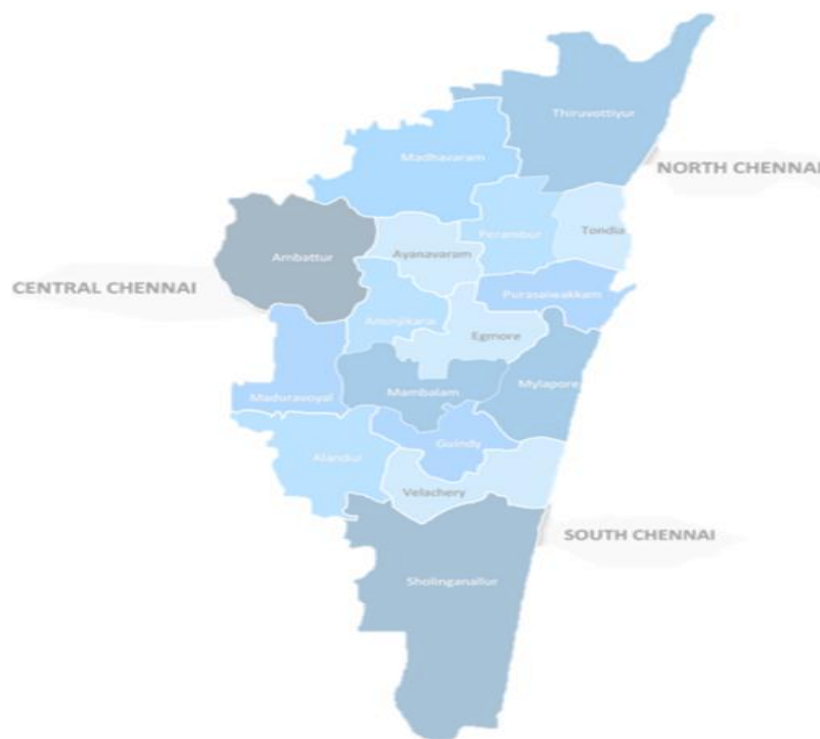


ACTION PLAN FOR CONTROL OF AIR POLLUTION IN MILLION PLUS CITY OF TAMILNADU (Revised)

CHENNAI U. A



Tamil Nadu Pollution Control Board
76, Mount Salai,
Guindy, Chennai - 600 032

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1. INTRODUCTION

Ambient air pollution has become one of the major health threats to the Indian population during recent decades. An effective clean air action plan is a powerful tool for achieving clean air for cities, comprising a list of mitigation measures for every air pollution source. The Clean air plan is a collection of regulations, policies, and programmes, which aims to improve air quality and public health by identifying cost effective measures to reduce emissions from all the known sources. Government of India launched National Clean Air Programme (NCAP), in 2019, India's flagship program for better air quality in 124 cities to tackle air pollution problems of cities and states with a long-term, time-bound strategy to achieve a 20-30% reduction in the Particulate Matter (PM₁₀) ambient concentrations by 2024 considering the base year 2017.

The Union government has disbursed Rs 4,400 crore as grant in aid for million-plus cities/agglomerations in its Union Budget for 2020-21 for formulating and implementing plans for ensuring cleaner air including capacity-building of the local bodies. The Union Ministry of Finance has released Rs 181 Cr to the city of Chennai U A for the improvement of clean air in million-plus cities on the basis of the recommendations of the 15th Finance Commission for the improvement of air quality for 2020-2025, based on the annual average concentration of PM₁₀ and PM_{2.5}.

2. CHENNAI CITY PROFILE

Chennai, also known as The Gateway to South India, is the capital city of Tamil Nadu located on the coromandel coast off Bay of Bengal and is the biggest industrial and commercial centre in South India. Chennai has grown into a software hub and technological city and is one of the leading Indian cities for banking and finance. It is also known as the automobile capital of India as it is home to several India's automobile companies. The city is also an educational and health destination and houses several recognized institutions in India owned by government as well as private sector.



CORPORATION OF CHENNAI

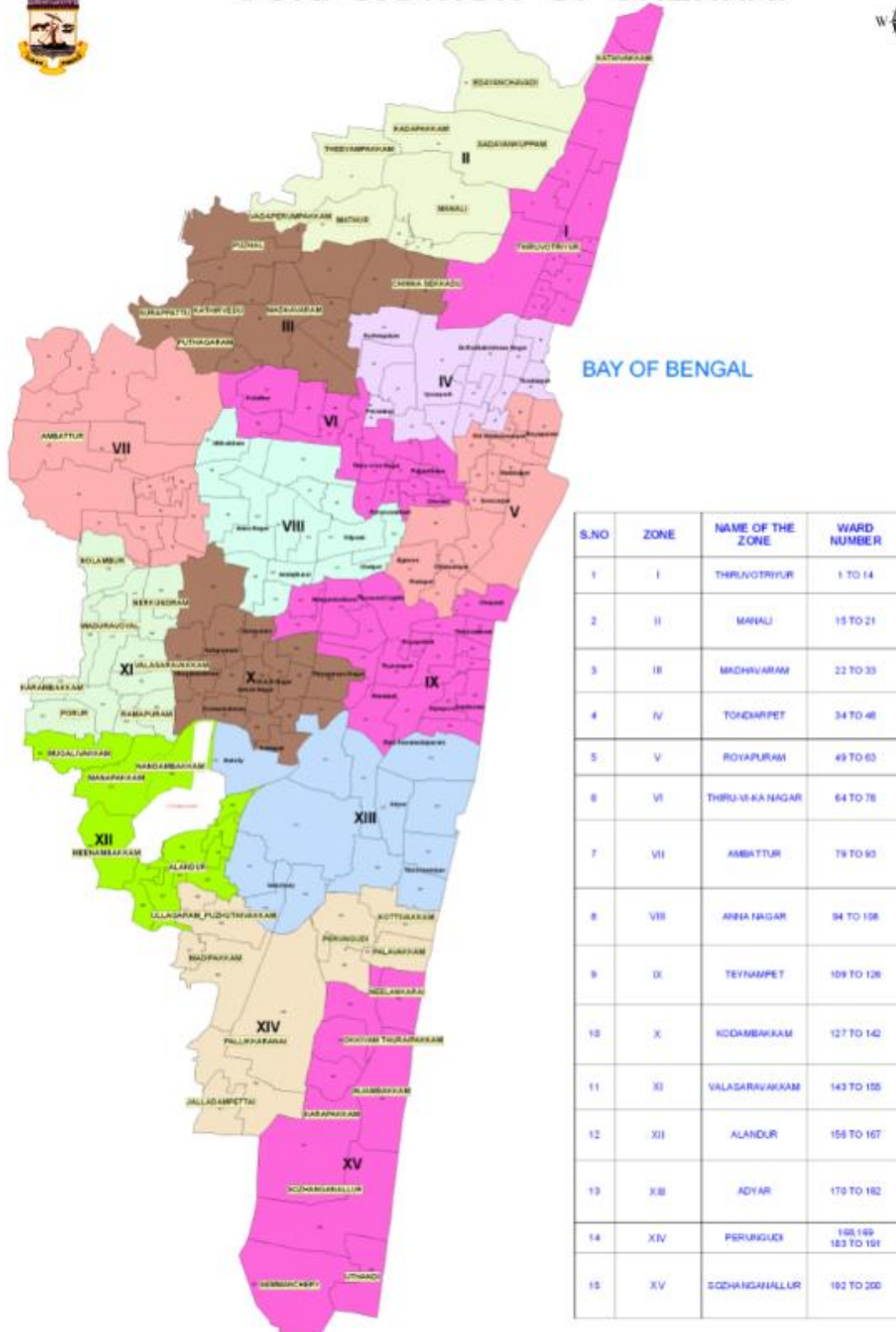


Figure 1: City map of Chennai

Chennai is the epicenter of the urban growth in the state with spill-over in the nearby districts of Kanchipuram and Thiruvallur. Chennai being capital of the State of Tamil Nadu houses the state executive and legislative headquarters in the secretariat buildings. The Madras High court is the highest judicial authority in the state whose jurisdiction extends across Tamil Nadu and Puducherry.

Chennai situated on the shores of the Bay of Bengal, is the capital of Tamil Nadu state. It is the fourth largest metropolis in India. Its older name 'Madras' was officially changed to 'Chennai' in 1996. Chennai Metropolis [with latitude between 12°50'49" and 13°17'24", and longitude between 79°59'53" and 80°20'12"] is located on the Coromandel Coast in southern India and the land is a flat coastal plain. Three rivers viz. Kosasthalaiyar, Cooum and Adyar pass through the Chennai Metropolitan Area. These rivers are placid and meander on their way to the sea. Buckingham Canal, a man-made canal, is another large waterway which runs north south through this Metropolis. Sholavaram lake, Red Hills Lake and Chembarambakkam lake are the three large lakes in the area.

Chennai Metropolitan Area (CMA) is delineated as the study area and it covers 1189 sq.km with Chennai city -176 Sq.km (which has been expanded to 426 sq.km in 2011), the population of CMA as per Census 2011 was 89 lakhs. Though the decadal population growth in the CMA is 27%, the growth in the Chennai core city is only 8%. Municipalities grew at 41%, Town Panchayats at 67% and Village Panchayats at 91%. Many areas within the Chennai City have shown a negative population growth rate in the last decades, while higher growth is observed in the rest of Chennai metropolitan area.

The proposed Land use pattern of Chennai city master plan is given in the fig 2.

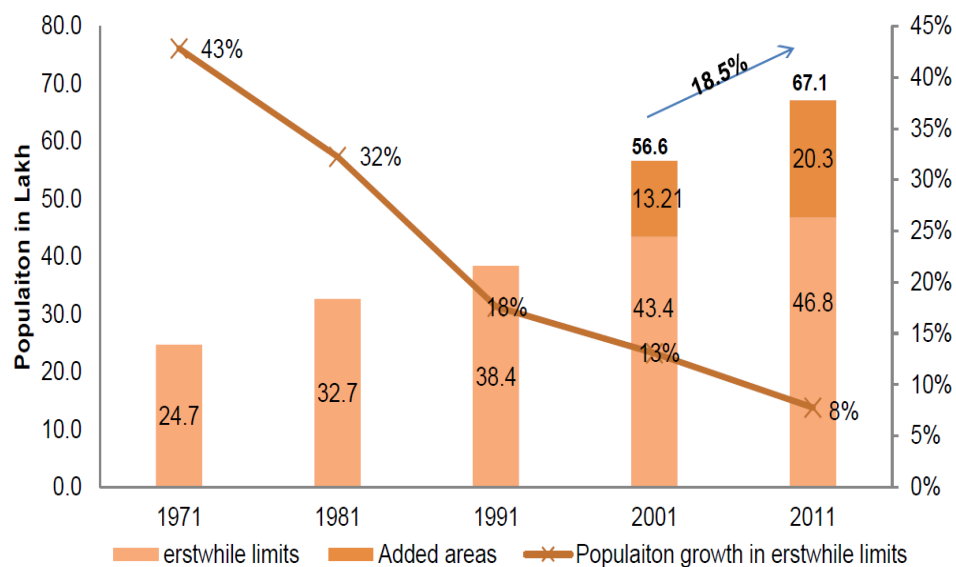
Source:

http://www.cmdachennai.gov.in/Volume1_English_PDF/Vol1_Chapter14_MP_Maps2.pdf

2.1 Demography

According to the 2011 census population, Chennai's population increased to 46, 81,087 at a density of 26,553 per sq. km with 13.42 lakh population in slums. The city is the most densely populated city in Tamil Nadu according to the Census 2011.

The area of the city was expanded in October 2011 from 176 sq.km to 426 sq. km. increasing the population to 66, 78,550. Fig 3 shows the decadal population growth in the city. The erstwhile Chennai city areas saw a growth of 8% from 2001 to 2011 whereas the newly added areas saw a growth of 54% in the period.



Source: Census India. IMaCS Analysis.

Figure 3: Decadal population growth in the Chennai City

2.2 Climate

Chennai city has a tropical wet and dry climate and the weather remains hot and humid for most of the year. As the city lies on the equator and on the coast, extreme variation in the seasonal temperature is not seen. The minimum temperature is around 18-20°C during January and the maximum temperature is around 38-42°C during May – June. The city gets its rainfall from the north-east monsoon winds, from mid-October to mid-December. The average annual rainfall is about 140 cm. The most prevailing winds are the South-westerly between the end of May to end of September and the North-easterly during the rest of the year.

2.3 Major Economic activities in the city

Chennai has an economic base anchored by the automobile, software services, medical tourism, hardware manufacturing and financial services. Other important industries include petrochemicals, textiles and apparels. The Chennai Port and Ennore Port contribute greatly to its importance.

Major economic activities are trade & commerce, tourism related activities and to some extent industrial activities. The city houses various health care facilities, IT, automobile, rubber, chemical, and textile manufacturing industries and has also developed as a Tier one city for information technology as well.

3. CURRENT STATUS AMBIENT AIR QUALITY IN CHENNAI U A

The major sources of air pollution at Chennai city are road dust, vehicular emission, construction activities, Industries etc., (source: <https://cpcb.nic.in/displaypdf.php?id=Q2hlbm5haS5wZGY=>) TNPCCB is regularly monitoring the ambient air quality at Chennai through eight manual NAMP stations installed in and around the city 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. In

addition to the NAMP stations, ambient air quality is measured by seven Continuous Ambient Air Quality Monitoring Station (CAAQMS). The locations of the NAMP and CAAQMS are given in the table 1 and fig 4.

Table. 1: The locations of NAMP and CAAQMS in Chennai U A

Manual	CAAQMS
1. Kathivakkam	1. Kathivakkam
2. Manali	2. Koyambedu
3. Thiruvottiyur	3. Royapuram
4. Anna Nagar	4. Perungudi
5. Adyar	5. Kodungaiyur
6. Thiyagaraya Nagar	6. Manali
7. Kilpauk	7. Gummidipoondi
8. Nungambakkam	

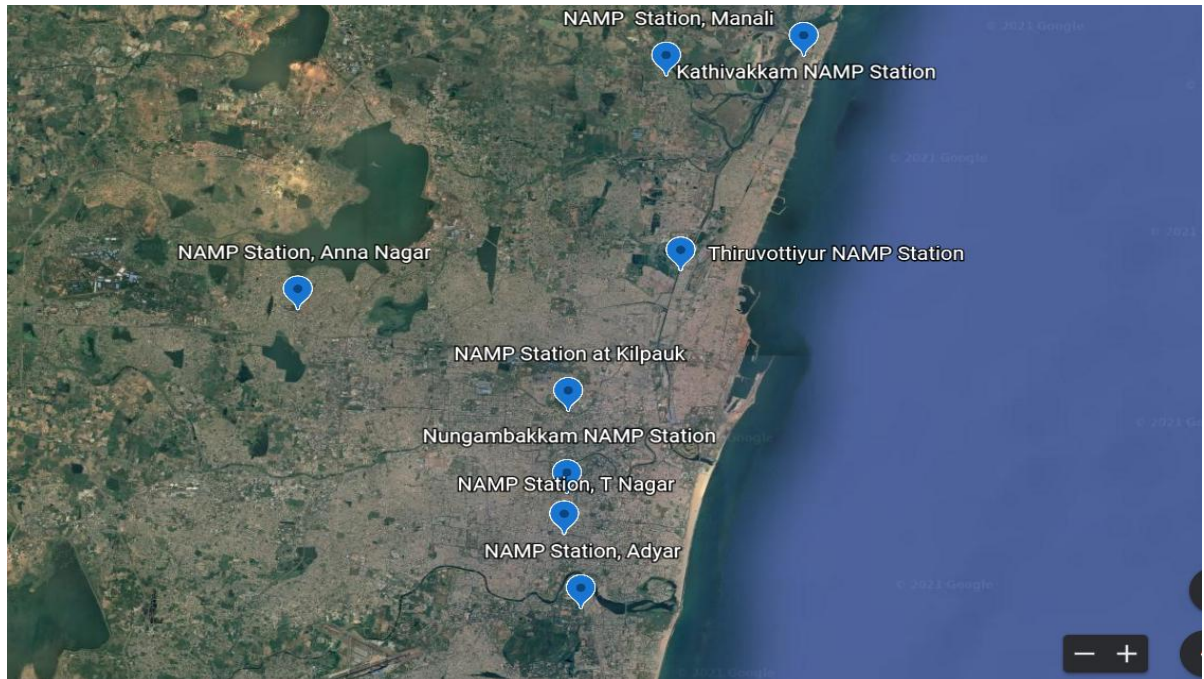


Figure 4: Locations of NAMP Stations in Chennai U A

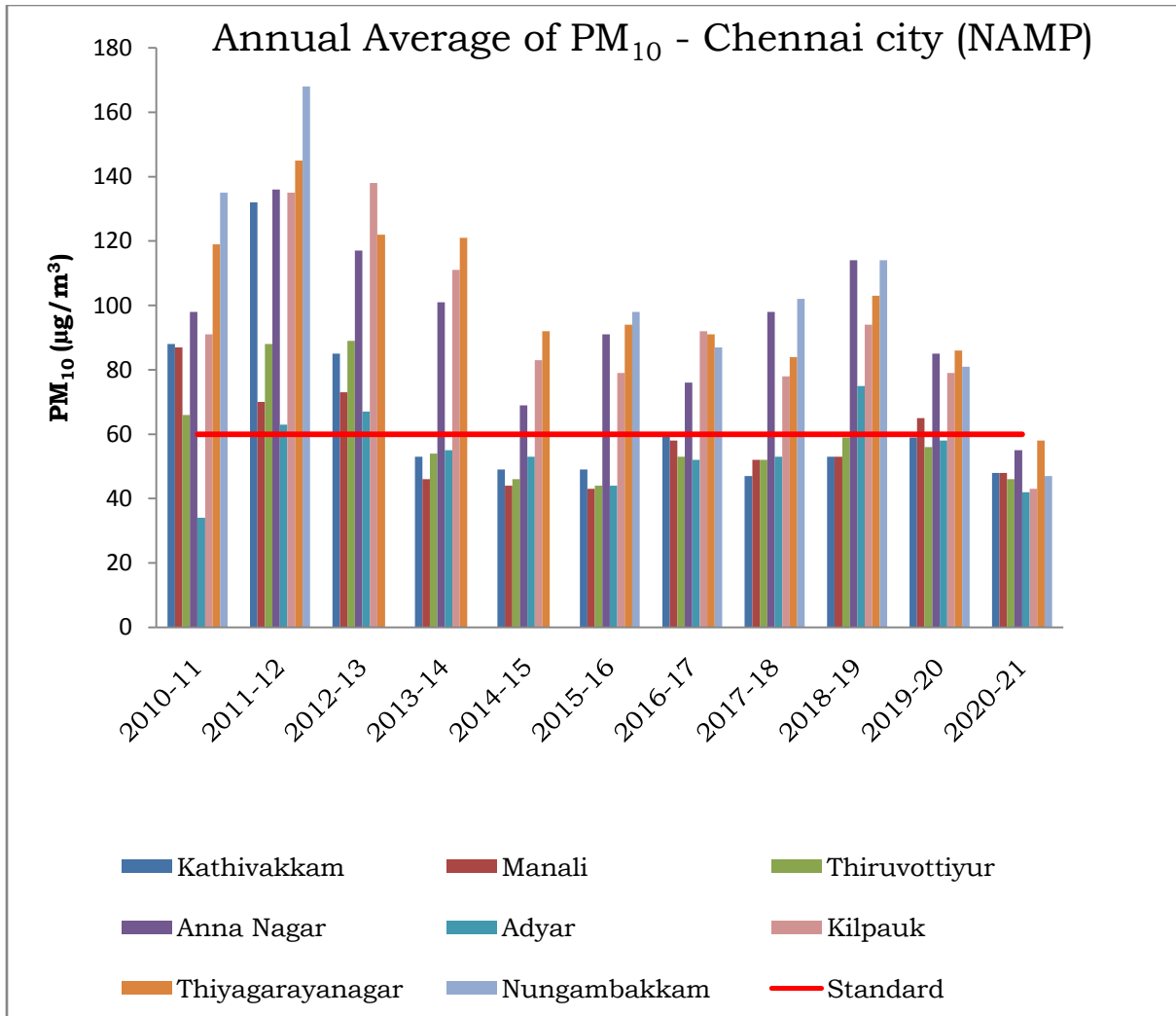


Figure 5: Annual average of PM₁₀ – Chennai City

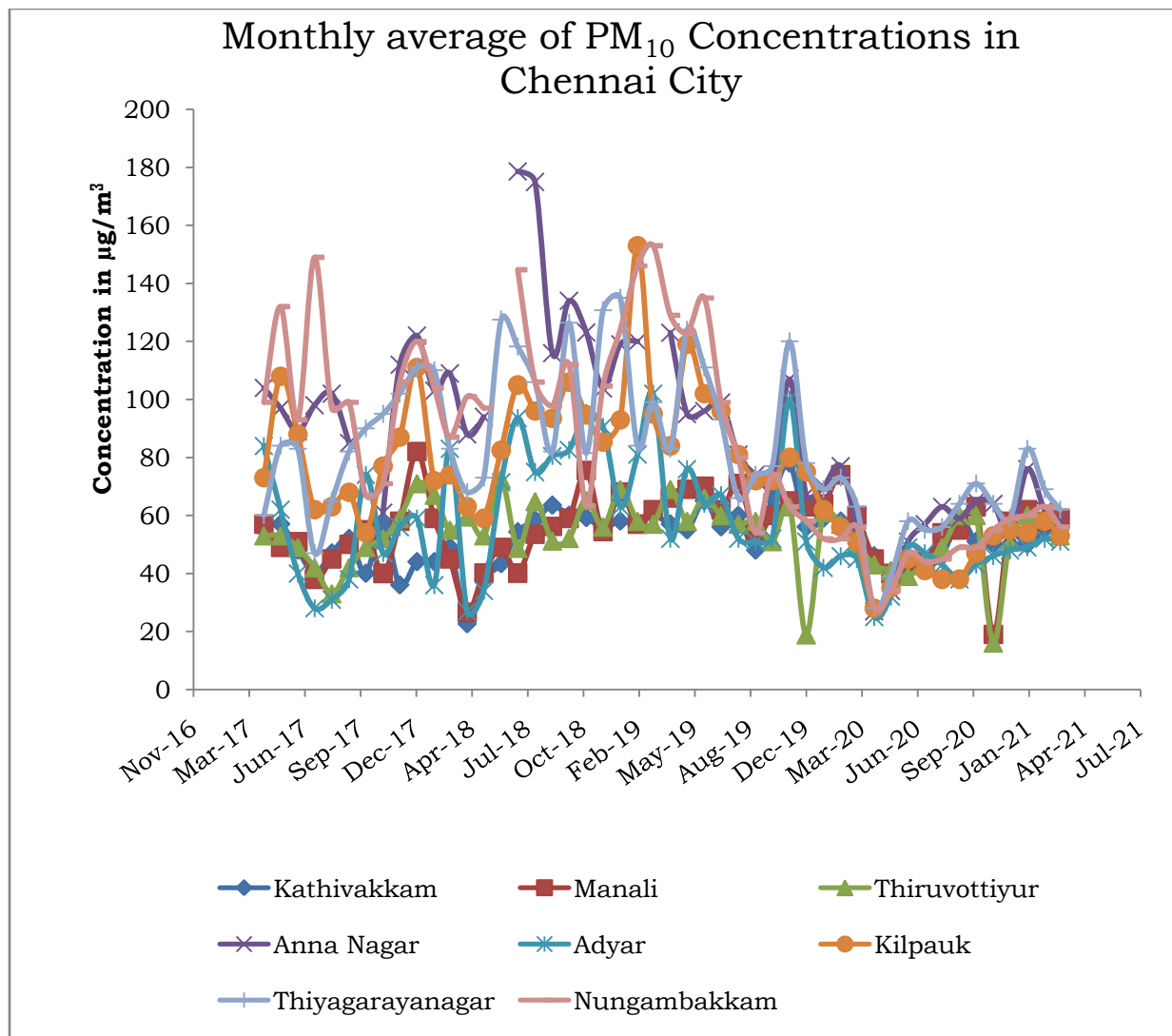


Figure 6: Monthly average of PM₁₀ Concentration in Chennai U A

Table 2: Annual Average of PM₁₀ values in Chennai U A

Year	Kathivakkam	Manali	Thiruvottiyur	Anna Nagar	Adyar	Kilpauk	Thiyagaraya nagar	Nungam-bakkam	Average PM ₁₀ in the City
	$\mu\text{g}/\text{m}^3$								
2010-11	88	87	66	98	34	91	119	135	90
2011-12	132	70	88	136	63	135	145	168	117
2012-13	85	73	89	117	67	138	122	--	99
2013-14	53	46	54	101	55	111	121	--	77
2014-15	49	44	46	69	53	83	92	--	62
2015-16	49	43	44	91	44	79	94	98	68
2016-17	60	58	53	76	52	92	91	87	71
2017-18	47	52	52	98	53	78	84	102	71
2018-19	53	53	59	114	75	94	103	114	83
2019-20	59	65	56	85	58	79	86	81	71
2020-21	48	48	46	55	42	43	58	47	48
Annual Average Standard= 60 $\mu\text{g}/\text{m}^3$									

Air quality category based on PM₁₀ Concentration furnished in Table 3.

