	128	98	**114**	131	65	**99**	139	54	**85**
Aug	156	99	**132**	148	85	**121**	170	74	**110**
Sep	123	96	**110**	101	71	**90**	111	47	**93**
Oct	123	55	**99**	135	59	**98**	135	59	**98**
Nov	113	47	**86**	103	78	**87**	96	73	**85**
Dec	99	48	**82**	82	58	**75**	97	53	**70**
Jan	107	69	**92**	104	60	**90**	99	64	**84**
Feb	96	82	**89**	96	71	**86**	98	70	**84**
Avg	**128**	**79**	**107**	**113**	**66**	**92**	**124**	**59**	**91**

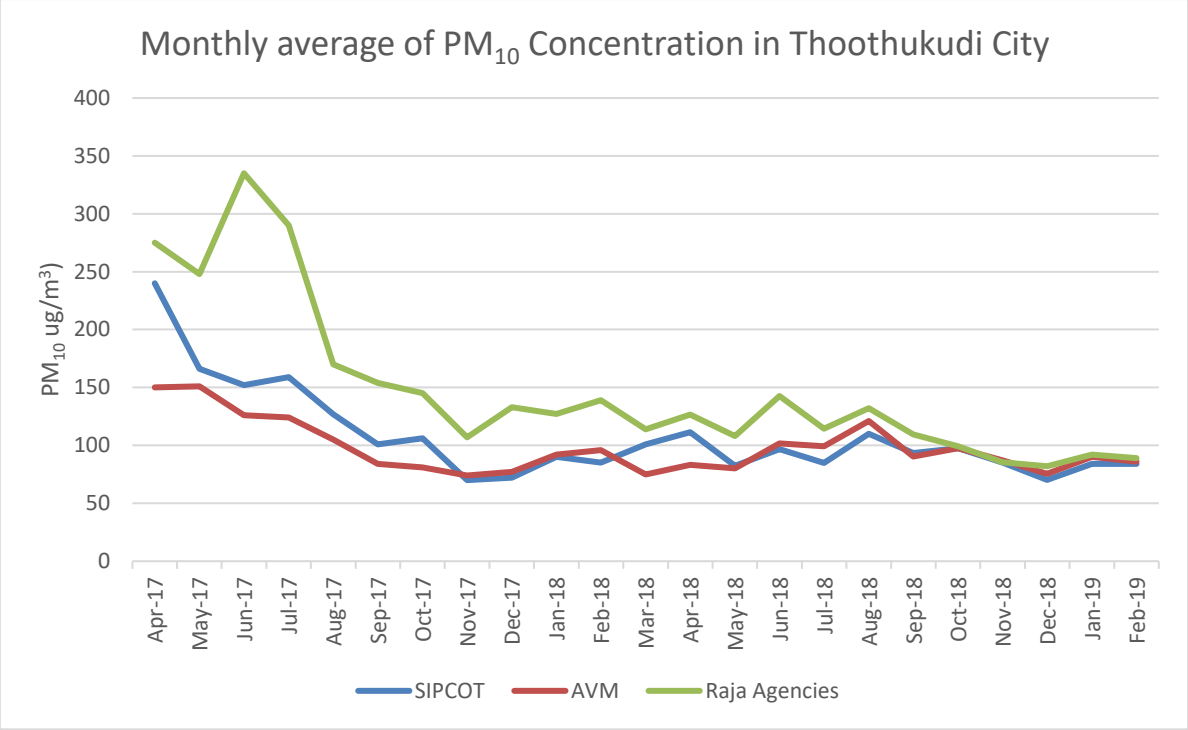

Figure 3 Monthly observed average PM10 Concentration in Thoothukudi AAQ Stations

The categorisation of PM $_{10}$ based on its value is furnished in Table 5.