Table 3: Air Quality Categorization

Category	PM ₁₀ µg/m ³
Severe + or Emergency	Ambient PM ₁₀ concentration values of 500 µg/m ³ persist for 48 hours or more
Severe	Ambient PM ₁₀ concentration value is between 430 µg/m ³
Very Poor	Ambient PM ₁₀ concentration value is between 351- 430 µg/m ³
Poor	Ambient PM ₁₀ concentration value is between 251- 350 µg/m ³
Moderate to poor	Ambient PM ₁₀ concentration value is between 101- 250 µg/m ³
Satisfactory	Ambient PM ₁₀ concentration value is between 51- 100 µg/m ³
Good	Ambient PM ₁₀ concentration value is between 0- 50µg/m ³

Based on the observed PM₁₀concentration (Fig 4 & 5), the concentration of the PM₁₀pertains to yearly and monthly average for the period April-17 to March 21 at Kathivakkam, Manali, Thiruvottiyur, Annanagar, Adyar, Kilpauk, Thiagarayanagar and Nungambakkam are varied from 47 to 60, 43 to 65, 44 to 59, 55 to 114, 42 to 75, 43 to 94, 58 to 103 and 47 to 114. Air quality data PM₁₀ (24h) concentration of Chennai city during the period April 2017 to March 2021 showed the Chennai city falls under “**Satisfactory**”.

4. MAJOR POLLUTING INDUSTRIES IN CHENNAI

Chennai district in Tamil Nadu constitutes the metropolitan city of Chennai which is one of the leading Industrial towns in the country. Chennai is hub of Information Technology and has Cluster of many Cluster group industries. The list of major polluting industries in Chennai U A is given in the table 4.

Table. 4: The details of major polluting industries in Chennai U A

S.No	Name of Industry	Category	Classification
1	Piramal Enterprises LTD	Red	Large
2	MRF LTD	Red	Large
3	Ashok Leyland LTD	Red	Large
4	SRF LTD-Technical Textile Business	Red	Large
5	Manali Petrochemicals LTD Plant II	Red	Large
6	Coromandel International LTD	Red	Large
7	Hinduja Foundries LTD	Red	Large
8	ITC LTD-Packaging and Printing Division	Red	Large
9	Manali Petrochemicals LTD-Plant I	Red	Large
10	CPCL Propylene Butylene Lube Plant	Red	Large
11	CPCL Refinery I II CPP	Red	Large
12	TPL-Heavy chemicals Division	Red	Large
13	TPL -Lab Plant	Red	Large
14	Madras Fertilizers LTD	Red	Large
15	Cetex Petrochemicals LTD	Red	Large
16	Royal Enfield-Unit of Eicher Motors LTD	Red	Large
17	Kothari Petrochemicals LTD	Red	Large
18	Indian Additives LTD	Red	Large
19	CPCL- Hexane Plant	Red	Medium
20	Brakes India LTD	Red	Large
21	Lucas TVS LTD	Red	Large
22	Rane Brake Lining LTD	Red	Large
23	Mohan Breweries and Distilleries LTD	Red	Large
24	Sundaram Fastners LTD	Red	Large
25	Manali Petrochemicals LTD Plant II POWER	Red	Large
26	Coromandel International LTD-AMM Storage	Red	Large
27	CPCL -DHDS Plant	Red	Large
28	Balmer lawrie and CO LTD-Leather Chem DN	Red	Large

29	CPCL Refinery III	Red	Large
30	MIL Industries LTD	Red	Large
31	IOCL Chennai-Madurai Pipeline Project	Red	Large
32	Tamil Nadu Co-op Milk Producers FED	Red	Large
33	IOT Infrastructure Energy Services LTD	Red	Large
34	IOCL Chennai-Bangalore Pipeline Project	Red	Large
35	NATCO Parma LTD, Chemical Division	Red	Large
36	IOCL Manila-Airport ATF Pipeline Project	Red	Large
37	Ballmer Lawry Co LTD Grease Division	Red	Large
38	Tamil Nadu Co-op MPF LTD Central Dairy	Red	Large
39	Cookson India LTD	Red	Large
40	Tamil Nadu Petro Products LTD - ECH PLA	Red	Large
41	Raj Petro Specialties PVT LTD	Red	Large
42	Ultramarine and Pigments LTD	Red	Large
43	Cetex Petrochemicas LTD-Fine Chem-UNIT I	Red	Medium
44	CPCL-Tertiary Sewage Treatment Plant	Red	Large
45	Balmer Lawrie and Co LTD-Barrel Division	Red	Large
46	Madras Fertilizers LTD-TTP	Red	Medium
47	CPCL-Twenty MW GTG Power Plant	Red	Large
48	TPL - Power Plant	Red	Large
49	Kothari Indl Corpn Ltd Fertilizer Division	Red	Medium
50	CPCL Crude Pipeline Chennai Port to CPCL	Red	Large
51	TMTE Metal Tech PVT LTD	Red	Large
52	CPCL - Resid Upgradation Project	Red	Large
53	Kothari Petro Chemical Limited - Power P	Red	Large
54	Hindustan Petroleum Corporation Ltd Casi	Red	Large
55	Basin Bridge Gas Turbine Power Station	Red	Large
56	IMC limited	Red	Large
57	HPCL, BBT, (Closed)	Red	Large
58	INDIAN OIL CORP. LTD., Foreshore Terminal	Red	Large
59	Bharath Petroleum Corporation Limited	Red	Large
60	Gemini Industries and Imaging Ltd-closed	Red	Medium
61	Indian Oil Corporation Ltd-TDR Terminal	Red	Large
62	Indian Oil Corporation Ltd-Krpt Terminal	Red	Large
63	India Pistons Limited	Red	Large
64	Southern Railway Carriage and Wagon Work	Red	Large
65	GMR Power Corporation ltd	Red	Large
66	Exide Industries Limited	Red	Large
67	ICF Shell Division	Red	Large
68	Creative Tannery Limited	Red	Medium

69	Mechanical Ore Handling Plant - Closed	Red	Medium
70	Simpson and Company Limited	Red	Large
71	Integral Coach Factory Furnishing Dvn	Red	Large
72	Indian Oil Corporation Double Entry	Red	Large
73	HINDUSTAN PETROLEUM CORP. LTD.,	Red	Large
74	IMC Limited	Red	Medium
75	Ms/Shasun Chemicals Bio Tech	Red	Large
76	Southern Railway Loco Works	Red	Large
77	Chennai International Terminals Pvt Ltd	Red	Large
78	Madras Fertilisers Limited	Red	Medium
79	Oil Dock I and II	Red	Large
80	Chennai Container Terminal (DP WORLD)	Red	Large
81	Hind Agro Industries PVT LTD	Red	Large
82	Chennai Port Trust	Red	Large
83	Chennai Port Trust-Revetment structure	Red	Large
84	Indian oil Corporation Limited FORESHORE	Red	Large
85	Indian Oil Corporation,	Red	Large
86	IOCL Foreshore Terminal Pipeline	Red	Large
87	The TamilNaduCo op Milk Producers	Red	Large
88	Chennai International Airport	Red	Large
89	Indian Oil Corporation Ltd aviation fuel	Red	Large
90	Integrated MSW Pro facility Perungudi	Red	Large
91	Adhesives and Chemicals	Red	Large

Source: TNPCB

5. CURRENT STATUS OF TRANSPORTATION IN CHENNAI

(Source: Chennai Mobility Plan)

Various developmental activities in the Chennai Metropolitan Area (CMA – 1189 sq km) have attracted people to migrate from Tier-II cities and even from other states. The Census 2011 population of CMA is about 89 lakhs. Chennai Master Plan 2026 has projected a population of 125.82 lakhs for the Chennai Metropolitan Area (CMA) with a proposed public and private mode share of 70:30. The combined share of public transport buses and train has decreased from a considerable 54% in 1970 to 28.5% in 2014 with increased private transport trips.

Large-scale urbanization in IT/ITES and industrialization with the rapid growth of vehicular population has laid severe stress on urban transport system in city. The city has about 48 lakhs vehicles as per Tamil Nadu government vehicle statistics. The usage of private modes is increasing unabated mainly due to inadequate public transport facilities.

The existing travel and transport characteristics of the study area were assessed through primary surveys to understand the trip patterns, travel demand, transport infrastructure needs, mobility issues and to develop travel demand model. In order to understand traffic and travel characteristics, including the origin, destination, mode choice, socio-economic characteristics, cost, distance and user preference various primary surveys were conducted. Based on the primary survey analysis, the below mentioned observations were identified in the Table 5.

Table 5: Travel and Transport characteristics

Total number of trips (Daily)	157 lakhs
Per Capita Trip Rate	1.62
Motorized Trip Rate	1.17
Average Trip Length	9.9 km
Motorized Public Transport mode share (Bus+Rail)	28.20%
Average vehicle speed	25.8 kmph (CMA) 17 kmph (Chennai City)

Analysis of household survey data has revealed significant increase in household income, per capita trip rate, share of trips performed by motorized two wheelers & cars, trip lengths by various modes while there has been a sizeable reduction in the percentage share of trips by public transport modes.

- Household size of 3.77 is observed in the current study, when compared with 2008 CTTS (4.07).

- Average household income has increased from Rs.8700 in 2008 to Rs.21875 in 2018 at a CAGR of 9.7% where the average household income has increased from Rs.1370 in 1992 to Rs.8700 in 2008 at a CAGR of 12.4%. The higher the house hold income level trips rate is found to higher than the lower income group.
- Number of trips made by various age groups were compared and found that trip makers between 41-65 years in 2008 is 18% whereas in 2018, the share of these trip makers has increased to 25%
- A slightly higher per capita trip rate with 1.62 is observed in 2018 compared to 1.60 in 2008. The motorized per capita trip rate has increased to 1.17 in 2018 from 1.06 in 2008.
- Trips by non-motorized transport decreased from 41% in 1970 study, 40% in 1984 study, 46.6% in (1992-95) and 34% in (2008) to 28% (2018).
- Cyclist opinion survey revealed that amongst users, 73% travel for work while 10% travel for educational purpose with about 84% travelling daily. Among the problems cited in using bicycle, interference due to parking/pedestrians/bus stops ranked first.

The mode share observed in the present study is given in the table 6.

Significant decrease in the percentage of trips by bus is observed from HHI survey- 22.6% in 2018 when compared 26% in 2008 (CTTS-2008) while there is significant increase in the percentage of trips by train from 5 % in 2008 to 5.60% in 2018.

Table 6: Mode share in the Chennai City

S No	Travel Model	2008	2018
1	Walk	28.0%	25.1%
2	Bicycle	6.0%	2.9%
3	Auto-rickshaw	4.0%	7.1%
4	Car/van	6.0%	7.1%
5	Two-wheeler	25.0%	29.6%
6	Bus	26.0%	22.6%
7	Train	5.0%	5.6%
	Total	100%	100%

5.1 Existing Public Transport Scenario in Chennai

City level transportation demand is catered predominantly by Metropolitan Transport Corporation buses (MTC), Commuter rail system including elevated Mass Rapid Transit System (MRTS), Chennai Metro Rail (CMRL) and Intermediate Public Transport System (IPT) in the form of shared services along major arterials.

5.2 Bus Transport

The bus service in Chennai metropolitan area is operated by metropolitan transport corporation (Chennai) and it covers most of the CMA and even covers up to 50 km to places beyond CMA limit. As per 2019-20 data, MTC has a total fleet of 3828 buses which operate in 684 different routes (MTC, Chennai). MTC bus services carried around 30.86 lakhs passengers daily. The MTC has 33 depots, each with an average parking capacity of 100 buses. Tambaram and Anna Nagar depots, with 222 and 214 buses each respectively are the largest,

and Basin bridge depot, with only 45 buses, is the smallest. About 387.35 km of roads within CMA are demarcated as bus route roads.

5.3 Commuter Rail System

The commuter rail system in CMA, operated by the Southern Railways, consists of following three broad gauge lines including Chennai Beach- Tambaram line running north-south, Chennai Central-Tiruvallur line running east-west and Chennai Central - Gummidipoondi line running north-south. Besides, MRTS) operates on Chennai Beach - Velachery section for a length of about 20 km. The commuter rail network together contributes to about 17.5 lakh daily passengers.



Table 7: Details of area covered by commuter rail system

S.No.	Line detail	Area covered	Distance (km)
1	Sub – urban Line	Chennai Beach – Vandalur	34.4
2		Chennai Central – Thiruninravur	29.0
3		Chennai Central – Minjur	26.0
4	MRTS	Chennai Beach – Velachery	19.34
Total Length (Km)			108.74

5.4 Chennai Metro Rail Limited

The Phase-I of Chennai Metro covers 54 km in two corridors - Washermanpet to Airport (23.085 Km), Chennai Central to St. Thomas Mount (21.96 km) and extension from Washermanpet to Wimco Nagar (9 km) in Thiruvottriyur. The portions of Corridor-1 with a length of 14.3 kms from Washermanpet to Saidapet, and Corridor-2 with a length of 9.7 km from Chennai Central to Anna Nagar 2nd Avenue are underground and the remainder elevated. Initially, a stretch of 10.7 km from Koyambedu to Alandur in Corridor 2 became operational from June 2015 and the operation of final section of Phase-I i.e., extension from Washerman pet to Wimco Nagar was commissioned in 2021

With a view of developing effective and efficient mass transit system in addition to the existing public transportation and Phase-I Metro rail system, construction of phase -II for 119 km covering 3 corridors - C3, C4 and C5 has been started.

5.5 Intermediate Public Transport (IPT)

Intermediate public transport fills the gap between public and private transport systems in the city. The IPT modes currently operating in the city include autorickshaws, call taxis and Share auto/ share Taxis. Share auto and share taxis are one of the predominant modes of transport in Chennai serving major arterials in the city along existing bus routes. The services are provided by three wheelers and four-wheeler shared transport like Tata Magic etc.

5.6 Chennai Unified Metropolitan Transport Authority (CUMTA)

In Chennai, the Unified Metropolitan Transport Authority is already under process of implementation, which would be a single body to monitor the implementation of various traffic and transportation measures, including promoting the cause of public mass passenger transport systems and regulating their operations, bringing out a unified ticketing system and aimed at better connectivity of the various modes of public transport for the public to be able commute seamlessly besides implementation of traffic and transportation infrastructure in the CMA. The CUMTA Act, which was aimed at framing an urban transport policy for the CMA on the lines of the National Urban Transport Policy, received the assent of the Governor in year 2010 and was published in the Tamil Nadu Gazette Extraordinary in December, 2010. Eight years after assent, the CUMTA Act and relevant rules have been notified in January 2019 paving way for integrated functioning of Multimodal Transport System.

Initially, the committee had the Transport Minister as the chairman. However, in September 2020, Tamil Nadu Assembly passed a bill to amend the Chennai Unified Metropolitan Transport Authority (CUMTA) Act, 2010, to make the Chief Minister the chairman of the CUMTA. This has been done to bring all sectors concerning various public transport facilities under one umbrella. While the Chief Minister would be the chairman of the CUMTA, the committee will have the Minister for Housing and Urban Development, Transport Minister, Chief Secretary and Vice-Chairman of the Chennai Metropolitan Development Authority (CMDA), as ex officio members.

6. PAST MEASURESTAKEN TO CONTROL AIR POLLUTION IN CHENNAI CITY.

The Government of Tamil Nadu has taken action to tackle air pollution in the city of Chennai with various departments.

Table 8: Past measures taken to tackle air pollution in Chennai City

S No	Departments/ Agencies	Actions	Status of action
1	Greater Chennai Corporation	The Greater Chennai Corporation has procured 7 Nos of High-capacity Super Sucker, 4 nos of Robotic Excavator, 2 nos of Amphibious Excavators and 3 nos of Mini Amphibian.	Regular and continuous activity is done
		Corporation has 16 nos of road mechanical sweepers to clean the mud and dust in the roads	Regular and continuous activity is done
		Development of Miawaki forest and parks	Corporation has 38 Nos of Miawaki forest at 35 locations of total 15 zones of the Chennai Urban Agglomeration. Present status and plan: 1. Completed- 18 Nos 2. In progress- 9 Nos 3. To be taken up- 8 Nos 4. No. of trees already planted- 64,352 Nos 5. No. of trees to be planted- 34237
		Procurement of e-vehicles for the Solid waste collection vehicle	Corporation has procured 419 numbers of electrical vehicles and planning to procure 1684 e- vehicle for the collection of solid waste at the corporation

S No	Departments/ Agencies	Actions	Status of action
			jurisdiction.
		GCC has implemented Non- Motorized Transport (NMT) projects in various places across the city	A total of 20 road networks have been implemented with NMT facility across the Chennai city.
		GCC has implemented Multi Level Parking (MLP) at one location	MLP at an extent of 43500 sq.ft has been constructed under Smart City Mission 2018 Fund at Thanikachalam Road which has 2 Basements +G +5 Floors with 513 Nos. of 2 wheelers & 222 Nos. of 4 wheelers parking facility
		GCC has implemented dedicated cycle lane project	17 km stretch already been completed
		GCC has been adopted street guidelines for paving of roads and footpaths	4 Volumes of guidelines with the details of planning, design, implementation and evaluation has already been published.
		GCC has constructed multiple advanced waste management site	Total of 393 sites has already been completed.
		GCC has implemented multiple solid waste segregation and processing centers across the city	Number of authorized colonies for waste segregation- 1767
		GCC has implemented multiple plants for horticulture waste processing	5 plants with 400 TPD per day
2	TNPCB	National Ambient Air Quality Monitoring Stations (NAMP) – 8 Nos (functioning since 1996) Continuous Ambient Air quality Monitoring Station –(CAAQMS) 7	TNPCB is regularly monitoring ambient air quality and data are updating in the web portal of TNPCB and CPCB.
		Directions issued by TNPCB for reducing the	TNPCB is regular monitoring the industrial emission and

S No	Departments/ Agencies	Actions	Status of action												
		Industrial emission	taking actions against the violators.												
3	Transport department	Regular checking of vehicular emission and issue of PUC	12,905 Nos of check report are issued for not carrying PUC and 10,33,321 PUC are issued by Transport department upto October 2020. Out of 127 emission testing centers, 41 centers are linked with remote server and eliminate manual intervention in PUC (Vahan portal)												
		Battery operated vehicles (BOV)	4 Nos of E –buses are registered in Chennai Total of 10728 Nos. of BOV are registered in Chennai												
			<table><tr><td>Type of vehicle</td><td>Numbers</td></tr><tr><td>E-rikshaws with cart</td><td>2802</td></tr><tr><td>Two-Wheeler</td><td>7512</td></tr><tr><td>E-motor car</td><td>408</td></tr><tr><td>Three wheeler</td><td>5</td></tr><tr><td>Motor-cab</td><td>1</td></tr></table>	Type of vehicle	Numbers	E-rikshaws with cart	2802	Two-Wheeler	7512	E-motor car	408	Three wheeler	5	Motor-cab	1
		Type of vehicle	Numbers												
		E-rikshaws with cart	2802												
Two-Wheeler	7512														
E-motor car	408														
Three wheeler	5														
Motor-cab	1														

7. PROPOSED STUDY ON 'SOURCE WISE CAUSE ANALYSIS FOR THE AIR POLLUTION

7.1 Source Apportionment

A Common methodology for the study has been designed by the CPCB. Accordingly, the study has to focus on air quality monitoring, development of emission inventory, dispersion and receptor modeling, collection of primary data and Secondary data and finally the development of an air quality management plan. A schematic for the overall approach for the source apportionment study is show in the figure 7.

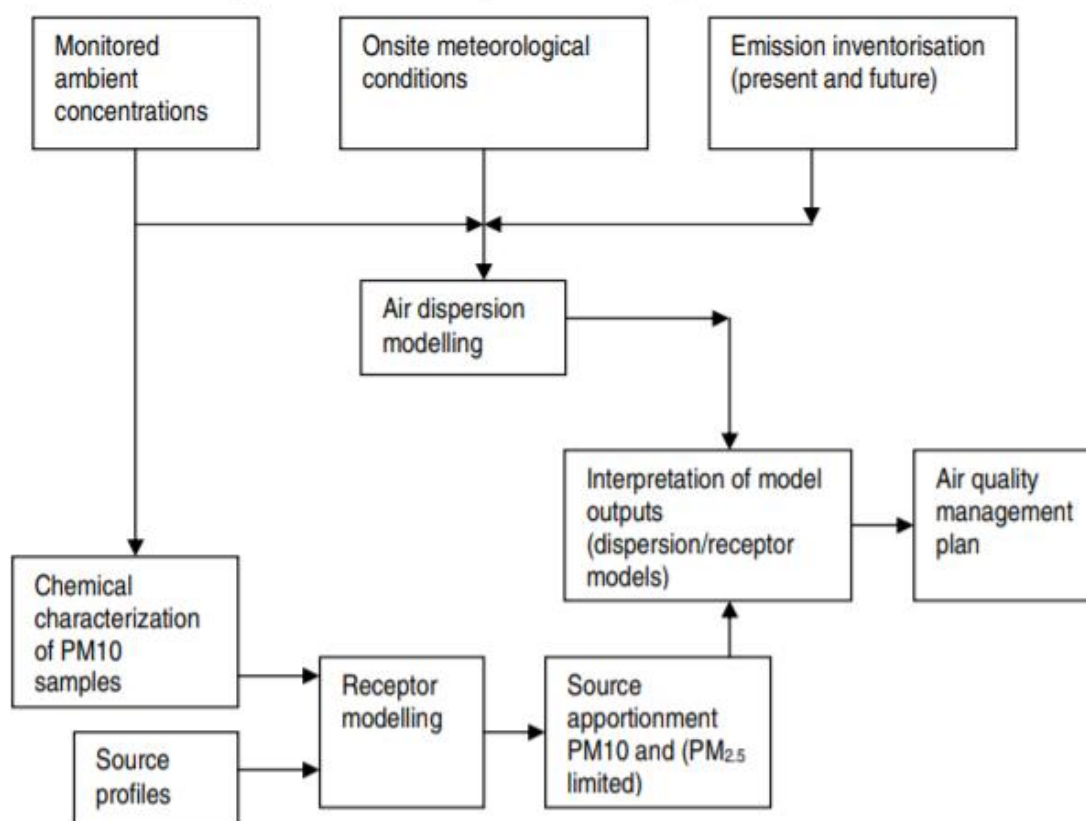


Figure 7 : Overall approach for the Source Apportionment

The samples of PM₁₀ will be collected from existing and any new locations. The PM₁₀ and PM_{2.5} sampling will be collected using respirable dust sampler through glass fiber filter and Teflon filter paper, respectively. The 24h sampling of PM₁₀ and PM_{2.5} will be carried out. The concentration of the PM₁₀ and PM_{2.5} will be calculated based on the gravimetric analysis. The chemical analysis will be carried out in the collected samples for Elements through XRF (X-Ray fluorescence), Scanning Electron Microscopy-Energy-Dispersive X-Ray (SEM/EDX), Total Organic Carbon analyzer, Thermal Optical Transmittance, and Ion Chromatography.

7.2 Emission Inventory

Emission inventory is an important tool for identifying the source of pollutants and quantitative expression of pollution load in a defined area at a particular time. Emissions inventories are an essential input to mathematical models that estimate air quality. The effect on air quality of potential regulatory actions can be predicted by applying estimated emissions reductions to emissions inventory data in air quality models.

Emission trends over time can be established with periodic updates of the emissions inventory. Inventories also can be used to raise public awareness regarding sources of pollution. An emissions inventory includes estimates of the emissions from various pollution sources in a geographical area. It should include all pollutants associated with the air quality problems in the area.

An emissions factor is a representative value that attempts to relate the quantity of a pollutant emitted with an activity level associated with the emission of that pollutant.

These factors are usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant (e.g., kilograms of particulate emitted per mega gram of coal burned). Such factors facilitate estimation of emissions from various sources of air pollution. In most cases, these factors are simply averages of all available data

of acceptable quality and are generally assumed to be representative of long-term averages for all facilities in the source category (i.e., a population average). Emission factors have long been the fundamental key to developing emissions inventories for air quality NAAQS implementation.

The general equation for emissions estimation is:

$$E = A \times EF \times (1 - ER/100)$$

Where: E = emissions, A = activity total

EF = Emission factor

ER = Overall reduction efficiency

EF = emission factor, and ER = overall emission reduction efficiency percent. The ER term is the combination of the relevant percentages related to emissions controls and rules that reduce emissions, as listed in Section 2.5.18. Emission factors are not limited to factors that are only representing broad national industry averages published by the EPA. Emission factors can also be stack-, process-, unit-, or facility specific, depending on the basis of the source test information. Whether for a single facility or a group of facilities of the same type, it is still considered an emission factor for the purposes of this guidance.

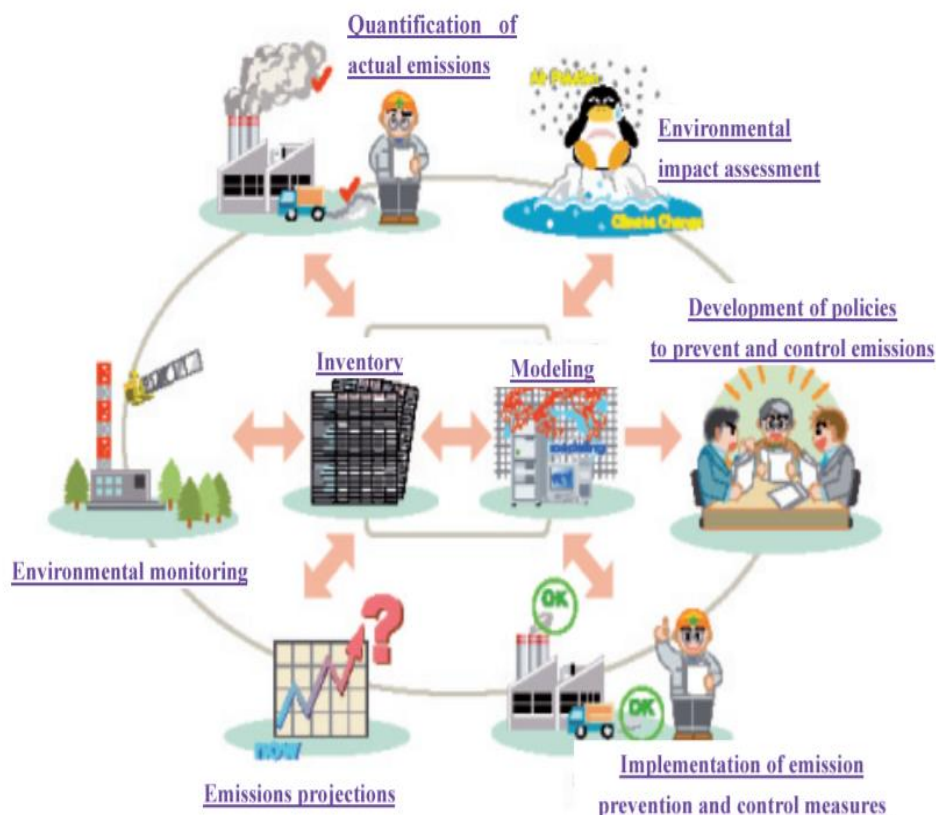


Figure 8: Role of the emission inventory for air quality management

(Source <https://www.acap.asia/wp-content/uploads/emissioneng.pdf>)

The quantitative emissions estimates provided by an inventory promote a better understanding of the actual emissions and help to raise the awareness of both policy makers and the general public. Through this process, the major emission sources can be identified, priorities for emission reduction defined and any data gaps requiring further work are revealed.

Emission inventory will be carried out based on the secondary data collection with the PM₁₀. An emissions inventory is a database that lists, by source, the amount of air pollutants discharged into the atmosphere from the community for a given time period. For listing the sources of air pollution, sources classified as

- Area Sources: Domestic cooking, Bakeries, Crematoria, Hotels and Restaurants, open eat outs, Open burning (refuse/biomass/tyre etc. burning, paved and unpaved roads, construction/Demolition/ Alteration activities for building, roads, flyovers, Waste incineration and DG sets.
- Point Source: Large scale Industries and power plants, Medium scale industries and small scale industries.
- Line Sources: 2Wheelers (Scooters, Motor Cycles, Mopeds), 3 wheeler (Compressed Natural Gas), 4 wheelers, (Gasoline, Diesel, CNG), LCVs (Light Commercial Vehicle), Trucks (Trucks, mini-trucks, multi-axle trucks) and buses (Diesel, CNG).

The major air pollutant sources identified in the city are road dust, vehicular emission, construction activities and industries.

7.3 Atmospheric Assimilative Capacity study for Chennai

Assimilative capacity or carrying capacity is the maximum amount of pollutant load an area can take without exceeding the specified standards (Goyal et. al.,2003)¹. Assimilative capacity of the atmosphere can be determined using two different approaches (Goyal 2006)².

First approach is based on ventilation coefficient, which is directly proportional to the assimilative capacity of the atmosphere and computed through micro-meteorological parameters Second approach is based on pollution potential, which is inversely proportional to the assimilative capacity of the atmosphere and estimated through dispersion models in terms of concentration of pollutants.

¹ Goyal, P., T.V.B.P.S.R. Krishna, and S. Anand. 2003. Assimilative capacity and dispersion of pollutants in Delhi. Proc. Indian Natl. Sci. Acad. Part A 69:775–84

²Goyal, P., S. Anand, and B.S. Gera. 2006. Assimilative capacity and pollutant dispersion studies for Gangtok city. Atmos. Environ. 40:1671–82. doi: 10.1016/j.atmosenv.2005.10.057.

The proposed study on carrying capacity will be using Box model approach concept that assumes air pollutants are uniformly dispersed in the atmosphere by active advection.

Estimation of Annual inflow and out flow of PM₁₀ including the dry deposition and chemical conversion

$$V \frac{dc}{dt} = qC_{in} - qC_{out} + S - K_{dd} \cdot CLW - K_{cr} CV$$

Where, q = volumetric flow rate (m³/sec)

C_{in} = influent air concentration of a pollutant (m³/sec)

C_{out} = effluent air concentration of a pollutant (m³/sec)

K_{dd} = dry deposition velocity (g/sec)

K_{cr} = First order chemical reaction constant (1/sec)

qC_{in} = influent mass flow rate of pollutants (g/sec)

qC_{out} = effluent mass flow rate of pollutants (g/sec)

S = source emission rate (g/sec)

$K_{dd}CLW$ = the amount of pollutants removed by dry deposition (g/sec)

$K_{cr}CV$ = the amount of pollutants converted by chemical reaction (g/sec)

W = wind speed (m/sec)

In equation, V- equal to volume of city (Lx Wx H)

H (m) – mixing height

The model is further simplified with following assumptions

Assuming steady state ($V \frac{dc}{dt}$) = 0,

Pollutant does not undergo any chemical transformation $K_{cr}=0$

Pollutant does not have any deposition in the box $K_{dd}=0$

Carrying capacity can be estimated as follows

$$Q_{cc}=(C -C_o \times u.W.H)$$

In this calculation, Area (A) of the system boundary, Width (W) of the system boundary, mixing height (H) (average for winter and summer) within the system boundary, Wind Speed (s) within the system boundary is required. Background concentration C_B into the system boundary is also required.

8. PROPOSED NEW MOBILITY TECHNOLOGY MEASURES

Technological improvements are important for the city to be smart. Technological improvements can encompass changes in vehicle design, fuel use, energy use and reduction in CO₂ emissions related to the electrically driven vehicles. Various actions framed for the same are:

- a. Smart signaling at intersections
- b. Real time information systems for public transport
- c. Introduce integrated ticketing system
- d. Use of smart parking technologies

As a green initiative to move towards sustainable urban transport, technological transformations in terms of public transport vehicles are suggested. With efforts to reduce carbon emissions the LCMP suggests the use of CNG or electric vehicles.

8.1 Non-Motorized Transport (NMT) streets

More than a third of the state's urban population (67%) depends on walking, cycling and public transport as their primary means of transportation. As a pioneer in recognizing their needs and to promote more usage of these environmentally and economically sustainable modes of transportation, the GCC has introduced a host of initiatives from becoming the first city in

the country to adopt a Non-Motorised Transport (NMT) Policy to transforming over 140 km of Bus Route Roads with safe and accessible footpaths.

In 2019, the Humble Chief Minister launched Chennai's first pedestrian plaza — an iconic public space — for all its citizens including children, women, elderly and specially challenged. The pedestrian plaza has become a must-visit bustling destination for Chennai's citizens and tourists.

In line with its NMT policy and to guide the street redevelopment work going forward, the GCC has also adopted a set of guidelines prepared in line with global best-practices, Indian Roads Congress (IRC) specifications and from its own experience since the past five years. The guidelines cover, planning, design, implementation and evaluation.

Chennai Smart City Limited has established a pedestrian plaza at Sir Thyagaraya Nagar with the aim of utilizing the additional road space to incorporate all essential pedestrian amenities and to create a traffic-free social space for the citizens of Chennai. People, particularly senior citizens and the differently-abled, finally have a place to walk, shop, eat and lounge freely without the fear of motor accidents. This initiative of pedestrianization of roads has acted as a catalyst for economic growth, attracting many tourists and locals alike.

The pedestrian plaza planned by Chennai Smart City Limited and the Greater Chennai Corporation is set up on Sir Thyagaraya Road between Panagal Park and Mount Road at a cost of Rs.40 Crore. The section is characterized by 3 types of cross-sections.

Table 9: Types of Cross Sections

Type of Cross Sections	Length (m)	High lights
Thyagaraya Road from Panagal Park to Thanikachalam Road	730	• Improved walkways on both sides of the road up to Mount Road • Hassle-free wheel chair passage • Ornamental lamp posts with LED lights in the median • Traffic Island at the North Boag and South Boag Roads junction • One high mast lamp post with adequate lighting arrangements.
Thanikachalam Road to Boag Road junction	380	
Boag road to Mount Road junction	525	

8.1.1 Proposed Non-Motorised Transport Streets Project

Further to its efforts in creating high-quality and equitable streets for all, under NMT streets project, GCC has launched the Mega Streets Programme with the aim of reimagining the city’s arterial roads as “complete streets,” taking into account the needs of all street users and uses with the view to the following.

- **Enhancing Livability:** To ensure happiness and the well-being of our citizens
- **Ensuring Seamless Mobility:** For all users including pedestrians, cyclists, women, children, elderly and persons with disabilities.
- **Well-Managed Utility:** To ensure resilience of urban infrastructure with no road cutting necessary for the next 30 years.

The new designs would include continuous footpaths, streamlined carriageways, organized on-street parking and well-planned underground utilities. The designs also integrate bus stops, street vending and all other street furniture, locating them carefully such that they do not hinder the walking experience of pedestrians. The first phase of this programme is taken up as a project spanning over 70 sq. km of the North, Central and South Chennai areas.

Objective of the Project

- To develop a vision for the area of the allocated package.
- To develop detailed street designs for the identified primary mobility corridors, employing a holistic approach, incorporating utility, mobility and livability elements
- To identify secondary streets and other public space projects within the allocated package in order to form a street network; and to develop detailed designs for the same.
- To propose a phasing plan, which specifies the order in which streets will be taken up for redesign, with 5km of primary streets as quick wins
- To ensure that the network plan and street design are based on scientific assessment of needs and behavior of street users, as observed in the surveys as part of this study.

The scope broadly entails

- Designing the arterial and sub arterial streets as *complete streets*, ensuring integration with the different transportation modes, especially mass transit and public transport; ensuring **universal accessibility**.
- Surveying existing **utilities** and seamlessly integrating them as part of the street design using ducts and other innovative technologies.
- Intersection redevelopments to ensure **Road Safety**.

- Designs that enhance the character and **identity of neighbor hoods** (Heritage, Commercial, etc.,)
- Developing **cycling and walking trails** along canal/river edges
- Improving safety on streets that connect to institutions like **anganwadis, schools, religious places, etc**
- By integrating utility management as part of the street design, the need for road-cutting for laying or management of utility lines can be eliminated; increasing the lifespan of the laid roads and the utility lines.
- Providing dedicated ducts for different utilities mitigates accidental damage of utility lines due to both natural events like cyclones, and human errors. It also presents the opportunity to maximize line rental revenue for GCC.

8.2 Outcomes of the Project

Economic Resilience

By integrating utility management as part of the street design, the need for road-cutting for laying or management of utility lines can be eliminated; increasing the lifespan of the laid roads and the utility lines.

Providing dedicated ducts for different utilities mitigates accidental damage of utility lines due to both natural events like cyclones, and human errors. It also presents the opportunity to maximize line rental revenue for GCC.

Climate Resilience

- Interruptions in basic service delivery (electricity, telecom, internet, water supply, sewage management, etc.) due to O&M or natural calamities will drastically come down with the climate resilient infrastructure.

- Integrated storm water design would help improve removal of excess rainwater during heavy rain spells/floods and would improve localized groundwater recharge - helping mitigating water woes during the dry seasons.

Road Safety

Chennai leads the charts in the number of road accidents and injuries/fatalities. Majority of the accidents are caused by human error. And more than 35% of the victims are pedestrians/cyclists. By designing streets with segregated footpaths and dedicated cycle lanes where possible, the project aims to reduce conflict between pedestrians, cyclists and speeding vehicles, thus drastically reducing pedestrian injuries and deaths. By adopting the principles of uniform carriageway, speed calming and compact intersection, the severity of motor vehicle crashes caused by human error would also be drastically reduced.

Environmental Resilience

- The project would encourage people of all age, gender, economic background, physical ability to shift to walking, cycling and public transport as their preferred mode of mobility for shorter trips. This will improve the capacity of our streets, increase productivity and reinforce economic growth.
- By designing the intersections efficiently, the project aims to ensure smooth flow of traffic and to cut down the idling time of vehicles at intersections, drastically reducing green house gas (GHG) emissions from the transportation sector.

- By retaining existing trees and including more greenery as part of the new design, the project aims to improve urban green cover and mitigate urban heat-islands. This would improve the microclimate of the project locales.

Inclusivity

- By prioritizing redesign of bus-plying roads, safe last-mile connectivity will be ensured for all; especially the urban poor and people who don't have access to private vehicles like women, children and elderly.
- The project aims to improve access for physical ability to the streets—reducing their dependency on others for their mobility.

8.3 Project Packages

As the first phase of this project, six packages as shown below, focusing on different neighborhoods in Chennai, have been defined, with a cumulative area of 76.6sq km, which includes a total of ~110 km of Arterial and Sub-arterial streets in the neighborhood of **Anna Nagar, Tondiarpet, Nungambakkam, Mylapore, Velachery** and **Adyar**.