Table 5 Categories of PM_{10} Concentration

Category	Description
Severe + or Emergency	Ambient PM_{10} concentration values of 500 µg/m3 respectively persist for 48 hours or more
Severe	Ambient PM_{10} concentration value is between 430 µg/m3 respectively
Very Poor	Ambient PM_{10} concentration value is between 351- 430 µg/m^3
Moderate to poor	Ambient PM_{10} concentration value is between 101- 350 µg/m^3

Based on the observed PM_{10} concentration (Fig 2), the Thoothukudi city falls under Severe (Raja Agencies), very poor (SIPCOT and Raja Agencies) and moderate to poor (all three stations). The concentration of the PM_{10} pertains to annual average for the period 2011-18 at SIPCOT, AVM and Raja Agencies are varied from 74-162, 53-124 and 102-240 ug/m^3respectively

A Graded Response Action plan has been prepared for implementation of Thoothukudi, Non-attainment City and enclosed in Annexure-1.

Action Plan for Thoothukudi city has prepared based on different source contribution as below with the Time Scale for Implementing/Initiation.

- Immediate
- Short (within 3 months)
- Mid (3 - 6 months)
- Long (6 Months and above)

TAMIL NADU POLLUTION CONTROL BOARD

Revised Action plan to control PM10 pollution in Thoothukudi (Non attainment city)

1	**Name of the city**				:	**Thoothukudi**
2	Air Pollution concerns				:	PM_{10}
3	Air pollution levels (provide range of 24-hourly average concentration values; annual average for past five years)				:	**Figure - 2**
4	Months with higher air pollution levels				:	March, April, May June, July and August (Figure 2)
5	Action Plan					
Source group	**Action**	**Implementation period (Short/Mid/Long term)**	**Time limit for implementation**	**Responsible Agency (i.es)**	**Financial Implications (if any)**	**Present status/ Remarks**
Vehicles	Restriction on plying and phasing out of 15 years old commercial diesel drive vehicles	Long	12 months and above (Policy matter – decision at government level)	Transport Department	--	As pert the Central Motor Vehicle Act, 1988, Sec 59" Power to fix the age limit of motor vehicle". Under this section Central Government is empowered to fix the age limit of motor vehicle. To Phase out 15 year old commercial diesel driven vehicles is a policy matter and the decision is required to be taken at Central Government level.
	Strengthen and encourage public transport services to reduce the vehicular	Long	Apr '20	State Transport Corporations	--	To reduce the number of Private cars/two wheelers on road, the government/private buses may

	congestion					be increased by about 5% every year
	Construction of flyovers and bypass road to ease the transportation and reduce the dust	Long	May '21	State Highway, NHAI	--	Already one number of fly over is under construction. Depending on the need, this may be increased.
	Action against visibly polluting vehicles and Parking prevention in non-designated areas	Immediate	--	RTO, Traffic Police	--	Continuous Action to be taken
	Strict vigilance and no tolerance for visible emissions – stop plying of visibly polluting vehicles by impounding or fine	Immediate	--	RTO, Traffic Police	--	--
	Strict vigilance and enforcement of (vehicular testing centre) for pollution under control certificates and regular inspection & monitoring	Immediate	--	RTO, Traffic Police, TNPCB	--	--
	Vehicles should be frequently monitored to avoid over loading.	Immediate	--	RTO, Traffic Police	--	--
	Deploy traffic police for smooth traffic flow at identified vulnerable areas	Immediate	--	Traffic Police,	--	--
	Introduction of cleaner fuels (CNG/LPG) for vehicles	Long	Dec '21	Transport Department and Oil companies	--	Introduction of cleaner fuel (CNG/LPG) for vehicles is a Policy decision and availability of cleaner fuels.
	Regular checking of	Mid	Aug '19	Transport	--	It is a regular activity and being