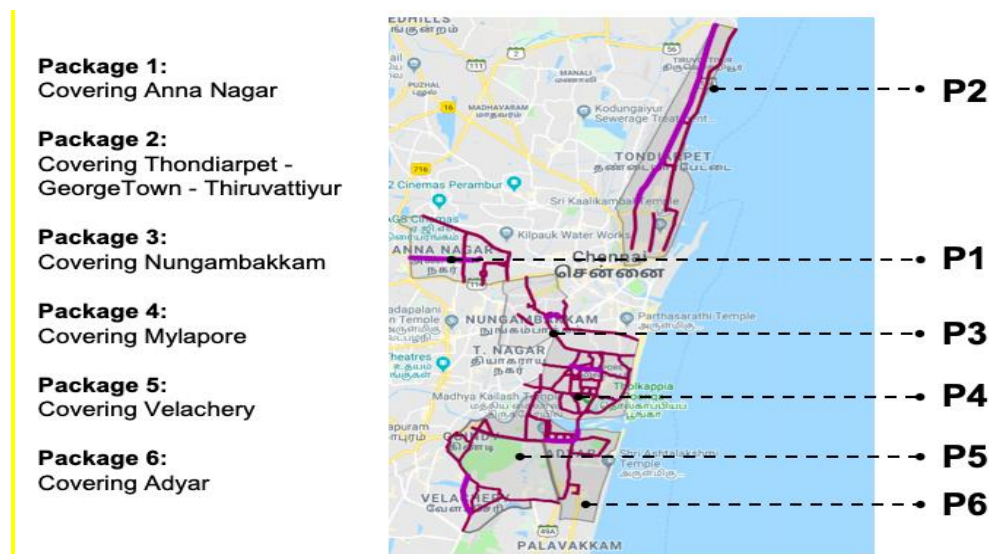
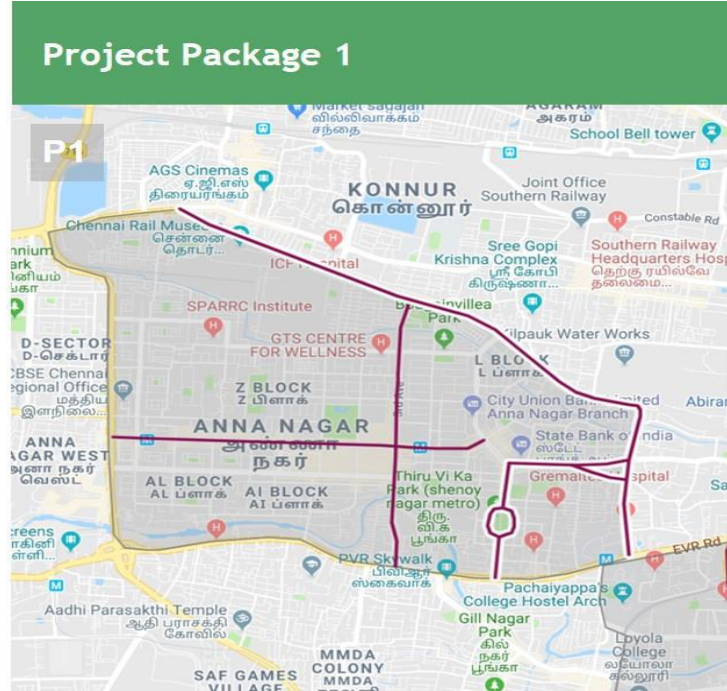


Figure 9: Details of Mega Street Project



Package 1:

- Covering Anna Nagar
- **Length** : 13.08km
- **Area** : 9.4 sqkm



Package 2:

- Covering Thondiarpet - GeorgeTown - Thiruvattiyur
- **Length** : 25.81km
- **Area** : 18.7 sqkm

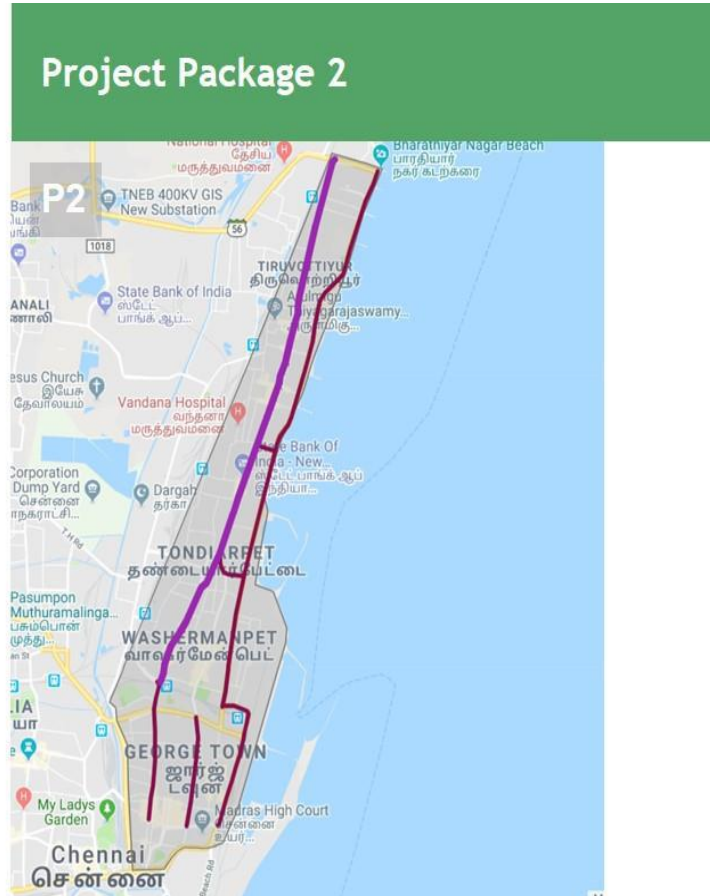


Figure 10: Mega Street Project Package 1 &2



Package 3:

- Covering Nungambakkam
- **Length** : 12.24km
- **Area** : 10.7 sqkm



Package 4:

- Covering Mylapore
- **Length** : 30.5km
- **Area** : 11 sqkm

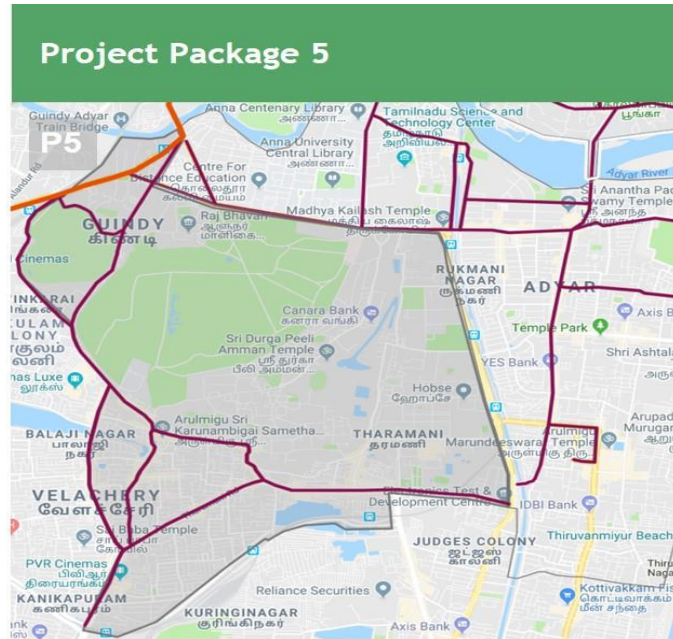


Figure 11: Mega Street Project Package 3 & 4



Package 5:

- Covering Velachery
- Length : 9.89km
- Area : 13.8 sqkm



Package 6:

- Covering Adyar
- Length : 20.84km
- Area : 13 sqkm

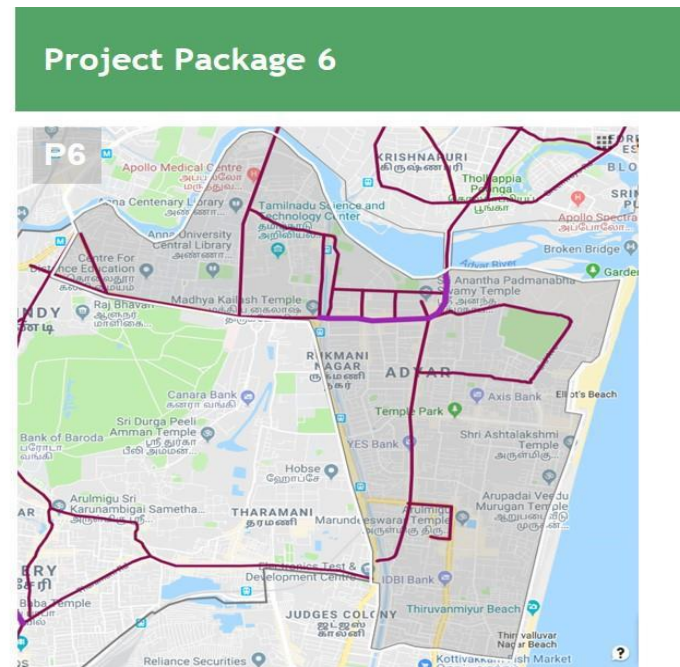


Figure 12: Mega Street Project Package 5 & 6

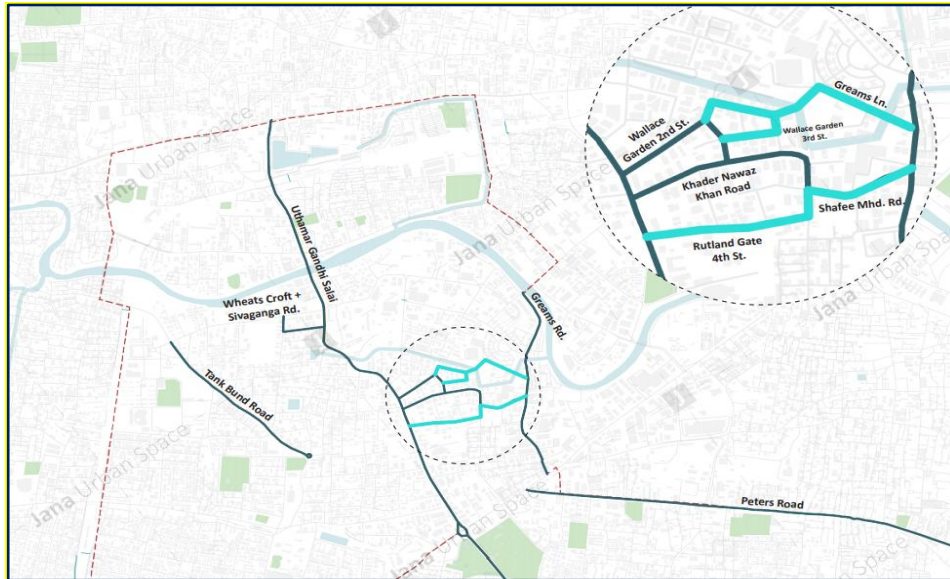


Figure 13: Package 3-Location map of Khader Nawaz Khan (KNK) road in Nungambakkam area and Existing scenario of the KNK road

Table 10: Quick Win Project Details

PACKAGE	AREA	QUICK WIN PROJECT DETAILS	LENGTH (km)
1	Anna Nagar	✓ 3rd Avenue Road ✓ Kilpauk Garden road ✓ Pulla Avenue	4.784
2	Tondiarpet	✓ SN Chetty road /Ennore High road ✓ Thiruvottiyur High road	5.000
3	Nungambakkam	✓ Dr. Radhakrishnan Salai ✓ Cathedral road	3.470
4	Mylapore	✓ C.P.RamasamySalai ✓ Kamaraj Salai ✓ Eldams road	3.340
5	Velachery	✓ Velachery Main Road ✓ Race Course road	5.658
6	Adyar	✓ West Canal Bank road ✓ East Canal Bank road ✓ Gandhi Mandapam road ✓ Taluka Office road ✓ Dr. Ramachandra aditanar road ✓ 1st cross street Gandhi Nagar ✓ 2nd cross street Gandhi Nagar ✓ 3rd cross street Gandhi Nagar	7.000

Current Status of the project

- ✓ Inception Report submitted for all 6 packages
- ✓ Topography survey completed for the quick win corridors
- ✓ Design of the quick win corridors is in progress

8.4 NMT at Kasturbhai nagar station to Thiruvanmiyur station.

Greater Chennai Corporation proposes to develop cycle track, pedestrian walkway and tree plantation along Buckingham Canal from Kasturibai Nagar MRTS station to Thiruvanmiyur MRTS Station

- The project stretch is behind the MRTS stations mentioned along the present service road which caters to exit/entrances of MRTS with the neighborhood.
- Project area is parallel to Rajiv Gandhi IT expressway and canal bank road
- The length of the project stretch is about 2.1 km between its extremities.

The design is looking at the project stretch holistically, though initial scope was limited to site, we have incorporated part b as a phase 2 possibility to the project for seamlessness of design.

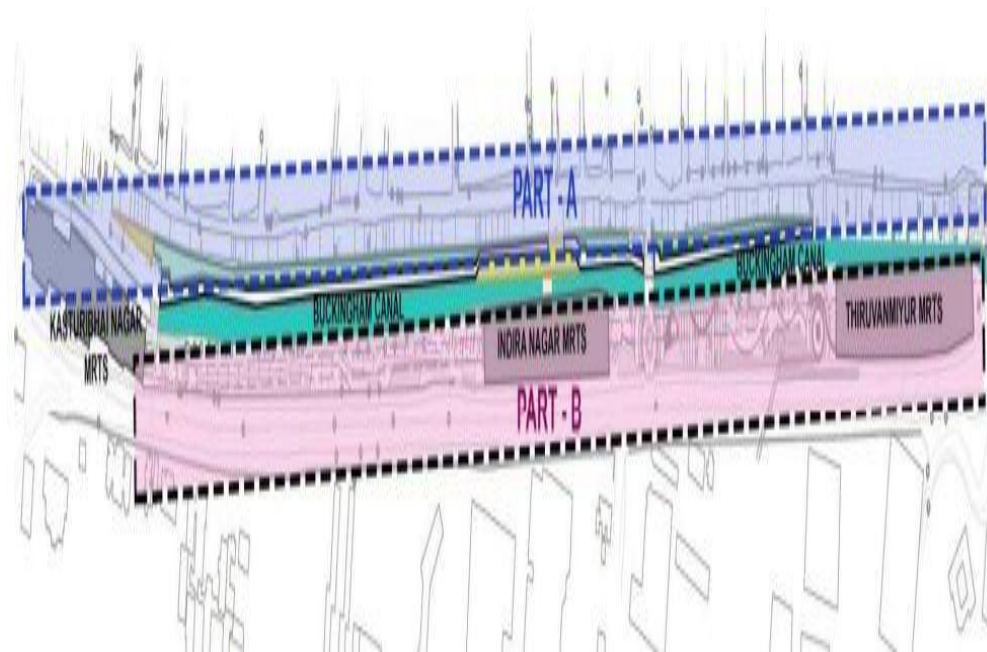


Figure 14: Buckingham canal from Kasturbhai nagar station to Thiruvanmiyur station.

8.5 Development of Cyclist-Friendly Streets.

Cycling is increasingly recognized as a clean, sustainable mode of transport and an essential part of an inter-modal plan for sustainable urban travel. More cycling in urban areas in place of car use could contribute to less energy consumption from travel activity and reduced congestion. Increasing cycling could be a promising way to contribute to the reduction of greenhouse and other emissions. More than capturing the captive users to use the cycles for movement, the development of cycle tracks should attract more uninterested citizens to use cycles.



(Left -A cycle lane, created from the carriageway) and (Right -Cycle tracks at carriageway level that break to become lanes across accesses and side roads)

Bicycle friendly streets are designed considering following principles:

- **Safety:** Segregated cycle tracks for increased sense of security and safe route to schools and bus stops.
- **Connectivity:** The NMT network should connect major attractions and a complete consistent network with fewer missing links
- **Comfort:** A more comfortable pedestrian and cycle path with facilities to support and encourage the use of NMT.
- **Ambience:** To make cycling a pleasant and great experience to its users

9. EXPANSION PLAN FOR E-VEHICLES

9.1 Battery Operated 3-Wheeler Vehicles (BOV)

In order to upkeep the public hygiene, day to day removal of garbage at door steps is mandatory. Initially, tricycles are in use for the primary collection of solid waste on doorsteps run by sanitary workers manually. There are hardships faced and to overcome this, it has been felt to introduce mechanized battery-operated vehicles in order to ease the door-to-door collection of

garbage. The collection efficiency will be increased apart from reducing the burden of the conservancy workers.



Hence, in the first phase, 411 nos. of battery operated vehicles with lead acid battery are procured by Greater Chennai Corporation under Swachh Bharath Mission (SBM) Fund (7th SHPC) at a total cost of Rs.7.18 Core and are deployed in Zones I to XV. These vehicles have considerably reduced the garbage collection time and manual effort of tri cycle workers and maximized garbage collection thereby facilitating effective primary collection in conservancy operation. Also, these vehicles are environment friendly.

Now, in the 2nd phase, work order has been awarded for procurement of 1684 Nos. of BOV with Lithium- ion battery under Swachh Bharath Mission Fund (10th SHPC) at unit cost of Rs.1.8 Lakhs. Further, due to privatization of zones 11, 12,14 & 15, additional 3000 nos. of BOVs have been procured by the Concessionaire, M/S.Urbaser Sumeet.

9.2 E-Bikes

Greater Chennai Corporation is the first municipal corporations in India to implement the Non-Motorized Transport (NMT) policy. Various NMT initiatives like construction of pedestrian friendly foot paths, modernization of bus shelters for increasing the share of public transport, etc., have already been

implemented. GCC has implemented the bi-cycle sharing as mandated in the NMT Policy through Chennai Smart City initiative.

It has implemented the Cycle Sharing System (CSS) through a prospective bidder who would “Design, Built, Finance and Operate (DBFO)” the developed facility over a period of 7 years. The operations of the CSS based on the financial model implemented will be owned, managed and operated by the service provider. The service provider will be paid based on the service charge (cycle usage charge/hour) quoted during the tender process. The Service provider will develop an operating manual for the CSS indicating cycle design, customer information, fee collection procedures, enforcement procedures, safety procedures, maintenance procedures, IT system and communication protocols and data security among others.

In this line GCC has implemented the bi-cycle sharing system in the following locations:

- Schools & Colleges
- Metro & Train Stations
- Bus Terminus
- Parks & Gardens
- Other recreational areas

Smart bike launches electric and Next Gen bikes in Chennai in January 2020. Smart bike has added a combined fleet of additional 1000 bicycles over and above the present fleet of 500 smart bikes, making a total of 1500 smart bikes in Chennai. With speeds of up to 25 kmph with a range of up to 50km in a single charge, citizens can look forward to faster and more efficient commutes using the E-bike.

The NextGen bike, India's first shaft transmission (no chain) bike, has magnesium alloy wheels and puncture proof tyres to ensure hassle free rides.

The public bike service system is fully automated and operated using the smart bike mobile app. A rider can locate the closest bike station, check bike availability, unlock the bike, and make payment and ride - using the Smart Bike app. The app also displays ride details such as distance travelled, fare estimate, calories burnt to help riders keep track of their fitness goals. Custom designed for Indian conditions, smart bikes are fitted with a secure lock system that is integrated with the app.

Target for the project is to procure 5000 cycles and establishing 500 stations. Currently, as part of this project, about 500 e-bikes are plying in Chennai. Additionally, it is planned to procure 3000 to 4000 more e-bikes under this project.



10. MULTI-LEVEL PARKING

The fast developments of the commercial establishments, residential colonies, institutional buildings and increasing public interest in using the motorized vehicle and various others key factors causes intense growth of the vehicle population in Chennai City. As the length and width of road remains constant and also the major portions of the roads are being occupied by the parked vehicles, causes more traffic congestion and nuisance to the public.

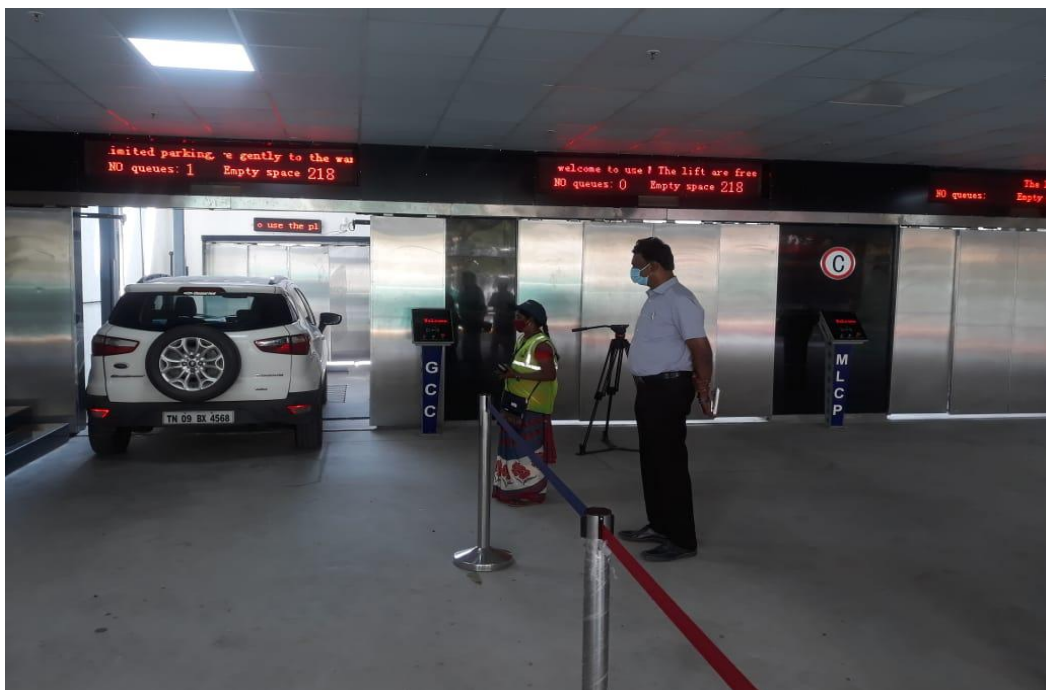
On behalf of the Govt. CMDA / TNUDF engaged the consultant, M/s.Wilbur smith Associates Pvt.Ltd (M/s.WSAPL) during Feb'03 to make an elaborate study on this subject and to suggest suitable recommendations. Accordingly they submitted the report, 'Study on parking requirements for CMA area'. This study made many recommendations to reduce the parking problems. One of its prime off street parking strategy is the construction of multilevel parking complexes at some critical areas, such as T.Nagar, Parry's Corner, Anna Nagar, Adayar, Anna salai, Nungambakkam and Velachery.

In Chennai city, multi-level parking has been constructed at Thanikachalam road, T.Nagar and the same has been commissioned for operation from February 2021. The details of the project are presented below.

Table 11: Details of completed multi-level parking

Completed Multi-Level Parking							
S.No	Name of the project / location	Area (in acre)	No. of floors	No. of car parking	No. two wheeler parking	Project cost (in crore)	Remarks
1	Thanikachalam Road, T.Nagar	1.0	2 Basements + Stilt + 5	222	513	40.71	Project completed in February

Completed Multi-Level Parking							
S.No	Name of the project / location	Area (in acre)	No. of floors	No. of car parking	No. two wheeler parking	Project cost (in crore)	Remarks
			Floors				2021



In addition to the above, multi-level parking system is planned at various locations across the city by GCC. Two more locations have been identified and feasibility study has completed for the same. The details of those two projects are presented below.

Table 12: Details of proposed multi-level parking for immediate execution

Proposed Multi-Level Parking for immediate Execution							
S. No.	Name of the project / location	Area (in acre)	No. of floors	No. of car parking	No. two wheeler parking	Project cost (in crore)	Remarks
1	Uthamar Gandhi Salai, Nungambakkam	0.6	2 Basements+ Stilt + 13 Floors	238	320	50	Feasibility report completed. Execution is yet to be taken up
2	Multi-modal facility complex (MMFC) at Broadway Bus Terminus	4.42	Bus stand + MLCP + Commercial Space	124 Bus Parking 1900 Car Parking	2500	800	Feasibility report completed. Execution is yet to be taken up

CMDA has addressed the Government to accord permission to implement a MLCP project also at T-Nagar Bus Stand. Similarly, a project "**Comprehensive Integrated Parking Management**" has been taken up by Greater Chennai Corporation. The objective was to implement the programme of 'Comprehensive Integrated Parking Management' in Chennai city by creating underground parking facilities, multi-level parking facilities and on-lane smart

parking under PPP mode to accommodate two lakh four wheelers and two lakh two wheelers at a cost of Rs 2,000 crore.

11. TRAFFIC CONGESTION POINTS AND PLAN FOR TRAFFIC DECONGESTION

(Source: Traffic Police Department & GCC, Chennai)

The details of the traffic congestion points in the Chennai U A are given as Annexure III a & b.

11.1 Decongestion plan

Traffic congestion affects travel costs, travel time, mobility, accessibility, productivity, and impacts on the environment such as air pollution and global warming due to fast driving and congestion. It also leads to increased accidents and noise pollution.

In order to decongest the road networks in the city, Greater Chennai Corporation and Chennai Smart City Limited is carrying out following studies.

- Intelligent Transport System
- Chennai Mega Streets Project
- On-Street Parking Management System
- Flyovers at traffic congestion locations

11.2 Intelligent Transport System

The Project “Installation of Chennai Metropolitan Area Intelligent Transport Systems” is meant to construct an efficient traffic system to meet increasing traffic demands and reduce traffic congestion in Chennai Metropolitan Area (CMA).

The main components of the project are:

1. Traffic Information & Management System

- To enhance proper traffic control and management
- To provide effective traffic information
- Intersection Design

2. City Bus System

- To enhance Public Transportation

Each component has following sub-components.

- **Traffic Management & Information System** - Adaptive Traffic Signal Control System (ATCS), Traffic Incident Detection System (TIDS), Variable Message Sign System (VMS), Red Light Violation Detection System (RLVD) & Speed Limit Violation System (SLVD), Automatic Traffic Counter and Classifier (ATCC) and Probe & Internet System.
- **City Bus System** to Metropolitan Transport Corporation with Bus Tracking System, Depot Management System and Passenger Information System.

As part of the study, 497 intersections in Chennai have been identified and in Phase-I, the above components will be implemented for 165 intersections within the city limit and remaining 332 intersections in CMA boundary will be implemented in Phase-II.

The design principle considered for intersection improvement is based on international norms and the standardization as listed below.

- Compacting Intersection Area
- Incorporated dedicated right turning lanes on major arterials if space is available – Right Turn Phases
- Lane Marking throughout functional area, maintain lane continuity
- Standardization of Locations of Primary and Secondary Poles and Types

Design consultants have been appointed for the project and detailed project report has been submitted. Tendering for execution of the project will be taken up shortly.

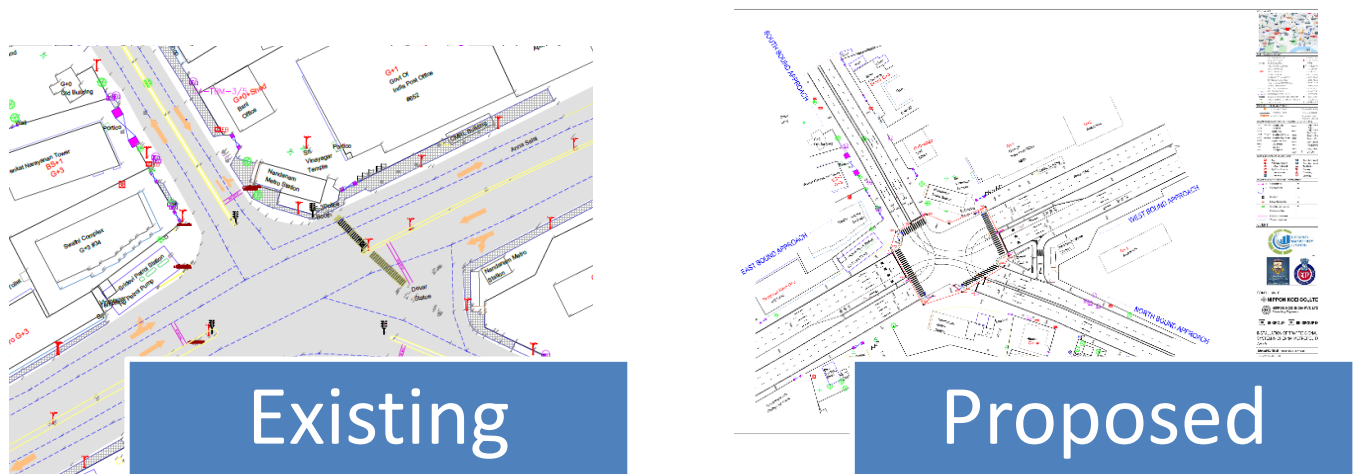


Figure 15: Details of existing and proposed plan

In creating high-quality and equitable streets for road users, Greater Chennai Corporation launched the Mega Streets Programme. It aims to transform all the arterial and sub-arterial streets in the city with three guiding principles.

- **Enhancing Livability:** To ensure happiness and the well-being of our citizens
- **Ensuring Seamless Mobility:** For all users including pedestrians, cyclists, and women, children, elderly and disabled.

Well-Managed Utility: To ensure resilience of urban infrastructure with no road cutting necessary for the next 30 years.

The objective of the study is listed below:

- To develop a vision for the area of the allocated package.
- To develop detailed street designs for the identified primary mobility corridors, employing a holistic approach, incorporating utility, mobility and livability elements
- To identify secondary streets and other public space projects within the allocated package in order to form a street network; and to develop detailed designs for the same.
- To propose a phasing plan, which specifies the order in which streets will be taken up for redesign, with 5 km of primary streets as quick wins
- To ensure that the network plan and street design are based on scientific assessment of needs and behaviour of street users, as observed in the surveys as part of this study.

Both the above said projects involve detailed design of the road networks and intersection addressing various issues related to traffic congestion. With these projects and the multi-layer parking projects being planned pan city, traffic congestion of the roads of Chennai will drastically come down.

As part of Chennai Mega streets program, around 67 major intersections in the city including Gemini Flyover intersection, Anna nagar Rountana intersection are being redesigned. Along with the improvement of road geometry in Mega streets program, traffic signals in these intersections will be synchronized with Intelligent Transport System (ITS).

The design once implemented will streamline the traffic flow; regularize vehicular movement thereby decongesting the intersections. Along with the improvement of road geometry in Mega streets program, traffic signals in these intersections will be synchronized with Intelligent Transport System (ITS).

11.3 On-Street Parking Management System

In order to organize the parking on roads and reduce congestion, GCC has initiated steps for implementation of Parking Management System (PMS) in Chennai City under the Smart City initiative for improving the 'on street' parking operations, optimum usage of the available parking space in the city for operating an effective implementation plan and by better enforcement against parking violations.

Parking Management System will be implemented in 12,047 Equivalent Car Space (ECS) in the 471 BRR roads and other major non bus route roads. There will be separate parking lots earmarked for two, four wheeler and free bicycle parking. The project being implemented would be on cashless transaction and IT enabled system with dedicated mobile app, to ensure a friendly smart parking experience to the citizens of Chennai City. In this system the cameras were fixed in all roads and based on detection of number plate registration of vehicles is made.



The project is being implemented on Public Private Partnership (PPP) mode through “Design, Built, Finance, Operate and Transfer” model (DBFOT) over a period of 5 years.

This project has been implemented at Anna Nagar, Thyagarya Nagar and Besant Nagar as a first phase. This project would be completed part by part and implemented throughout the Chennai city. This system is not aimed at making profit but only to provide a quality parking service to the public and thereby enabling hassle free parking and reduced congestion on roads.

11.4 FLYOVERS AT TRAFFIC CONGESTION LOCATIONS

Flyover over the existing subway at Ganesapuram

The Proposed flyover connects Northern part of Chennai. It will curb traffic congestion at Dr.Ambedkar College Road and it will be benefited to the public residing in North part of Chennai. As per the recent traffic study, 6 lane flyovers warranted. Hence, it is proposed to construct 4 lane flyover over the existing Subway and the 2 lane existing traffic will be allowed in the Subway to cater the local traffic. Length of proposed flyover is 650m and width of 17.20m.

Flyover at the Junction of Konnur High Road - Strahans Road - Cooks Road – Bricklin Road (Otteri)

The proposed flyover connects Konnur High Road and Strahans Road. Konnur high road leads to the major Arterial road (M.T.H Road) on Western side. Strahans Road leads to the Chennai Central, Parrys Corner on the Eastern side. Length of the proposed flyover is 540m and width of 8.50m.

Construction of flyover along South Usman Road and CIT Nagar 1st Main Road

To avoid congestion at the busiest junctions viz., South Usman road - Burkit Road & Madley Road Junction (Four legged junction), South Usman road - South West Boag Road & New Boag Junction (Four legged Junction) and

CIT Nagar 1st Main Road - CIT Nagar North Road Junction (T-Junction), a flyover is proposed along South Usman road and CIT Nagar 1st Main Road. Length of the proposed flyover is 1000m and width of 8.50m.

Construction of ROBs in lieu of existing LC No. 2A at Ennore High Road and LC No.2B at Manali Road.

The Railway Level Crossings 2-A at Ennore High Road and 2-B at Manali Road are located in the congested traffic area between Korukkupet and Vyasarpadi. As per the study, 42,000 fast moving vehicles were stopped daily due to the closure of both the railway level crossings 14 times a day to facilitate the train traffic. Due to this heavy vehicles and public are taking long time to cross the both level crossings. Hence it is decided to construct 2 ROBs at these level crossings. Length of the proposed ROBs is 500m and width of 8.50m.

Construction of flyover at Valluvar Kottam junction

To decongest the traffic flow at ValluvarKottam junction, it is planned to construct an Elliptical type flyover at the junction of ValluvarKottam. Length of the proposed flyover along Arcot road will be 500m and width of 17.2m and length along Thirumalaipillai road and ValluvarKottam high road will be 500m length and 8.5m width.

12. GRADE SEPARATORS BY HIGHWAYS DEPARTMENT / METRO

The high vehicle congestion is the main contributing factor to air pollution originated from the vehicular engine's combustion in many urban areas. Grade separation projects have been used to solve this problem and have resulted in overall air pollution reduction in many cases. Many grade separation projects are constructed near sensitive urban locations accommodating susceptible individuals. Air pollution concentration near sensitive locations could be

reduced by up to 40% with no significant change to the overall air pollution and the average vehicle speed.

The ultimate objective of grade separated intersections is to eliminate all grade crossing conflicts and to accommodate other intersecting maneuvers by merging, diverging and weaving at low relative speed. The relative speed of the conflicting vehicle streams is an important factor affecting the significance of a conflict. The interchange configurations are designed in such a way to accommodate economically the traffic requirements of flow, operation on the crossing facilities, physical requirements of the topography, adjoining land use, type of controls, right-of-way and direction of movements. The benefit of providing for low relative speed is twofold. First, events unfold more slowly allowing more judgment time and second, in case of an impact the total relative energy to be absorbed are less and hence, the damage is less. In addition, when relative speed is low, the average motorist will accept a smaller time gap space between successive vehicles to complete his move. This condition increases roadway capacity.

12.1 Completed grade separator works

1. Construction of Grade Separator at the intersection of Anna Nagar Second Avenue and Mugappair road with Inner Ring Road at Thirumangalam
2. Construction of Grade Separator at Moolakadai junction at Km 8/6 of GNT Road.
3. Construction of Grade Separator in EVR salai at the intersection with the Nelson Manickam Road and Anna Nagar Third avenue.
4. Construction of Grade Separator and Pedestrian Subway in Kolathur Irattai Eri at the Junction of Perambur Red hills Road and Inner Ring Road (LHS).
5. Construction of Grade Separator at the intersection of NSK Road (Arcot road) and Inner Ring Road at Vadapalani.

6. Construction of Grade separator at the intersection of Kodambakkam – Sriperumbudur Road and Mount-Poonamallee Road at Porur
7. Construction of Grade Separator at the intersection of Sandhai road and Kundrathur road with GST road at Pallavaram
8. Construction of Grade Separator in the Right-Hand Side in Kolathur Irattai Eri at the Junction of Perambur Red hills Road and Inner Ring Road.
9. Construction of Grade Separator at the intersection of Mount Medavakkam and Pallavaram Thuraipakkam Road near Kilkattalai.

12.2 Details of ongoing grade separator works

1. Construction of Grade Separator at the Intersections of Taramani Road, Tambaram – Velachery Road and Velachery Bypass Road at Velachery Vijayanagaram
2. Construction of Grade Separator Connecting Medavakkam - Sholinganallur Road junction. Medavakkam Mambakkam road Junction and Mount Medavakkam road junction in Marmalong bridge Irumbuliyur road at Medavakkam
3. Construction of Grade Separator in Jawaharlal Nehru Salai (IRR) at the junction of Kaliyamman Koil Street and City Bus entrance of CMBT at Koyambedu.

13. WATER FOUNTAINS AT MAJOR SECTIONS / JUNCTIONS

The vehicular movement causes dust, air pollution and particulate matters that float in the air. Installing water fountains reduce the air pollutants by producing negative ions, resulting in cleaner and fresher air that helps us breathe better. The continuous sprinkling of water will increase the moisture level in the air, reduce the dryness, absorb dust particles and thereby improve the air quality to make the air more breathable. These fountains will cool down the traffic signals, which are usually heat islands and ensure that

the air is more breathable. The GCC has identified 69 traffic locations for the installation of water fountains. The list of locations is given in the annexure-1

14. VERTICAL GARDENS

In the Jurisdiction of Greater Chennai Corporation, vertical garden has been provided around the piers of the existing grade separators/flyover/RoB at 15 locations to absorb carbon dioxide and dust, which releases oxygen in the atmosphere in addition to the beautification of the city. This project will also play a vital role to tackle the pollution and also it acts as a natural sound proofing barrier, which benefits those living nearby and the quality of air improved in built-up areas. The water source for irrigating vertical garden is provided by treating the CMWSSB sewage water using moving bed biofilm reactor (MBBR) at an estimated cost of Rs. 8.50 crores. The details of vertical garden at 15 locations are given in the annexure-2

Estimate has been prepared for Rs. 4, 30,00,000/- for the annual maintenance of vertical garden around the piers of existing grade separators/flyover/RoB in the Zones-V, VI, IX, X & XIII with Sewage treatment plant at 15 locations.

14.1 Parks – Greater Chennai Corporation

Greater Chennai Corporation maintains around 702 parks, 99 centre medians, 99 traffic island parks and 163 road- side parks for the use of general public. Out of these 702 parks, 76 parks are being maintained by GCC's own workers, 533 parks are being maintained by private contractors through outsourcing & 93 parks are being maintained under adoption. Out of these 93 parks under adoption, 82 parks were created & maintained by Residential Welfare Association/ Individuals/ Firms/ companies on their own & 11 parks

were created by Greater Chennai Corporation & being maintained under adoption.

The works carried out by Park Department are detailed below:

- Under the Capital fund during the financial year 2019-20, one park was created at SIDCO Nagar 4th Main Road, Villivakkam at an estimated cost Rs.1.08 crore and put into public use.
- During the current financial year 2020-21, it is proposed to develop 67 new parks at an estimated cost of Rs.65.07 crore under the Capital fund. Of which, 3 parks have been completed at an estimated cost of Rs.1.78 crore till date and 53 park works are under progress at an estimated cost of Rs.47.31crore and the remaining 11 park works at an estimated cost of Rs.15.98 crore would be taken up shortly.
- Under Atal Mission for Rejuvenation and Urban Transformation (AMRUT) Scheme for the financial year 2015-16, 2016-17 and 2017-20 and under the AMRUT reform incentive fund (2017-18) & (2018-19), 58 new parks were newly created at an estimated cost of Rs.39.24 crore.
- Under the CRRTS scheme during the financial year 2020-21, formation of new park and playfield work at Adyar river bank, Kotturpuram is under progress at an estimated cost of Rs.9.41 crore.
- Further, Greater Chennai Corporation has taken sustained efforts to increase the green cover in Chennai city and planted native tree saplings in various parts of the city. Accordingly, 23,000 no's of native tree saplings were planted in various parts of Chennai city during the financial year 2018-19 at an estimated cost of Rs.5.29 crore. Further, 50,000no's of tree saplings were planted in various parts of the city during the financial year 2019-20 under CSR initiative and through NGO's.
- Greater Chennai Corporation initiated the creation of Urban dense forests (Miyawaki method) mainly to increase the green buffers

throughout the city and thereby reducing the pollution level. Urban dense forest (Miyawaki method) has been created and planted 64,000 no's of tree saplings at 18 different locations both in the extended areas and in the core city in the past two years (2019 & 2020). Further, it is also proposed to create Miyawaki forest in 17 more locations throughout Chennai city.

15. EXPANSION PLAN FOR COMPRESSED NATURAL GAS (CNG) STATIONS

The availability of natural gas shall create an ecosystem and provide a major boost to the socio-economic development of the region. The widespread availability of natural gas and CNG will help in reducing pollution and also lead to significant savings for families using CNG and industries using natural gas. It will also act as a catalyst for the overall economic development of the region.

Petroleum and Natural Gas Regulatory Board (PNGRB) has authorized Torrent Gas Pvt Ltd to develop a City Gas Distribution (CGD) network in the geographical area of Chennai & Thiruvallur districts for supply of natural gas. The firm will lay pipelines and other infrastructure in Chennai and Tiruvallur districts, covering an area of 3,569 sq.km to provide piped natural gas (PNG) connections to homes, industries and commercial establishments. It will also set up the infrastructure to dispense compressed natural gas (CNG) to automobiles

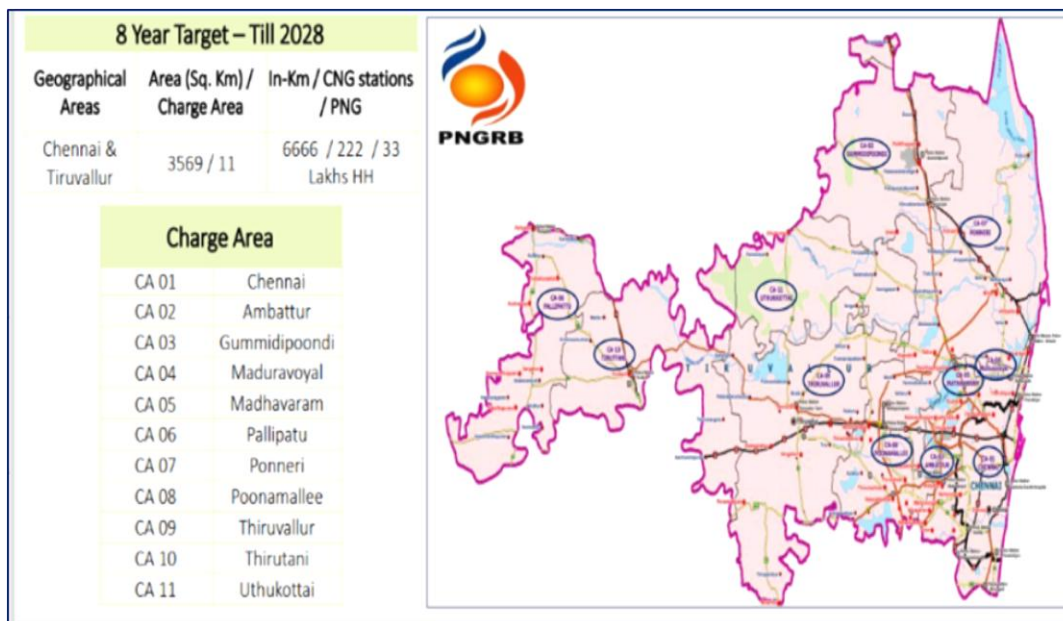


Figure 16: Map showing areas to give PNG connection

As part of the first phase of infrastructure roll-out, Bharat Petroleum Corporation Limited (BPCL) has opened 25 CNG gas stations in Chennai in tie up with Torrent Gas is expecting to commission 50 such CNG stations in Chennai and Tiruvallur districts by 2022. Subsequently, it is planned to expand the number of CNG stations by 100 locations by March 2023.

16.CONVERSION TO LPG BASED CREMATORIUMS

LPG cremation is the process of closed combustion, vaporization and oxidation of a human body into various chemical compounds like gases, ashes and mineral fragments retaining the cremation remains of bone with ashes which is dispersed in many ways. The proposed list of crematorium to be converted is given in the Table 13.

16.1 Benefits

1. The temperature required is from 800 – 1000°C to cremate the body. So an average of 45 minutes is needed to finish the whole process.
2. LPG crematoriums burns the body in lesser duration where the biomass gasifier crematoriums need wood to be burned which causes enormous release of CO₂ in the atmosphere and the electric crematoriums take more time to heat which also lead to half burning due to power crisis or technical snags.
3. The main benefit of using LPG for cremation services includes control of air pollution and they are recovered as thermal energy used for space heating of the funeral chapel, or other facilities or for distribution into local district heating networks.
4. LPG Crematory is more economic, efficient and eco-friendly.
5. The calorific value of LPG is comparatively more.
6. It has lower running costs and lower fuel consumption.
7. The ash quantity is comparatively less and more dead bodies can be cremated in less space using LPG.
8. LPG cremation process is conducive and highly appreciable from environment point of view.

Table 13: The list of Crematorium to be converted into LPG

S NO.	ZONE	DN.	NAME OF BURIAL GROUND	CURRENTMETHOD Bio/ Elec
1	1	9	Thiruvottriyur burial ground	Bio
2	4	43	Kasimedu burial ground (Hindu)	Bio
3	5	53	Moolakothram	
4	6	68	Thangal burial ground, Thiru.V.K. Nagar	Bio
5	7	85	Gasifier Vanagaram Road	Bio
6	8	101	Velangadu(BG-1 & BG-2)	Bio
7	9	110	Numgambakkam	Bio
8	11	151	Arcot Road, Porur, BG	Elec
9	12	163	Balakrishnapuram	Bio
10	13	174	Velachery main road, Guru nanak college	Elec
11	14	169	Puzhuthivakkam B.G	Bio
12	15	196	Injampakkam burial ground	Bio

17. IT ENABLED DATA MANAGEMENT SYSTEM- CHENNAI SMART CITY

Chennai Smart City is a flagship project implemented under the Smart City mission. This project has various smart components like; IoT enabled environmental sensors, flood sensors, solid waste management sensors etc. installed across the city. As part of this project, a Central Command Control Centre was created where the real-time data from the IoT sensors are being monitored and analyzed. This Integrated Command & Control Center is acting as an IT enabled data management system for the Chennai city. In addition to this, the data from public grievance, non-motorized transport system, Monitoring of solid waste management processing centers, illegal burning of garbage, real-time Monitoring of parks etc. are being integrated with the command & Control center and various use cases has been created for the proactive monitoring and effective governance. The following are the high level components of the Integrated Command & Control Center Project.

1. Disaster Management System
2. Environmental Sensors
3. Solid Waste Management System
4. City Surveillance System
5. Digital Signage
6. Parking Management System
7. Integrated Traffic-cum-Transport Management System (only integration)
8. Smart Street Light Monitoring
9. Smart Pole
10. Public Address System (PAS) and Emergency Call Button (ECB)
11. Data Center & Disaster Recovery
12. Mobile Command & Control Center
13. Integration with 3rd party applications such as PGR, SWM, Electrical lighting system etc.

17.1 Integration of Public Grievance System (PGR) with Chennai Smart City

The grievance and complaints from the general public and citizens are received at the PGR portal developed by the Greater Chennai Corporation. The ERP system of PGR is integrated with the Command & Control Center of Chennai Smart city where these data are analysed and shared with the respective departments and authorities to take the necessary actions.