	vehicular emission and issue of Pollution under Control Certificate (PUC)			Department /RTO and Traffic Police.		done by RTO. At present 2 PUC centres are available and PUC centre's numbers has to be increased to meet the demand for the issue of PUC certificates.
	Good traffic management restriction/ redirection of heavy vehicles inside the city	Immediate	--	RTO, Traffic Police	--	Already implemented and further need may be assessed
	Promotion and operationalization of E-Rickshaw.	Long	May '20	Transport department/RTO	--	Policy decision to be taken
	Create More Parking facilities in and around the city	Long	May '20	Municipal Corporations of Thoothukudi City, Highway Department.	--	--
	Development of multilayer parking in congested areas	Long	Dec '20	Thoothukudi Corporation, Housing and urban development	--	--
	Retrofitting of particulate filter in diesel driven vehicle. Or ban on registration of Diesel driven auto rickshaws	Long	Dec '20	Transport/ RTO	--	Policy decision to be taken
	Checking of fuel adulteration	Short	Aug '19	District administration, Oil companies, Food and Civil Supplies department.	--	--
	Monitoring of vehicle fitness.	Short	Aug '19	RTO	--	--

	Periodic calibration test of vehicular emission monitoring equipment.	Short	Aug '19	Transport department/RTO and TNPCB	--	--
Road dust	Identify road stretches with high dust generation and Increase frequency of mechanized clearing of road and sprinkling of water on paved and unpaved roads	Short	Aug '19	Municipal Corporations, PWD, State Highway and National Highway Authority of India (NHAI).	--	At present manual cleaning done occasionally. Action to be taken at the earliest using regular mechanized cleaning
	Create Proper Pedestrian Infrastructure	Long	Dec '20	PWD, State Highway and NHAI.	--	--
	Maintenance and repair of roads on priority.	Immediate		State Highway and NHAI.	--	--
	Construction of pucca pavement along the roads.	Mid	Dec '19	Municipal Corporation.	--	--
	Strengthening the roads inside the Thoothukudi city	Long	Dec '20	State Highway	--	--
	Widening of roads at highways with service roads and parking facilities for the heavy vehicles	Long	Dec '20	State Highway and NHAI.	--	--
	Reduce Emission during coal handling and transport.	Short	Aug '19	TNPCB, Port Trust, Traffic Police	Provision of wind screen at the wind carrier around coal stack yard – 35 lakhs Dust suppression	--

					system 220 lakhs planting of 10 thousand no's for year for next five years 1.40 lakhs Total 430lakhs	
	End to end carpeting of road with black topping to avoid road dust	Mid	Dec '19	Municipal Corporations, State Highway and NHAI.	--	--
	Formulate action plan for creation of green buffers along the traffic corridors	Short	Aug '19	Department of Forest, Municipal Corporation, State Highway and NHAI.	--	--
	Undertake greening of open areas, gardens, schools, housing societies and community places	Mid	Dec '19	Municipal Corporation	--	--
	Implement Road Side Tree Plantation with Indigenous species for creating carbon sink, abating the air pollution	Long	Dec '20	State Highway and NHAI.	--	--
	Do periodic mechanized sweeping on roads with heavy traffic and water sprinkling regularly	Mid	Dec '19	Municipal Corporation	--	--
	Introduction of water fountains at major intersection/circle	Long	Dec '20	Municipal Corporation, Industries.	--	--

	Covering of construction site.	Short	Aug '19	Municipal Corporation	--	--
Construction Activities	Stringently enforce rules for dust control in construction activities and close non – compliant sites	Immediate		Municipal Corporation	--	--
	Control dust pollution at construction sites through appropriate cover	Immediate		Municipal Corporation	--	--
	Transportation of construction materials like sand, soil, stone chips etc in covered conditions.	Immediate		RTO, Traffic Police	--	--
	Restriction on storage of construction materials along the road.	Immediate		Municipal Corporation	--	--
	Restriction on open burning of municipal solid waste, Crop residue, Biomass, plastic and horticulture waste etc	Short	Aug '19	Municipal Corporation, Agriculture Department	--	--
Biomass and garbage burning	Disposal of Garbage should be monitored periodically and to avoid open garbage firing.	Immediate		Municipal Corporation	--	--
	Immediate lifting of solid waste generated from desalting and cleaning of municipal drains for its disposal	Short	Aug '19	Municipal Corporation	--	--
	Transportation of municipal solid wastes, construction materials	Short	Aug '19	Municipal Corporation, Traffic Police	--	--