The below data encapsulates the Public grievance by citizens for the last one year with respect to environmental aspects. A total of 466 complaints were registered through social media, 1913 helpline number, WhatsApp, online portal etc. related environmental and pollution. Burning of garbage at dump yards and burning of garbage within city limits received the highest number of complaints

Table 14 Details of complaints shown in grievance portal

S No	Description	Qty
1	Total Complaints registered	466
2	Total Complaints closed	257
3	Total Complaints completed	43
4	Total Complaints Final Closure	7
5	Total Complaints Final Rejected	136
6	Withdrawn	23

18. DETAILS ON BRICK KILN

The brick manufacturing sector in India is traditionally a small-scale and improperly managed industry which stands as the second largest brick producer in the world. Brick kilns are highly polluting industries as brick making involves burning of large amounts of fuel that emit particles into the air. Fuel burning during brick making leads to emission of pollutants and ash into the environment.

The Chennai city, capital of Tamil Nadu covering an area of 426km² is experiencing an increase in the air pollution levels during last two to three decades due to increase in transportation and industrial activities. There are around 215 brick kiln units in and around Chennai within 50km² limits. Air pollutants emitting from brick kilns are also an important factor of environmental pollution in Chennai. All the brick kilns are of the natural draught firing technology type. Nearly 20,00,000 bricks have been manufactured in Chennai where the estimated amount of coal consumed by each brick kiln varies between 9 – 10 tonnes/lakhs. Emissions from these industries vary with respect to quantity in relation to production capacity, quality and quantity of fuel used.

Bricks are fired to a temperature of 700- 1100 degree Celsius requiring a large amount of fuel for the firing operation. Combustion of fuels such as coal and other biomass fuels in brick kilns results in the emission of Suspended Particulate Matter, Particulate Matter (PM_{2.5}), including Black Carbon and Gaseous pollutants like Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Carbon Dioxide (CO₂) and Carbon Monoxide (CO). The emission of these pollutants has an adverse effect on the health of workers, local atmosphere and vegetation around the kilns. But the impacts are not continuous or long term because brick kilns are seasonally operated and operations are cyclic in nature.

Some process emission control measures include crushing of coal in enclosed equipment/ area which avoids process emissions are followed. Water should be sprinkled frequently over roads around brick kiln and over the ash layer before its removal and transfer. Two or three rows of trees should be planted along the outer periphery of kiln area. Development of green belt around the brick kiln industries may be an effective mitigation mechanism. Provision of shed over the kiln structure will also reduce the fugitive emissions.

Due to severe air pollution from this old brick kiln technology, it will be converted to zigzag and induced draught system as per CPCB norms at the earliest. The design and technology with qualified people are being mobilized to initiate the change from natural to zigzag and induced draught. Concerned divisions under environmental engineering are also initiating the conversion of present system to advanced one. About 200 kilns got sealed for violating the environmental norms.

The following are some of the better practices to control the emission of fuel.

Fuel storage - The coal should be stacked on a raised platform under shed with proper ventilation where the height of the coal stack should not be more than 1.5 meter.

Properly graded size of coal – This properly graded coal would help in uniform brick quality as the powdered coal ignites immediately on feeding thereby releasing heat to the top layer of brick setting.

Fuel feeding - Feeding of fuel in more number of lines would increase the length of firing zone and would result in more efficient combustion thereby reduction in stack emissions.

Kiln maintenance - The kiln should always be above the ground level with proper drainage facility. The kiln structure should preferable be covered by providing a shed over the kiln portion. Provision of shed over kiln would save at least 20-30 tons of coal every first cycle.

Use of internal fuel such as ash with carbon, powdered coal or other waste will reduce the feeding requirement thus leading to reduced emissions.

Monitoring – The temperature gauge shall be installed in the kiln chimney to monitor the temperature of flue gas.



Figure 17: Map showing brick kilns clusters around Chennai

19. ACTION PLAN CATEGORY

Action Plan for Chennai city has prepared based on different source contribution as below with the time scale for implementing/initiation.

- Short- term (within 6 months)
- Mid-term (6 – 12months)
- Long-term (12 months and 36 months)

**20. ACTION PLAN FOR CONTROL OF AIR POLLUTION IN
NON- ATTAINMENT CITY OF TAMIL NADU (CHENNAI)**

1	Name of the city	:	Chennai
2	Air Pollution issue	:	PM ₁₀
3	Air pollution levels (provide range of 24-hourly average concentration values; annual average for past five years)	:	Fig 5&6
4	Months with higher air pollution levels	:	June- August November- January

Table 15 Action plan for control of air pollution

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Vehicles	Restriction on plying and phasing out of 15 years old commercial diesel drive vehicles	Long term	August 23 and above	Transport Department	Not Applicable	As per 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. A draft policy has been formulated by Central Government to phase out 15 year old vehicle. Once implemented the same will be acted upon by the State Government.
	Strengthen and encourage public transport services to reduce the vehicular congestion	Long-term	August 23	Transport Corporation	Not Applicable	Under World Bank project, Chennai City Partnership Programme is enhancing the quality, efficiency and sustainable urban services in Metropolitan Transport Corporation in principal approval given by Government of Tamil Nadu

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
	Action against visibly polluting vehicles and Parking prevention in non-designated areas	Short term and Regular activity	January 22	Transport Department, Traffic Police	Not Applicable	Regularly monitored
	Strict vigilance and no tolerance for visible emissions - stop plying of visibly polluting vehicles by impounding or fine	Short term and Regular activity	January 22	Transport Department, Traffic Police	Not Applicable	Regularly monitored
	Strict vigilance and enforcement of (vehicular testing centre) for pollution under control certificates and regular inspection & monitoring	Short term and Regular activity	January 22	Transport Department, Traffic Police, TNPCB	Not Applicable	Regularly monitored

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Vehicles	Vehicles should be frequently monitored to avoid over loading.	Short term and Regular activity	January 22	Transport Department, Traffic Police	Not Applicable	Regularly monitored
	Deploy traffic police for smooth traffic flow at identified vulnerable areas	Short term and Regular activity	January 22	Traffic Police,	Not Applicable	Regularly monitored
	Introduction of cleaner fuels (CNG/LPG) for vehicles	Long- term	August 23	Oil companies	Not Applicable	Indian Oil Corporation has commissioned 2 CNG stations in Chennai and in Tiruvallur. The Torrent gas Pvt Ltd has proposed for installing 100 CNG station in Tamil Nadu by July 2022.
	Installation of CNG Stations within city	Long term	August 23	Petroleum Companies	Not Applicable	Installations of CNG stations are proposed.

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks`																							
Vehicles	Good traffic management restriction/ redirection of heavy vehicles entering inside the city	Short term and Regular activity	Implemented	Transport Department, Traffic Police	Not Applicable	Already implemented and on further need will be assessed and implemented.																							
	Regular checking of vehicular emission and issue of Pollution under Control Certificate (PUC)	Short-term and (Periodical checking are being carried out to check vehicular emission	January 22 continuous afterwards	Transport Department	Not Applicable	At present 27 PUC centres are available and PUC centres numbers will be increased to meet the demand for the issue of PUC certificates. Periodical checking are being carried out to check vehicle. <table><tr><td>Year</td><td>No of check report issued for not</td><td>PUCC issued :</td></tr><tr><td>2015</td><td>2831</td><td>242847</td></tr><tr><td>2016</td><td>2604</td><td>263435</td></tr><tr><td>2017</td><td>2461</td><td>231214</td></tr><tr><td>2018</td><td>2179</td><td>44230</td></tr><tr><td>2019</td><td>2255</td><td>187008</td></tr><tr><td>2020(upto Oct 2020)</td><td>575</td><td>64587</td></tr><tr><td>Total</td><td>12905</td><td>103321</td></tr></table>	Year	No of check report issued for not	PUCC issued :	2015	2831	242847	2016	2604	263435	2017	2461	231214	2018	2179	44230	2019	2255	187008	2020(upto Oct 2020)	575	64587	Total	12905
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2019	2255	187008																											
2020(upto Oct 2020)	575	64587																											
Total	12905	103321																											

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks																
Vehicles	Auditing and reforming of pollution control under (PUC) certification	Mid-term (Monthly checking are being done to reform PUC Certification)	August 22, continuous afterwards	Transport Department	Not Applicable	<table><tr><th>Year</th><th>CF collected for w/o PUCC :</th></tr><tr><td>2015</td><td>1017000</td></tr><tr><td>2016</td><td>839000</td></tr><tr><td>2017</td><td>779000</td></tr><tr><td>2018</td><td>587000</td></tr><tr><td>2019</td><td>1174000</td></tr><tr><td>2020</td><td>1255000</td></tr><tr><td>Total</td><td>5651000</td></tr></table>	Year	CF collected for w/o PUCC :	2015	1017000	2016	839000	2017	779000	2018	587000	2019	1174000	2020	1255000	Total	5651000
	Year	CF collected for w/o PUCC :																				
2015	1017000																					
2016	839000																					
2017	779000																					
2018	587000																					
2019	1174000																					
2020	1255000																					
Total	5651000																					
	Linking of PUC centers with remote server and eliminate manual intervention in PUC testing.	Mid-term	Implemented (Ongoing process)	Transport Department	Not Applicable	All the PUC centres in Tamil Nadu were linked with Vahan portal. Total no of Emission Testing Centres- 27 No.of Emission Testing Centres linked with vahan data base: 27																

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Vehicle	Promotion and operationalization of E-Vehicle/ Rickshaw.	Long- term	August 23	Transport department	Not Applicable	7271nos of E-rickshaws are registered upto August 2021 Three wheeler goods – 873 nos Motor cycle& others - 6398
	Introducing cycle tracks along the roads	Mid Term	August 22	Greater Chennai Corporation	2160	About 0.8 Km of Taluk office road, Adyar area in Chennai shall be developed as NMT network zone with dedicated cycle track 1) Identification of Roads – Completed 2) DPR Preparation – Final Stage under progress Tendering and Contract Signing for Execution – after Election Model Code of Conduct
	Prepare and Implement zonal plans to develop an NMT network	Mid Term	August 22	Greater Corporation		Preparation and Implementation to develop an NMT Network along Khader Nawaz Khan (KNK) Road of length 0.65 Km

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Vehicle		Mid Term	August 22	Greater Corporation	104000	About 40 km length streets in Chennai shall be developed as NMT network zone with dedicated cycle track and wider footpath in Phase - II (Under Medium Term Plan)
		Long Term	August 25		1,04,000	About 40 km length of streets in Chennai shall be developed as NMT network zone with dedicated cycle track and wider footpath in Phase - III (Under Long Term Plan).
	Introduction of new electric buses (with proper infrastructure facilities such as charging stations) and CNG buses for public transport.	Long- term	August 23	Transport Corporation	Not Applicable	Government of Tamil Nadu has issued order on E-vehicle policy in 2019 G.O. (MS) No. 176, dated 9.10.2019

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
	Retrofitting of particulate filter in diesel driven vehicle and ban on registration of Diesel driven auto rickshaws	Long- term	August 23	Transport Department	Not Applicable	Guidelines have to be formulated for Retrofitting of particulate filter in diesel driven vehicle and on ban on registration of new Diesel driven auto rickshaws. Government of Tamil Nadu has issued order on the conversion of existing petrol run auto rickshaw into LPG mode G O Ms. No 510 dated 13.4.2007 Government of Tamil Nadu has issued order on auto-rickhaws that will play in CMA should run on LPG as per the existing guidelines G O MS No. 463 dated 13.05.2010.

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
	Monitoring of vehicle fitness	Short-term and regular activity	January 22	Transport Department	Not Applicable	Monitored regularly
	Checking of fuel adulteration	Short-term and regular activity	January 22	District administration, Oil companies, Food and Civil Supplies department	Not Applicable	Regularly monitored by Oil companies, food and civil suppliers and taking actions against those who violates.

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Vehicle	Development of multilayer car parking (MLCP) in congested areas	Long- term	August-23	Greater Corporation	Rs.850 Crore	Currently, 1 no. of Multi-level Parking constructed. MLP at an extent of 43500 Sq.ft under Smart City Mission 2018 Fund at Thanikachalam Road. (2 Basements +G +5 Floors) with 513 Nos. of 2 wheelers & 222 Nos. of 4 wheelers parking facility. Multi-level Parking at Uthamar Gandhi Salai, Nungambakkam (Area = 0.6 Acre, 2 Basements+ Stilt + 13 Floors with 320 Nos. of 2 wheelers & 238 Nos. of 4 wheelers parking facility) Multi-modal Facility Complex (MMFC) at Broadway Bus Terminus (Area = 4.42 Acre, Bus Stand + MLCP + Commercial Space with 124 Bus Parking, 1900 Car Parking and 2500 2-wheeler parking)

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget	Remarks
Vehicle	Periodic calibration test of vehicular emission	Short-term and regular activity	January 22	Transport department/ and TNPCB	Not Applicable	Periodic calibration of vehicular emission is tested by PUC agencies or entrepreneurs are monitored by RTO and TNPCB
Road dust	Immediate lifting of solid waste generated from desilting and cleaning of municipal drains for its disposal	Short-term and regular activity	January 22	Greater Corporation		Regular cleaning is carried out Using High capacity Super Sucker - 7nos. Robotic Excavator - 4 nos. Amphibian - 2 nos. Mini Amphibian - 3 nos.

Source group	Action	Implementation period (Short/ Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks	
Road dust	Maintain potholes free roads	Long term and regular activity	August 23	PWD, Municipal Corporation State Highway and NHAI.	25000	Continuous and Regular activity as and when required. GCC attends to emergency patch work due to flood at every year and purchase of Jet patches machine is in progress. GCC has proposed the budget upto the year 2026	
						Year	Rs Cr
						30.03.2022	40
						30.03.2023	45
						30.03.2024	50
						30.03.2025	55
						30.03.2026	60
Regular Cleaning of street surfaces and spraying of water to suppress dust	Mid Term	August 22	Greater Chennai Corporation	300	Continuous and Regular activity as and when required. To augment existing water supply arrangement, it is proposed to procure water tankers for watering of plants, shrub trees in Chennai City		

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks				
Road dust	End to end carpeting of road And black topping to avoid road dust	Long- term	August 23	Greater Corporation, State Highway and NHAI.	5000	The Fund of Rs. 5000 lakhs is proposed by Highway department				
		Long- term	August 23	Greater Corporation	14100	Greater Chennai Corporation maintains 471 Bus Route Roads and 34442 Interior Roads. Underground utilities work is in progress. <table><tr><th>Year</th><th>Rs (Cr)</th></tr><tr><td>30.03.2022</td><td>71</td></tr><tr><td>30.03.2023</td><td>70</td></tr></table>	Year	Rs (Cr)	30.03.2022	71
Year	Rs (Cr)									
30.03.2022	71									
30.03.2023	70									

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks	
Road dust	Road design improvement	Long- term	August 23	Greater Corporation	41000	Provide Improvements to Sign Boards and Gantry Girders and to reduce accidents.	
						Year	Rs (Cr)
						30.03.2022	5
						30.03.2023	6
						30.03.2024	8
						30.03.2025	10
	30.03.2026	12					
	Introduction of water fountains at major intersection/ circle.	Mid- Term	August 22	Greater Corporation/ industries.	—	69 locations are identified in the city for the introduction of water fountain. Annexure -1	

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks												
Road dust	Widening of roads / (With service roads and parking facilities for the heavy vehicles)	Long term	August 23	State Highway and NHAI/ Municipal Corporation	2144000	In order to reduce Traffic Congestion, Land Plan schedule has been prepared. (24 roads, area 175256.66 sqm) GCC has proposed fund details upto 2026 as follows <table> <tr> <th>Year</th> <th>Rs (Cr)</th> </tr> <tr> <td>30.03.22</td> <td>536</td> </tr> <tr> <td>30.03.23</td> <td>536</td> </tr> <tr> <td>30.03.24</td> <td>536</td> </tr> <tr> <td>30.03.25</td> <td>536</td> </tr> <tr> <td>30.03.26</td> <td>536</td> </tr> </table>	Year	Rs (Cr)	30.03.22	536	30.03.23	536	30.03.24	536	30.03.25	536	30.03.26	536
	Year	Rs (Cr)																
30.03.22	536																	
30.03.23	536																	
30.03.24	536																	
30.03.25	536																	
30.03.26	536																	
	Strengthening the roads in the Chennai city	Long- term	August 23	State Highway	40	In progress												

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks	
Road dust	Designing and Construction of environment friendly roads	Long term	August 23	Greater Chennai Corporation/ Highway Department	7300	To reduce accidents and Improvements to Centre Median, Traffic Island, laying speed breakers and thermoplastic paint works.	
						Chennai Corporation proposed the fund requirement for the year April 2021 to March 2026 as follows	
						Year	Rs (Cr)
						30.03.22	10
						30.03.23	12
						30.03.24	14
	30.03.25	17					
30.03.26	20						
Identify road stretches with high dust generation and Increase frequency of mechanized clearing of road and sprinkling of water on paved and unpaved roads	Mid term (Regular and continuous activity)	August 22	Greater Corporation		The Concessionaires have deployed 11 nos of 4.5 cubic meter capacity mechanical sweepers and 40 nos of 6 cubic meter capacity mechanical sweepers to sweep roads of width of 6m and above.		

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
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	Mid term (Regular and continuous activity	August 22	Greater Corporation		GCC has deployed 16 nos of 4 cubic meters capacity mechanical sweepers and sprinkling while sweeping. 7 noses of suction and jetting machine are used for cleaning roads. Vehicle is covered with tarpaulin covers to prevent spilling of garbage and compactors for transportation of garbage/ horticulture waste. There is no earthen pavement and all are concrete topped.
	Create Proper Pedestrian Infrastructure	Long - term	August 23	PWD, Municipal Corporation and State Highway	11500	GCC has been becoming the first city in the country to adopt a Non-Motorized Transport (NMT) Policy to transforming 107 noses of Bus Route Roads with accessible footpath.

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(is)	Budget in laths	Remarks										
Road dust	Create Proper Pedestrian Infrastructure	Long - term	August 23	PWD, Municipal Corporation and State Highway	35000	In order to promote Non-Motorized Transport (NMT) to reduce pedestrian-vehicle conflict, pollution and traffic congestion, Greater Chennai Corporation have undertaken a project for widening the footpaths from 5 feet to 10 feet. 176 Km. Budget proposed by Highway department up to March 2027- Rs/ 11500 Lakhs and Municipal Corporation-proposed for the years as in the below table. <table><tr><td>Year</td><td>Rs (Cr)</td></tr><tr><td>2021-22</td><td>58</td></tr><tr><td>2022-23</td><td>64</td></tr><tr><td>2023-24</td><td>70</td></tr><tr><td>2024-25</td><td>76</td></tr></table>	Year	Rs (Cr)	2021-22	58	2022-23	64	2023-24	70	2024-25	76
Year	Rs (Cr)															
2021-22	58															
2022-23	64															
2023-24	70															
2024-25	76															

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Road dust	Creation of green buffers (Indigenous species for creating carbon sink, abating the air pollution) along the traffic corridors and their maintenance and Implementation	Mid term	August 22	Greater Corporation	2650	Identification of locations (50,000/- only) – Completed Tendering – Yet to be done. Creation of Urban Green Forest (MIYAWAKI method) in the existing vacant OSR land and inside Parks in Chennai city. It is proposed to create a dense forest of an area about 1, 65,000 sq.m. Strategic locations have been identified and estimates for the same have been prepared. Plantation of trees of native varieties along the margins of arterial roads, inside school buildings, institution

Source group	Action	Implementation period (Short/Mid/ Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Road dust		Long term	August 23	Department of Forest, State Highway and NHAI.	5000	buildings, hospitals buildings, parks and playgrounds, burial grounds and other corporation buildings in Chennai city. It is proposed plant around 50000 tree saplings Highway department has proposed an amount of 5000 Lakhs for the green buffers.
	Urban Greening with vertical garden.	Long- term	August 2023	Greater Corporation	1560	Improving the quality of air in built-up areas. Combating the spike in pollution and acting as a natural sound proofing barrier. It is proposed to create vertical gardens in important office buildings like Greater Chennai Corporation, school buildings, parks, community center buildings and in facades of bridges in an area of about 10000 m ²

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Construction activities	Control dust pollution at construction sites through appropriate cover/ Control measures for fugitive emissions from material handling –conveying and screening operations.	Short-term and regular activity	January 22	Greater Corporation	Not Applicable	Continuous and regular activity.
	Restriction on storage of construction materials along the road	Short-term and regular activity	January 22	Greater Corporation	Not Applicable	Continuous and regular activity. Corporation has 4 Nos. of collection points for construction materials.
Biomass and garbage burning	Restriction on open burning of municipal solid waste, Crop residue, Biomass, plastic and horticulture waste etc	Short-term and regular activity	January 22	Greater Corporation, Agriculture Department	Not Applicable	Continuous and regular activity as and when required <u>Corporation:</u> Bio mass fuels in Restaurants / Roadside eateries are not in Practices. Notice on restriction of single use plastic materials is already issued to all Restaurants / Roadside eateries.

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Biomass and garbage burning	Stop use of coal/firewood in hotels and open eateries	Short-term and regular activity	January 22	Greater Corporation / Oil Companies	Not Applicable	<u>Corporation:</u> Use of coal/firewood in hotels and open eateries are not in practice.
	Restriction of usage of Single use Plastics	Short-term and regular activity	Implemented	Greater Corporation	Not Applicable	Government of Tamil Nadu has issued notification on ban on single use plastics effective from January 2019. Strict enforcement has been carried out by corporation and fine imposed against the violators
Industries	Strict action against industries having non-compliance to the norms	Short-term and regular activity	January 22	TNPCCB	Not Applicable	TNPCCB is regularly monitoring the industries and taking action against the Industries violating the norms.
	Ensuring emission standards in industries	Short-term and regular activity	January'22	TNPCCB	Not Applicable	TNPCCB is regularly monitoring the emission standards in industries.
	Adoption of cleaner technology in brick kilns.	Mid term	August 22	TNPCCB	Not Applicable	

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Industries	Shifting of polluting industries	Long-term	August 23	TNPCB and Industry dept.	Not Applicable	After conducting the source apportionment, Emission Inventory Studies and Carrying Capacity in the city, Adopting better technology to reduce the pollution in the industries or shifting of industries will be considered
	Ban on polluting industries	Mid-term	August 22	TNPCB and Govt of Tamil Nadu.	Not Applicable	After conducting the source apportionment, Emission Inventory Studies and Carrying Capacity in the city, Adopting better technology to reduce the pollution in the industries or ban on polluting industries will be considered

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Strengthening of AAQ Monitoring	Air Quality Monitoring may be strengthened by increasing the no of monitoring site location covering all regions especially industries, and road transportation areas/ educational institution areas by the Installation of Additional CAAQMS at Chennai UA. (Commercial/ Residential/ Industrial / Traffic dominant area)	Mid-term	August 22	Greater Corporation / TNPCB: CPCB	480	In Chennai eight NAMP stations are under operation and the data are available on EAQEDS portal and 7CAAQMS under operation are connected to CPCB server. 5 Nos. of CAAQM Station integrated with corporation, TNPCB and CPCB server is proposed under 15th FC Fund based on the station required as per CPCB criteria. After due approval of Technical clearance, the project will be implemented as per the guidelines of CPCB.
	Strengthening of Noise monitoring network by the procurement of noise level meters	Mid-term	August 22	GCC, Office of DGP and TNPCB	200	GCC has sanctioned 2Cr for the procurement of 106 Noise level meters under XVFC fund

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Strengthening of AAQ Monitoring	Emission Source Apportionment, Emission Inventory and Carrying Capacity Study for Chennai	Mid term	August 22	Greater Corporation /TNPCB/CPC B	223	The detailed Emission inventory, SA, carrying capacity study will be conducted for 18 months under grants received from XV-FC.
Public Awareness	Educate the advantage of using cleaner fuel such as LPG/CNG	Short-term and regular activity	January'22	Greater Corporation, Department of Environment, Indian Oil Corporation and NGOs	5 lakhs	Public awareness on advantage of using cleaner fuel such as LPG shall be conducted by Department of Environment and NGOs at the earliest.
	Involvement of school and other academic institution in awareness program.	Mid-term	August 22	Greater Corporation, Department of Environment NGO's	5	Public awareness will be conducted by Department of Environment and NGOs at the earliest by incorporating the school and other academic institution.

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Public Awareness	Create awareness about polluting vehicles, open burning and its health impacts	Mid-term	August 22	Greater Corporation / Department of Education. Department of Health, District administration	30	Display boards at traffic junction to display real time noise level carbon monoxide level at that point with audio messages to switch of the vehicles when the signal is red and commuters can see the increase and decrease in noise level and Carbon monoxide levels due to their actions. Similar type of display with awareness message on health issues due to burning of waste.

Source group	Action	Implementation period (Short/Mid/Long term)	Time limit for implementation	Responsible Agency(ies)	Budget in lakhs	Remarks
Others	Compliance of guidelines on D.G.sets and action against violation	Mid-term	August 22	TNPCB and District administration	Not Applicable	TNPCB has issued notice on Retrofitting of Emission Control Devices/ Equipment in DG sets with Capacity of 125 KVA and above in the state of Tamil Nadu.
	Stop use of diesel generator sets	Mid -term	August 22	TNPCB Corporation and District administration	Not Applicable	District Administration will issue directions for the stoppage of operation of DG sets when the PM ₁₀ level exceeds the standards
	Helpline to oversee non compliances on aforesaid issues	Short-term and regular activity	January 22	District administration and TNPCB.	Not Applicable	Public helpline is already existing and operational Help line no 1913

21. GRADED/ EMERGENCY RESPONSE ACTION PLAN FOR CHENNAI U.A.

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

Table 16 Agencies implementing for severe ambient PM_{2.5} or PM₁₀ concentration

Severe (Ambient PM_{2.5} or PM₁₀ 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	TANGEDCO
Strengthen and encourage public transport services to reduce the vehicular congestion.	State Transport Corporations, Greater Chennai Corporation 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	Greater Chennai Corporation, State Highway and National Highway Authority of India.

Very Poor (ambient PM_{2.5} or PM₁₀ 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, Greater Chennai Corporation and 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
Stop use of coal/firewood in hotels and open eateries	Greater Chennai 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 PM₁₀ 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	Greater Chennai Corporation

responsible	
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	Greater Chennai Corporation
	Traffic Police
	Highways and NHAI
Strict vigilance and no tolerance for visible emissions – stop plying of visibly polluting vehicles by impounding or fine	Transport Department, Traffic police
Strict vigilance and enforcement of PUC norms	
Stringently enforce rules for dust control in construction activities and close non – compliant sites	Greater Chennai Corporation, Town planning authorities.
Deploy traffic police for smooth traffic flow at identified vulnerable areas	Traffic Police. Chennai
Ensure fly ash ponds* are watered every alternate day during summer months (March – May)	Industries

Moderate to poor (ambient PM_{2.5} or PM₁₀ 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 and Greater Chennai Corporation

Table 17 Details of Public Grievance Redressal Portal (PGRP)

S No	PGRP/ERS	Details of status of PGRP/ERS
1	<u>Direction -V</u> <u>Development of Public Grievance Redressal Portal (PGRP)</u>	1. <u>Chief Minister Cell- Tamil Nadu</u> App –Nil Portal -http://cmcell.tn.gov.in/ Phone Number : 044 - 2567 1764 E-Mail : cmcell@tn.gov.in 2. <u>Amma Cell</u> App-<u>Amma Call Centre</u> mobile app Portal- http://www.ammacallcentre.tn.gov.in/ Toll free number -1100. The complaints received through the above media are immediately attended and replies were furnished to the complainant. 3. <u>TNPCB</u> – Online Grievance Petition Redressal System Portal http://pcbolgprs.in/ Email: tnpcbgrivance@gmail.com Ph.No 044 - 2235 3134

		TNPCB has Toll-free number for lodging public grievances on issues related to pollution. Toll free No: 1800 - 425-6750
2	<u>Direction -XV</u> <u>Finalization of Emergency Response System</u> With regard to finalization of Emergency Response System (ERS), we are of view that the State Disaster Management Authorities in coordination with the SPCBs/PCCs and State Units of Meteorological Departments may include emergency as a part of disaster management and develop ERS accordingly which may be placed in public domain.	State Disaster Management authority of Tamil Nadu has policy and plan for the Emergency Response system for the natural disasters such as cyclones, floods, drought, landslides, earth quake, tsunami, heat wave and for manmade disasters such as chemical, biological and nuclear. App-<u>TN SMART</u> mobile app <u>Disaster management section –</u> <u>Collectorate – Chennai</u> What's App- 9445869848 Toll free No -1077



**Construction activites in Chennai
International Air port**



Construction and Demolition waste



Road Dust Emission



Vehicular Emission

Figure 18 Potential Source of PM₁₀ in Chennai city

22.MONITORING MECHANISM FOR IMPLEMENTATION

District level Committee constituted under the chairmanship of Commissioner of GCC and monthly meeting of the District level Committee will be conducted to discuss/ monitor the progress of the activities to be performed under the Action Plan. The committee shall involve various stakeholders and their participation will be ensured for achieving various targets mentioned in the Action plan. Tamil Nadu Pollution Control Board shall regularly review the implementation of aforesaid action plan. The quarterly progress reports (QPR) on action taken are to be submitted to Central Pollution Control Board on regular basis to furnish the same to Hon'ble National Green Tribunal (NGT)

The details of the various committee members involved in the overall guidance, monitoring and implementation of the city action plan are given in the table below

a) The District Level Committee shall be constituted as follows

1	Commissioner of Greater Chennai Corporation	Chairman
2	Commissioner of Police Chennai	Member
3	Joint chief Environmental Engineer(Monitoring) Tamil Nadu Pollution Control Board	Member & Convener
4	District Environmental Engineer, TNPCB, Chennai	Member
5	Joint Transport Commissioner,	Member

	Chennai	
6	Chief Engineer State highways Department Chennai	Member
7	Joint Commissioner. Civil Supplies Department	Member
8	Regional Oil Companies Coordinator , Tamil Nadu	Member
9	National Highway Authority of India, Chennai Region	Member
10	Deputy Director, Agriculture Department, Chennai	Member
11	Hotel Owners Association	Member
12	Chief Planner, CMDA	Member
13	Regional Director, CPCB, Chennai	Member
14	Chief Scientific Officer, TNPCB	Member

b) Steering Committee members

The Steering committee members to provide overall guidance for the National Clean Air Programme in respect of Chennai U A will be constituted as follows

1	Chief Secretary to Government of Tamil Nadu	Chairman
2	Additional Chief Secretary Government, Finance Department	Member
3	The Principal Secretary to Government, Environment and Forest Department	Member
4	The Principal Secretary to Government, Municipal Administration and Water Supply Department	Member

5	The Principal Secretary to Government, Industries Department	Member
6	The Principal Secretary to Government, Home(Transport) Department	Member
7	The Principal Secretary to Government, Agriculture Department.	Member
8	The Principal Secretary to Government Highways & Minor Ports Department	Member
9	The Member Secretary, Tamil Nadu Pollution Control Board	Member
10	The Commissioner, Greater Chennai Corporation	Member & Convener

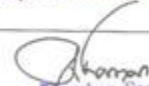
c) Air Quality Monitoring Committee (AQMC) at State Level

The Government of Tamil Nadu has constituted the Air Quality Monitoring Committee (AQMC) at state level with following members for the non-attainment cities/ million plus cities Chennai, Madurai and Trichy Vide GO (D) no.96 dated 14.06.2021

1	The Principal Secretary to Government, Environment Climate Change and Forest Department.	Chairman
2	Commissioner/ Director Industries and Commerce	Member
3	Commissioner, Municipal Administration Department	Member
4	Commissioner, Transport Department	Member
5	Director, Agriculture Department	Member
6	The Director of Environment	Member

7	The Member Secretary, Tamil Nadu Pollution Control Board	Member & Convener
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The above action plan is placed before the Air Pollution Monitoring Committee on 2.12.2021 and approved for forwarding the same to Central Pollution Control Board, Delhi.

S.No	Department		Signature
1	The Director of Environment, Panagal Building, Saidapet, Chennai-15.	Member	 DIRECTOR DEPARTMENT OF ENVIRONMENT CHENNAI - 600 015.
2	The Transport Commissioner, Transport department, Chepauk, Chennai-5	Member	 Transport Commissioner, Chepauk, Chennai - 5.
3	The Commissioner/Director of Industries and Commerce, Guindy, Chennai-32	Member	 Industries Commissioner and Director of Industries and Commerce Guindy, Chennai - 600 032
4	The Commissioner, Municipal Administration and Water Supplies department, MRC Nagar, Chennai-28.	Member	 சென்னை மாநகராட்சி ம.ந.அ. துறை - 28
5	The Director, Agricultural department, Chepauk, Chennai-5	Member	 Director of Agriculture Chepauk, Chennai-600 005.
6	Member Secretary, Tamil Nadu Pollution Control Board, Chennai-32	Member and Convener	 Member Secretary, Tamil Nadu Pollution Control Board CHENNAI-600 032.
7	The Principal Secretary to the Government Environment Climate Change and Forest Department, Government of Tamil Nadu, Chennai-9	Chairman	 Principal Secretary to Government Environment, Climate Change and Forest Department Secretariat, Chennai-9.

ANNEXURE 1: LIST OF JUNCTIONS TENTATIVELY IDENTIFIED FOR THE INSTALLATION OF WATER FOUNTAINS

S.No	Location	GCC Zone
1	Near cyclone shelter	1
2	Manali express road near Ernavur fly over traffic island	1
3	Manali express road near Ramakrishna Nagar traffic island	1
4	Near Matty mandai fly over traffic island	1
5	Vaduvudai Amman temple near	1
6	Perumal koil near	1
7	Kamaraj - JPP salai Junction	2
8	200 ft road Junction	2
9	KamarajarSalai - TPP salai Jn	2
10	200 feet road, Jawaharlal Nehru salai	2
11	MR nagar junction sidconagar main road (Jn – T.H. Road)	4
12	Manali salai Junction with KathivakkamHigh road	4
13	Dr.AmbedkarCoollege road Junction of M.P.M. street	4
14	Pantheon Road	5
15	Montinets road & R.K. Lakshmipathy Jn	5
16	Raja Muthiahsalai	5
17	Rajaji Salai - NSC Bose road Jn	5

S.No	Location	GCC Zone
18	Choolai road	6
19	Murasolimaran park	6
20	K H road	6
21	peravallorejn	6
22	Pallavansalai	6
23	perambur bridge both north & south	6
24	Anderson road traffic junction	6
25	Strahans road new zonal off	6
26	Padi Flyover	7
27	Thirumangalam Junction	7
28	Ambattur OT bus terminus	7
29	Nadhamuni Signal	8
30	Anna Arch Traffic Island	8
31	3rd Avenue Near K4 police station	8
32	Pulla Avenue Jn of 1st Avenue	8
33	Kellys signal	8
34	P.H.Road near Ega theatre Signal	8
35	Flowers Road Junction	8
36	Purasaiwalkam High Road Near Welcome Hotel	8
37	Skywalk Bridge	8

S.No	Location	GCC Zone
38	Harrington road	8
39	Ghandi Statue beachside fountain	9
40	Mountain falls opposite ezhilagan	9
41	Dr. Besant Beachside statue	9
42	Peters road flyover below	9
43	Graems road + Annasalai Junction	9
44	Loyola college opposite island	9
45	Sterling avenue	9
46	Opposite valluvarkottam	9
47	Anna salai + peters road junction	9
48	Haddows road college road junction	9
49	Haddows road near BSNL	9
50	College road + college lane junction	9
51	Koyambeduroundtana	10
52	Ashok pillar	10
53	Burkit rd. Venkatnarayana road junction	10
54	College road - Bharathi salai Jn	11
55	Arcot road - Alapakkam main road Jn	11
56	Arcot road Alsa Tower	11
57	Porur Jn (Below flyover)	11

S.No	Location	GCC Zone
58	Arcot road (Zonal Office -XI)	11
59	CMRL Land in front of Richard Park Zone 13 lorry station	13
60	Under kotturpuram flyover	13
61	Under kotturpuram flyover	13
62	Road side park opposite Ambika Appalam depot	13
63	Traffic island Jn of Gandhinagar 1st Main road	13
64	Road side Traffic Island	13
65	OMR thuripakkam Junction	15
66	OMR KK salai junction	15
67	ECR new toll plaza	15
68	Nakkompallayam junction of semmencherymainroad	15
69	ECR junction of KK Salai	15

ANNEXURE I LIST OF VERTICAL GARDEN AROUND THE PIERS OF EXISTING GRADE SEPARATORS/FLYOVER/ROB WITH STP AT 15 LOCATIONS:

Sl. No	Name of Flyover/Grade Separator/ROB	No. of Piers	Bays	Vertical Garden Area (m2)	STP Provided
1	Grade Separator at Vallalar Nagar at Mint Junction in Div 53, Zone 5.	2	Nil	260	Yes
2	Doveton Junction Flyover in Div 58, Zone 5.	7	1	120	Yes
3	Pantheon Road - Casa Major Road Junction Flyover in Div 61, Zone 5.	6	1	180	Yes
4	Peters Road - Coronsmith Road Junction Flyover in Div: 111 & 115, Zone 09.	8	1	250	Yes
5	Peters Road - West Cott Road Junction Flyover in Div 115 & 119, Zone 09.	7	1	250	Yes
6	Grade Separator at North Usman Road - Mahalingapuram Road Junction in Div: 110 & 113, Zone: 09.	4	2	310	Yes
7	Grade Separator at South Usman Road - Duraisamy Junction in Div 136, Zone 10.	10	7	850	Yes
8	Dr. Radhakrishnan Road - TTK Road Junction Flyover (Music Academy) in Div 118 & 119, Zone 09.	22	1	500	Yes
9	Dr. Radhakrishnan Road - Royapettah High Road Flyover in Div 119 & 121, Zone 09. (Ajantha)	9	1	250	Yes
10	TTK Road - C P Ramasamy Road Junction in Div: 118 & 123, Zone: 09. (Kauvery Hospital)	16	7	800	Yes
11	G K Moopanar Bridge at Cenotaph Road and Turnbolls Road Junction in Div 122, Zone 09.	6	1	250	Yes
12	Sardar Patel Road - L B Road	16	1	800	Yes

Sl. No	Name of Flyover/Grade Separator/ROB	No. of Piers	Bays	Vertical Garden Area (m2)	STP Provided
	Junction Flyover in Div 175&176, Zone: 13.				
13	Sardar Patel Road - Gandhi Mandapam Road Junction Flyover in Div: 171&172, Zone: 13.	8	Nil	120	No
14	Murasoli Maran Bridge at Perambur High Road to the West of Perambur Railway Station in Div 70 & 71, Zone 06.	12	2	800	Yes
15	Kalaivanar Bridge, GN Chetty Road in Div 117, Zone IX.	8	Nil	260	No

ANNEXURE IIIA TRAFFIC- CHENNAI (SOURCE TRAFFIC DEPARTMENT-CHENNAI)TRAFFIC NORTH ZONE

Sl. No.	TRAFFIC PS Limits	Traffic Congestion Points
1.	M1. Madhavaram	GNT Road X Madhavaram Roundabout
2.	M4. Redhills	GNT Road X Thiruvallur Line Road Junction
3.	M6. Manali	KanarajarSalai X Manali Market
4.	C1. Flower Bazaar	Central Light Point (EVR Salai – Central Railway Station Signal)

ANNEXURE IIIB TRAFFIC- CHENNAI (SOURCE TRAFFIC DEPARTMENT-CHENNAI) TRAFFIC SOUTH ZONE

S.No.	TRAFFIC PS Limits	Traffic Congestion Points
1.	R1 – Mambalam	Usman Road X Duraisamy Street (Pothys junction)
2.	R2 – Kodambakkam	Arcot Road – Vadapalani Arch up to Ambedkar statue.
3.	J1 – Saidapet	CIT Nagar 1st Street (MC Raja Hostel upto CIT Nagar)
4.	J2 – Adyar	Kasthuribai Nagar junction
5.	J3 – Guindy	Sardar Vallabai Patel Road X Taluka Office Road
6.	J6 – Thiruvannamiyur	Thiruvannamiyur Junction
7.	J7 – Velachery	Vijayanagar Bus Stand Junction
8.	J10 - Semmancheri	Cholinganallur Junction
9.	S1 – Mount	Pat road
10.	S2 – Airport	PallavaramDharka Road
11.	S15 – Selaiyur	Velachery Main Road – Nearby Selaiyur Police Station

ANNEXURE IV LIST OF MAJOR JUNCTIONS / INTERSECTIONS IN THE CITY OF CHENNAI

Source (Greater Chennai Corporation)

S.N o	Location Name	Lat	Long	Corridors Name	Name of the Zone
1	Anna Salai X Poes Road (Anna Arivalayam)	13.042401	80.247615	Mount Road (Anna Salai)	TEYNAMPET

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
2	Anna Salai X Sivasankaran Road	13.045196	80.247956	Mount Road (Anna Salai)	TEYNAMPET
3	Anna Salai X Kavignar Bharathidasan Road (SIET)	13.0357109	80.2460885	Mount Road (Anna Salai)	TEYNAMPET
4	Anna Salai X Eldams Road	13.039298	80.24696	Mount Road (Anna Salai)	TEYNAMPET
5	Anna Salai X Dams Road	13.066434	80.268391	Mount Road (Anna Salai)	ROYAPURAM
6	Anna Salai X General Patters Road	13.0657774	80.2676206	Mount Road (Anna Salai)	ROYAPURAM
7	Anna Salai X Blackers Road	13.068072	80.271206	Mount Road (Anna Salai)	ROYAPURAM
8	Anna Salai X PallavanSalai	13.073775	80.276466	Mount Road (Anna Salai)	ROYAPURAM
9	Anna Salai X Wallajah Road (Anna Statue)	13.068475	80.27192	Mount Road (Anna Salai)	ROYAPURAM
10	Anna Salai X Swami Sivananda Salai (Periyar Statue)	13.071693	80.27441	Mount Road (Anna Salai)	ROYAPURAM
11	Anna Salai X Binny Road (Spencer Plaza)	13.062043	80.26305	Mount Road (Anna Salai)	TEYNAMPET

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
12	Anna Salai X Venkatanarayana Road (Nandhanam)	13.031025	80.239778	Mount Road (Anna Salai)	ADYAR
13	Anna Salai X Todd Hunter Road	13.024664	80.228972	Mount Road (Anna Salai)	KODAMBAKKAM
14	Anna Salai X CIT Nagar 1st Main Road	13.026049	80.231375	Mount Road (Anna Salai)	ADYAR
15	Anna Salai X CIT Nagar 3rd Main Road	13.02665	80.233045	Mount Road (Anna Salai)	KODAMBAKKAM
16	Anna Salai X Lampart Church (ArunaPedestrian)	13.01525	80.22473	Mount Road (Anna Salai)	ADYAR
17	Anna Salai X Sardar Patel Road	13.0121346	80.2213174	Mount Road (Anna Salai)	ADYAR
18	Anna Salai X Saidapet Metro Station	13.0244088	80.2285828	Mount Road (Anna Salai)	KODAMBAKKAM
19	Anna Salai X Flag Staff Road	13.0789169	80.2819581	Mount Road (Anna Salai)	ROYAPURAM
20	Anna Salai x Velachery Main Road	13.0154738	80.2253321	Mount Road (Anna Salai)	ADYAR
21	Anna Salai X Jeenis Road	13.0199885	80.2246286	Mount Road (Anna Salai)	KODAMBAKKAM

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
22	Anna Salai X Smith Road (Ty.Switched Off-CMRL work)	13.0599413	80.2604082	Mount Road (Anna Salai)	TEYNAMPET
23	Anna Salai X Whites Road (Ty.Switched Off- CMRL Work)	13.056485	80.256679	Mount Road (Anna Salai)	TEYNAMPET
24	Anna Salai X Thiru. Vee Ka Salai	13.0576172	80.2576985	Mount Road (Anna Salai)	TEYNAMPET
25	Anna Salai X Cenatoph Road	13.034666	80.245666	Mount Road (Anna Salai)	TEYNAMPET
26	EVR Salai X Ritherdon Road	13.079377	80.258767	EVR Salai	ROYAPURAM
27	EVR Salai X EVK Sampath Road	13.080241	80.262769	EVR Salai	ROYAPURAM
28	EVR Salai X Gandhi Irvin Bridge Road	13.080685	80.265141	EVR Salai	ROYAPURAM
29	EVR Salai X Dr. Nair Road	13.079049	80.256685	EVR Salai	ROYAPURAM
30	EVR SalaiX Raja Annamalai Road	13.078976	80.254701	EVR Salai	ROYAPURAM
31	EVR Salai X Raja Muthiah Road	13.0809508	80.2709004	EVR Salai	ROYAPURAM
32	EVR Salai X Burnaby Road	13.077876	80.244459	EVR Salai	ANNA NAGAR
33	EVR Salai X Gengu Reddy Road	13.078834	80.251715	EVR Salai	ANNA NAGAR
34	EVR Salai X Taylors Road	13.076659	80.238106	EVR Salai	ANNA NAGAR
35	EVR Salai X Dr. Guruswamy Bridge	13.077246	80.240727	EVR Salai	ANNA NAGAR
36	EVR Salai X Nelson Manickam Road	13.074357	80.220917	EVR Salai	ANNA NAGAR