	and debris in covered system					
	Stop use of coal/firewood in hotels and open eateries	Short	Aug '19	Municipal Corporation	--	--
	Phasing out of Bio mass fuel and replacing with LPG in the Restaurants, Dhabas/Road side eateries	Mid	Dec '19	Municipal Corporation and Hotel Owner associations	--	--
Industries	Adopting Cleaner Technology in Coal based Thermal Power Plants	Mid	Dec '19	TNPCB, TANGEDCO	Supply, Erection, installation and commissioning of suitable pollution control equipment to reduce the SOx emission level – at a total cost of Rs.500 Crores.	Dedicated Railway line and conveyor belt facilities available at Sea PORT for handling import of coal
	Strict action against industries having non-compliance to the norms	Immediate		TNPCB	--	--
	Stringent compliance by Thermal power plants with respect to the emission norms according to the timelines up to December 2022.	Long	Dec '22	TNPCB, TANGEDGO	Retrofitting of Electro static precipitator (ESP) and augmentation of additional ESP fields/pass, if	--

					required, to reduce the Particulate Matter (PM) at a total cost of Rs.400 crores.	
	Switching to power generation from existing wind and solar plants (renewable source) to reduce operation of coal-based power plants	Long	Dec '23	TANGEDGO	--	State level Policy decision
	Ensuring emission standards in industries	Short	Aug '19	TNPCB	--	--
	Adoption of cleaner technology in brick kilns.	Mid	Dec' 19	TNPCB	--	--
	Shifting of polluting industries	Long	Dec '23	TNPCB and Industry dept.	--	--
	Ban on polluting industries	Mid	Dec '19	TNPCB and Govt of Tamil Nadu.	--	--
Strengthening of AAQ Monitoring	Air Quality Monitoring may be strengthened by increasing the no of monitoring site location covering all regions especially industries, Port and road transportation areas/ educational institution areas by the Installation of Additional CAAQMS at Thoothukudi city. (Commercial/Residential)	Long	May '20	TNPCB, CPCB	--	At present, 1 Number of CAAQM Station is functioning and all the coal based power plants have CEMS and the data are connected to TNPCB CARE Centre. Additional CEMS will be installed in air polluting industries.
	Continuous Source	Long	May '20	TNPCB,CPCB	--	Short period SA study was

	apportionment study					conducted.
Public Awareness	Create awareness about polluting vehicles, open burning and its health impacts	Short	Aug '19	TNPCB, DOE, Department of Health, District administration.	4.00	--
	Educate the advantage of using cleaner fuel such as LPG	Short	Aug '19	TNPCB and Department of Environment, NGOs	4.00	--
	Involvement of school and other academic institution in awareness program.	Mid	Dec '19	TNPCB, DOE, District administration	5.00	--
	Compliance of guidelines on D.G.sets and action against violation	Short	Aug '19	TNPCB and District administration.	--	--
Others	Stop use of diesel generator sets	Mid	Dec '19	TNPCB and District administration.	--	--
	Helpline to oversee non compliances on aforesaid issues	Short	Aug '19	District administration and TNPCB.	--	Public helpline is already existing and operational

V. Theagarajan 14/8/18
For Chairman (FAC)

Monitoring mechanism for implementation.

District Level Monitoring Committee may be formed and meeting shall be conducted periodically to review the progress and ensure smooth implementation of the plan. The Committee includes Municipal Commissioner, District Collector, comprising senior officers from concerned departments such as Department of Environment and Forests, Govt of Tamil Nadu, Urban development and Housing department, Govt of Tamil Nadu, Transport department, Agricultural department, and Forest department and District administration may be considered. Tamil Nadu Pollution Control Board shall regularly review the implementation of aforesaid action plan. The status report on action taken to be submitted to Central Pollution Control Board on regular basis to furnish the same to Hon'ble NGT. The above action plan is approved by the following members of the Air Pollution Monitoring Committee vide G.O. No 20(D) dated 10.1.2019.