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
37	EVR Salai X Anna Arch Road	13.074933	80.217904	EVR Salai	ANNA NAGAR
38	EVR Salai X Pulla Avenue	13.074027	80.224776	EVR Salai	ANNA NAGAR
39	EVR Salai X Lakshmi Talkies Road	13.0740185	80.2275227	EVR Salai	ANNA NAGAR
40	EVR Salai X NSK Nagar Main Road	13.075125	80.2160633	EVR Salai	ANNA NAGAR
41	EVR Salai X PallavanSalai (Central Railway Station)	13.08168	80.275147	EVR Salai	ROYAPURAM
42	EVR Salai X Evening Bazzar Road	13.082172	80.27847	EVR Salai	ROYAPURAM
43	EVR Salai X 8th Main Road (Naduvankarai)	13.076985	80.211716	EVR Salai	ANNA NAGAR
44	EVR Salai X Muthuswamy Road	13.082268	80.281517	EVR Salai	ROYAPURAM
45	EVR Salai X New Avadi Road (Pachiyappas)	13.075805	80.233878	EVR Salai	ANNA NAGAR
46	EVR Salai X Harrington Road	13.075297	80.232028	EVR Salai	ANNA NAGAR
47	Inner Ring Road X Periyar Pathai	13.0587571	80.2115146	Inner Ring Road	KODAMBAKKAM
48	Inner Ring Road X Nerkundram Pathai	13.054501	80.211364	Inner Ring Road	KODAMBAKKAM
49	Inner Ring Road X Ashok Nagar 4th Avenue	13.037288	80.21234	Inner Ring Road	KODAMBAKKAM
50	Inner Ring Road X Ashok Pillar	13.034817	80.212094	Inner Ring Road	KODAMBAKKAM
51	Inner Ring Road X Vinayagapuram Main Road	13.063784	80.211639	Inner Ring Road	ANNA NAGAR
52	Inner Ring Road X CMBT	13.0699119	80.2049554	Inner Ring Road	KODAMBAKKAM

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
53	Inner Ring Road X Annai Sathya Nagar (Games Village)	13.067498	80.208623	Inner Ring Road	KODAMBAKKAM
54	Inner Ring Road X Arcot Road (Vadapalani Signal)	13.049875	80.211974	Inner Ring Road	KODAMBAKKAM
55	Inner Ring Road X PT Rajan Road (Laxman Suruthi)	13.044291	80.212276	Inner Ring Road	KODAMBAKKAM
56	Inner Ring Road X CMBT Emergency Exit	13.069278	80.205872	Inner Ring Road	KODAMBAKKAM
57	Inner Ring Road X Poonamalee Road	13.021752	80.20642	Inner Ring Road	ADYAR
58	Inner Ring Road X Water Works Road (Cipet)	13.0137561	80.2042721	Inner Ring Road	ADYAR
59	Inner Ring Road x Kalaimagal Nagar	13.0241386	80.2067246	Inner Ring Road	ADYAR
60	Inner Ring Road X MH Point	13.0015184	80.1959495	Inner Ring Road	ALANDUR
61	Inner Ring Road X Jaffer Khanpet Main Road (Kasi Theatre)	13.0302175	80.2090622	Inner Ring Road	KODAMBAKKAM
62	Inner Ring Road X 18th Main Road	13.094848	80.198605	Inner Ring Road	ANNA NAGAR
63	Inner Ring Road X Anna Nagar 2nd Avenue	13.085394	80.198527	Inner Ring Road	ANNA NAGAR
64	Inner Ring Road X Kalamman Koil Street (Ty. Switched off)	13.072079	80.202083	Inner Ring Road	KODAMBAKKAM
65	Inner Ring Road X Ambal Nagar Main Road	13.01777	80.205775	Inner Ring Road	ADYAR
66	Inner Ring Road X Ambattur Estate Rd	13.087186	80.1984573	Inner Ring Road	ANNA NAGAR

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
67	KamarajarSalai X Dr.Besant Road	13.050506	80.280535	Kamarajar Salai	TEYNAMPET
68	KamarajarSalai X Dr. Radhakrishnan Salai	13.043386	80.279739	Kamarajar Salai	TEYNAMPET
69	KamarajarSalai X Wallahjah Road	13.064171	80.283466	Kamarajar Salai	TEYNAMPET
70	KamarajarSalai X KaraneeswararKoi l Street	13.0373745	80.2782788	Kamarajar Salai	TEYNAMPET
71	KamarajarSalai X Pycrofts Road	13.057523	80.2820111	Kamarajar Salai	TEYNAMPET
72	KamarajarSalai X Swami Sivananda Salai	13.0680076	80.2842271	Kamarajar Salai	TEYNAMPET
73	KamarajarSalai X Foreshore Estate Promenade(near marina beach police station)	13.0394222	80.2789943	Kamarajar Salai	TEYNAMPET
74	GST Road X Airport Service Road (Palavanthangal)	12.994032	80.185457	GST Road	ALANDUR
75	GST Road X Air Port Entrance	12.981726	80.166908	GST Road	ALANDUR
76	GST Road X Airport Service Road (Old Airport Junction)	12.98978763	80.17921524	GST Road	ALANDUR
77	GST Road X MKN Road	12.996131	80.1892435	GST Road	ALANDUR
78	GST Road X Kamarajar Street (Meenambakkam Bazaar)	12.9864533	80.1747667	GST Road	ALANDUR
79	GST Road X Air Port exit gate	12.97989844	80.16293197	GST Road	ALANDUR
80	LB Road X Indira Nagar 1st Avenue	12.999493	80.256132	LB Road	ADYAR
81	LB Road X Sardar Patel Road	13.006703	80.257619	LB Road	ADYAR

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
82	LB Road X Mahatma Gandhi Road	12.996921	80.255828	LB Road	ADYAR
83	LB Road X Kamarajar Avenue 2nd Street	13.0012347	80.2565783	LB Road	ADYAR
84	LB Road X Kalashetra Road	12.990393	80.256044	LB Road	ADYAR
85	LB Road X East Coast Road (Thiruvannamiyur)	12.987682	80.255948	LB Road	ADYAR
86	Sardar Patel Road X Rajiv Gandhi Salai (Mada Kailas)	13.006641	80.247484	Sardar Patel Road	ADYAR
87	Sardar Patel Road X Gandhi Mandapam Road	13.006796	80.240319	Sardar Patel Road	ADYAR
88	Sardar Patel Road X Kasthuribai Nagar Road	13.006705	80.251709	Sardar Patel Road	ADYAR
89	Sardar Patel Road X Velachery Main Road(Concord)	13.011354	80.223249	Sardar Patel Road	ADYAR
90	Sardar Patel Road X VinayagarKoil Street (Servant Gate)	13.010694	80.224873	Sardar Patel Road	ADYAR
91	Sardar Patel Road X Anna University	13.007906	80.234976	Sardar Patel Road	ADYAR
92	South Usman Road X NewBoag Road	13.030739	80.230729	Usman Road	KODAMBAKKAM
93	South Usman Road X Burkit Road	13.035013	80.230259	Usman Road	KODAMBAKKAM
94	North Usman Road X Bazullah Road	13.04744	80.23307	Usman Road	KODAMBAKKAM
95	CIT Nagar 1st Main Road X North Road	13.029541	80.230797	Usman Road	ADYAR

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
96	South Usman Road X Mannar Street	13.0341745	80.2304081	Usman Road	KODAMBAKKAM
97	RK Salai X Dr.Natesan Road	13.04346	80.274272	Dr Radha Krishnan Road	TEYNAMPET
98	RK Salai X Sivasamysalai (Nilgris Jn)	13.044609	80.263538	Dr Radha Krishnan Road	TEYNAMPET
99	RK Salai X Royapettah High Road	13.044582	80.266882	Dr Radha Krishnan Road	TEYNAMPET
100	RK Salai X TTK Salai	13.045397	80.259873	Dr Radha Krishnan Road	TEYNAMPET
101	RK Salai X Light House Station Road	13.0433692	80.2764331	Dr Radha Krishnan Road	TEYNAMPET
102	Rajaji Salai X Flag Staff Road	13.07391	80.285673	Rajaji Salai	ROYAPURAM
103	Rajaji Salai X Secretariate out gate	13.08005838	80.28804833	Rajaji Salai	ROYAPURAM
104	Rajaji Salai X Jaffar Sarang Street	13.095145	80.292515	Rajaji Salai	ROYAPURAM
105	Rajaji Salai X NSC Bose Road (Parrys Corner)	13.088819	80.29044	Rajaji Salai	ROYAPURAM
106	Cathedral Road X MuthiahMudali Street	13.04871786	80.25354054	Cathedral Road	TEYNAMPET
107	Cathedral Road X Anna Salai	13.052325	80.251009	Cathedral Road	TEYNAMPET
108	Cathedral Road X Binny Road	13.0466962	80.254842	Cathedral Road	TEYNAMPET
109	Cathedral Road X KasthuriRangan Road	13.0460285	80.2567292	Cathedral Road	TEYNAMPET
110	Arcot Road X Puliur Main Road (Gogulam Point)	13.0534171	80.2241657	Arcot Road	KODAMBAKKAM

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
111	Arcot Road X Dr. Ambedkar Road	13.052399	80.220397	Arcot Road	KODAMBAKKAM
112	Arcot Road X Duraiswamy Road	13.0505178	80.2146754	Arcot Road	KODAMBAKKAM
113	Arcot Road X Mahalingapuram Main Road	13.053783	80.234625	Arcot Road	TEYNAMPET
114	Kodambakkam High Road X Uthamar Gandhi Salai	13.05373916	80.25028515	Kodambakkam High Road	TEYNAMPET
115	Kodambakkam High Road X ValluvarKottam High Road	13.052622	80.241718	Kodambakkam High Road	TEYNAMPET
116	Kodambakkam High Road X Josier Street	13.052863	80.245455	Kodambakkam High Road	TEYNAMPET
117	Kodambakkam High Rd X Vidyodaya Main Road	13.0527964	80.2431093	Kodambakkam High Road	TEYNAMPET
118	Nelson Manickam Road X 2nd Main Road	13.069766	80.224539	Nelson Manickam Road	ANNA NAGAR
119	Nelson Manickam Road X Choolaimedu High Road	13.0665761	80.2313653	Nelson Manickam Road	TEYNAMPET
120	Nelson Manickam Road X Sterling Road	13.063974	80.235229	Nelson Manickam Road	TEYNAMPET
121	Nelson Manickam Road X Metha Nagar Main Road (Switched Off)	13.068071	80.226494	Nelson Manickam Road	ANNA NAGAR
122	G N Chetty Road X Dr. Nair Road	13.0451	80.24026	GN Chetty Road	KODAMBAKKAM
123	G N Chetty Road X Srinivasa Road	13.042684	80.23588	GN Chetty Road	KODAMBAKKAM

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
124	GN Chetty Road X North Boag Road (Barathyraja Hospital) (Ty.Switched off - CMRL work)	13.047797	80.245195	GN Chetty Road	TEYNAMPET
125	Indira Nagar 2nd Avenue X 1st Avenue (Water Tank)	12.995068	80.252379	OMR	ADYAR
126	Rajiv Gandhi Salai X Indira Nagar 2nd Avenue	12.994414	80.249729	OMR	ADYAR
127	Rajiv Gandhi Salai X East Coast Road	12.9875624	80.2516636	OMR	ADYAR
128	Greenways Road X MRC Nagar Main Road	13.02079	80.26969	Greenways Road	TEYNAMPET
129	Greenways Road X R A Puram 2nd Main Road	13.027225	80.253791	Greenways Road	TEYNAMPET
130	Greenways Road X Durgabai Deshmukh Road	13.0186045	80.2612478	Greenways Road	TEYNAMPET
131	Ramakrishna Mutt Road X S Canal Bank Road (Mandaveli Jn)	13.026251	80.265936	Ramakrishna Mutt Road	TEYNAMPET
132	Ramakrishna Mutt Road X Venkatesa Agraharam Road	13.032639	80.2675142	Ramakrishna Mutt Road	TEYNAMPET
133	Luz Church Road X Royapettah High Road	13.036918	80.267533	Ramakrishna Mutt Road	TEYNAMPET
134	Mowbrays Road X PasumponMuthuramalingaThevar Road	13.0288459	80.2497281	Mowbrays Road (TTK Road)	TEYNAMPET
135	Mowbrays Road X Musiri Subramaniam Road	13.03887352	80.2572822	Mowbrays Road (TTK Road)	TEYNAMPET

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
136	Mowbrays Road X Eldams Road	13.038069	80.256576	Mowbrays Road (TTK Road)	TEYNAMPET
137	Valluvarkottam High Road X Harrington Road (Chetpet)	13.069278	80.242266	Valluvarkottam High Road	TEYNAMPET
138	Valluvarkottam High Road X Tank Bund Road	13.056853	80.24265372	Valluvarkottam High Road	TEYNAMPET
139	Valluvarkottam High Road X Sterling Road	13.065943	80.2435093	Valluvarkottam High Road	TEYNAMPET
140	C P R Road X 2nd Main Road (Kaliyappa Hospital)	13.027116	80.256546	Pasumpon Muthuram alingam Salai	TEYNAMPET
141	C P R Road X Rangacharry Road	13.033335	80.256917	CP Ramaswamy Iyer Road	TEYNAMPET
142	C P R Road X St Marrys Road	13.028861	80.256456	CP Ramaswamy Iyer Road	TEYNAMPET
143	DD Road X Gandhi Nagar 4th Main Road	13.009366	80.259115	DurgaBai Deshmukh Road	ADYAR
144	DD Road X Dr MGR janaki college of arts and science	13.016131	80.2595348	DurgaBai Deshmukh Road	TEYNAMPET
145	Evening Bazaar Road X Rattan Bazaar Road (MUC)	13.085847	80.280831	Evening Bazaar Road	ROYAPURAM
146	Gandhi Mandapam Road X PonniammanKoil Street	13.018096	80.241133	Gandhi Mandapam Road	ADYAR

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
147	Gandhi Mandappam Road X Murugappa Road	13.0195224	80.2415144	Gandhi Mandapam Road	ADYAR
148	Walltax Road X Elephant Gate Street	13.092325	80.275231	Grand Northen Trunk Road	ROYAPURAM
149	Walltax Road x Rasappa Chetty Street	13.086618	80.275773	Grand Northen Trunk Road	ROYAPURAM
150	Muthuswamy Road X Esplanade Road	13.085379	80.284212	Muthuswamy Road	ROYAPURAM
151	EthirajSalai X Rukmani Lakshmipathi Road	13.0639004	80.2600073	EthirajSalai	ROYAPURAM
152	NSC Bose Road X Broadway Road	13.088445	80.285312	NSC Bose Road	ROYAPURAM
153	PasumponMuthuramalingarSalai X Cenotaph Road	13.0295244	80.2457852	Pasumpon Muthuram alingam Salai	TEYNAMPET
154	Royapettah High Road X Peters Road	13.053899	80.264041	Royapettah High Road	TEYNAMPET
155	Santhome High Road X Rosary Church Road	13.033444	80.277338	Santhome High Road	TEYNAMPET
156	Santhome High Road X South Canal Bank Road	13.023979	80.273812	Santhome High Road	TEYNAMPET
157	Sir Theagaraya Road X North BoagRoad (Ma.Po.Ce)	13.039875	80.244021	Sir Theagaraya Road	TEYNAMPET
158	Taluk Office Road X Lourd Doss Grotto Road (MTC Depot)	13.014482	80.2261651	Taluk Office Road	ADYAR

S.No	Location Name	Lat	Long	Corridors Name	Name of the Zone
159	Tank Bund Road X Mahalingapuram Main Road	13.0610903	80.2375115	Tank Bund Road	TEYNAMPET
160	Tank Bund Road X Sterling Road(near Loyola College)	13.0627278	80.2360488	Tank Bund Road	TEYNAMPET
161	Uthamar Gandhi Road X Haddows Road	13.06131	80.24698	Uthamar Gandhi Road	TEYNAMPET
162	Venkatanarayana Road X Burkit Road	13.034389	80.237615	Venkatana rayana Road	KODAMBAKKAM
163	Venkatanarayana Road X Sivagnanam Street	13.039157	80.234583	Venkatana rayana Road	KODAMBAKKAM
164	Wallahjah Road X Quaid-E-Millath Road	13.066758	80.273774	Wallahjah Road	ROYAPURAM
165	Wallahjah Road X Bells Road	13.064713	80.278343	Wallahjah Road	TEYNAMPET

ANNEXURE V NON-ATTAINMENT CITIES – CHENNAI PARTICULARS UPTO SEP-2021

S.No	Name of zone	No. of Puc Centre in Chennai city	No. of E-vehicles/ battery operator vehicle register	No. of CNG vehicles	No. of LPG vehicles
1	Chennai (north)	17	5087	78	2205
2	Chennai (south)	10	2184	18	7594
	Total	27	7271	96	9799



ABSTRACT

Environment - Air Quality Monitoring Committee (AQMC) constituted for preparation and implementation of action plan for improving the ambient air quality in non-attained city (Thoothukudi) as per the orders of Hon'ble National Green Tribunal in O.A.No.681/2018, dated 08.10.2018 - Extending the scope of the Air Quality Monitoring Committee to the newly included non-attainment cities and Million Plus Cities - Orders - Issued.

Environment, Climate Change and Forest (EC.2) Department

G.O.(D)No.96

Dated: 14.06.2021

பிலவ, வைகாசி-31,

திருவள்ளூர் ஆண்டு-2052

Read :

1. G.O.(D).No.20, Environment and Forests (EC.2) Department, Dated:10.01.2019.
2. From the Member Secretary, Tamil Nadu Pollution Control Board, Guindy, Chennai-32. Letter No.TNPCB/DD(L)/3064/2013, Dated:30.03.2021.

ORDER

In the Government order first read above, an Air Quality Monitoring Committee has been constituted based on the directions of the Hon'ble National Green Tribunal, Principal Bench in O.A.No.681 of 2018, dated 08.10.2018 for preparation and implementation of action plan for improving the air quality in non-attainment city Thoothukudi with the following members :-

1.	Principal Secretary to Government, Environment and Forests Department	Chairman
2.	The Director of Environment, Department of Environment	Member
3.	Commissioner, Transport Department	Member
4.	Commissioner / Director Industries and Commerce	Member
5.	Commissioner Municipal Administration Department	Member
6.	Director, Agriculture Department	Member
7.	The Member Secretary Tamil Nadu Pollution Control Board	Member/Convener

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2. The Member Secretary, Tamil Nadu Pollution Control Board in his letter second read above has stated that the Hon'ble National Green Tribunal, New Delhi in its further order in O.A.No.681 of 2018, dated 06.08.2019 has identified the Trichy in Tamil Nadu also as non-attainment city based on the air quality data for the period from 2014-2018 and further in the month of November 2020, Central Pollution Control Board has included Madurai as non-attainment city based on the data for the period from 2015-2019.

3. The Member Secretary, Tamil Nadu Pollution Control Board has also stated that Chennai city have been included as Million Plus Cities for control of abatement of air pollution and the Central Pollution Control Board has requested the Tamil Nadu Pollution Control Board to prepare action plan for the Non-attainment Cities and Million plus cities (i.e., Trichy, Madurai and Chennai). The said Action plan for the non-attainment cities and the Million Plus Cities have to be approved by the Air Quality Monitoring Committee.

4. The Member Secretary, Tamil Nadu Pollution Control Board has therefore requested to extend the scope of Air Quality Monitoring Committee constituted vide G.O.Ms.No.20, Environment and Forests(EC.2) Department, dated 10.01.2019 to the other non attainment cities and Million Plus cities (i.e.,Trichy, Madurai and Chennai) for approval of the action plans.

5. The Government after careful examination have decided to accept the proposal of the Member Secretary, Tamil Nadu Pollution Control Board and to extend the scope of Air Quality Monitoring Committee constituted in G.O.Ms.No.20, Environment and Forests(EC.2) Department, dated 10.01.2019, to the other newly included non attainment cities and Million Plus cities of Trichy, Madurai and Chennai for approval of the action plans.

(BY ORDER OF THE GOVERNOR)

SUPRIYA SAHU
PRINCIPAL SECRETARY TO GOVERNMENT

To
The Chairman,
Tamil Nadu Pollution Control Board,
Guindy, Chennai-32.
The Commissioner, Transport Department,
Chepauk, Chennai-5.
The Commissioner of Municipal Administration,
Raja Annamalaipuram, Chennai-28.
The Commissioner / Director,
Department of Industries and Commerce,
Guindy, Chennai - 32.

..3..

-3-

The Director, Agriculture Department,
Chepauk, Chennai -5.
The Director of Environment,
Department of Environment, Saidapet, Chennai -15.
The Member Secretary,
Tamil Nadu Pollution Control Board,
Guindy, Chennai 32.

Copy to:

The Additional Chief Secretary to Government,
Municipal Administration and Water Supply Department,
Secretariat, Chennai-9.
The Additional Chief Secretary to Government,
Transport Department, Secretariat, Chennai-9
The Principal Secretary to Government,
Industries Department, Secretariat, Chennai-9.
The Principal Secretary to Government,
Agriculture Department, Secretariat, Chennai - 9.
The District Collectors concerned.
The Special Personal Assistant to Hon'ble Minister
(Environment-Climate Change and Youth Welfare and Sports Development),
Secretariat, Chennai-9.
The Private Secretary to Principal Secretary to Government,
Environment and Forests Department, Secretariat, Chennai-9.
Stock File/Spare Copy.

// FORWARDED : BY ORDER //

N.B.
18.6.2021
Shan Section Officer
15/6/2021