1	The Director of Environment Panagal building, Saidapet, Chennai-15.	Member	
2	The Commissioner, Transport department Chennai-5	Member	
3	The Additional Commissioner/Director of Industries and Commerce, Guindy, Chennai-32	Member	
4	The Commissioner, Municipal Administration and Water Supplies department, MRC Nagar, Chennai-28.	Member	
5	The Director, Agricultural department, Chepauk, Chennai-5	Member	
6	Member Secretary, TNPC Board, Chennai-32	Member and Convener	
7	The Principal Secretary to the Government Environment and Forests , Government of TamilNadu Secretariat, Chennai-9.	Chairman	

Annexure I

Graded Response Action Plan for Thoothukudi town.

In pursuant to the direction of the Central Pollution Control Board, Delhi a Graded Response Action plan has been prepared for implementation in Thoothukudi town under different Air Quality Index (AQI) categories namely, Moderate & Poor, Very Poor as per National Air Quality Index.

Severe (ambient $PM_{2.5}$ or PM_{10} concentration value is more than 250 µg/m³ or 430 µg/m³ respectively)	**Agency responsible / Implementing Agency**
Increase power generation from existing wind and solar plants (renewable source) to reduce operation of coal-based power plants	TANGEDGO
Strengthen and encourage public transport services to reduce the vehicular congestion.	State Transport Corporations and District Administration
Identify road stretches with high dust generation and Increase frequency of mechanized clearing of road and sprinkling of water on paved and unpaved roads	Municipal Corporations, State Highway and National Highway Authority of India.
Very Poor (ambient $PM_{2.5}$ or PM_{10} concentration value is between 121-250 µg/m³ or 351- 430 µg/m³ respectively)	**Agency responsible / Implementing Agency**
Stop use of diesel generator sets	TNPCB, District administration.
Compliance to norms by the industries	TNPCB
Cleaner technology in coal based power plants	Industries.
Reduction of non-point pollution emission sources such as handling of coal, transport of coal.	Industries, Port Trust
Stop use of coal/firewood in hotels and open eateries	Municipal Corporation
Alert in newspapers / TV / Radio to advise people .to avoid polluted areas and restrict outdoor movement.	District Administration and Police.

Moderate to poor (ambient $PM_{2.5}$ or PM_{10} concentration value is between 61-120 µg/m³ or 101-350 µg/m³ respectively)	**Agency responsible/Implementing Agency**
Stringently enforce/stop garbage burning in landfills and other places and impose heavy fines on person responsible	Municipal Corporation
Close / stringently enforce all pollution control regulations in industries	TNPCB ,District Administration
Stringently enforce pollution control in thermal power plants through PCB monitoring	Industries ,TNPCB
Do periodic mechanized sweeping on roads with heavy traffic and water sprinkling also on unpaved roads	Municipal Corporation
	Municipal Corporation ,Traffic Police
	Highways and NHAI
Strict vigilance and no tolerance for visible emissions – stop plying of visibly polluting vehicles by impounding or fine	Regional Transport Officer, Traffic police
Strict vigilance and enforcement of PUC norms	
Stringently enforce rules for dust control in construction activities and close non – compliant sites	Municipal Corporation, Town planning authorities.
Deploy traffic police for smooth traffic flow at identified vulnerable areas	Traffic Police
Ensure fly ash ponds* are watered every alternate day during summer months (March – May)	Industries
Moderate to poor (ambient $PM_{2.5}$ or PM_{10} concentration value is between 61-120 µg/m³ or 101-350 µg/m³ respectively)	**Agency responsible / Implementing Agency**
Information dissemination Social media, mobile Apps should be used to inform people about the pollution levels, contract details of control room, enable them to report polluting activities / sources to the concerned authorities, and that will be taken by government based on the level of pollution.	TNPCB, District Administration.

Annexure-II

Potential Sources of PM_{10} at Thoothukudi City

Figure 4 Road side Fast Food Shops

Figure 5 Bakery and Night time Shop

Figure 6 Road side Dust Emission

Figure 7Road Transport Emission

Figure 8Vehicular Emission

Figure 9 Vehicular Emission

Figure 10 Roadside Suspended Dust Particles and Power Plant of Thoothukudi