REVISED ACTION PLAN FOR CONTROL OF AIR POLLUTION IN NON-ATTAINMENT CITIES OF MAHARASHTRA

NAVI MUMBAI

MAHARASHTRA POLLUTION CONTROL BOARD

KALPATARU POINT, 3rd Floor,
Sion-Matunga Scheme Rd. No.8,
Opp. Sion Circle, Sion (East),
Mumbai-400 022.

Date: 24th April, 2019
1. Preamble

Navi Mumbai is a planned city off the west coast of the Indian state of Maharashtra in Konkan division. The city is divided into two parts, North Navi Mumbai and South Navi Mumbai, for the individual development of Panvel Mega City, which includes the area from Kharghar to Uran. Navi Mumbai has a population of 1,119,477 as per the 2011 provisional census.

Maharashtra Industrial Development Corporation (MIDC) has established an industrial estate at Thane Belapur Road, Navi Mumbai in the year 1963 which is known as Trans Thane Creek (TTC) MIDC Estate. The Estate is located along Thane Belapur Road towards Northern side of road and total area of the industrial estate is 27 sq.kms and about 16% of total area in Navi Mumbai falls under MIDC zone.

Navi Mumbai is a developing town and so many construction activities are going on. Besides the industries, there are other sources which are major contributors for pollution, especially air pollution. Month and Annual Air Quality Monitoring data for Navi Mumbai is as follows:

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Area sources

Although emissions from individual area sources are relatively small collectively their emissions are of great concern - particularly where large numbers of sources are located in heavily populated areas. Area sources are mainly domestic sources of fuel (coal, wood, kerosene, LPG) burning, trash/MSW combustion, bakeries, hotels/restaurants etc. and resuspension of dust. Assessing the estimation of emission inventory, contribution of regional ground level emission load of PM10 is 1.29 tons/day and from road resuspension is 19 tons/day out of the total PM10 emission load. Out of the total area source emission, the most contribution is from domestic and household consumption of fuels and construction activity. The same trend was observed for NOx emission load. This can be attributed to recent settlement and migration of huge population towards the region and inclination of new building and construction project in and around the region. Based on the survey and assessment, following recommendations emerge to curb area source emissions:

- Inventorization of LPG quantity from supply agencies should be maintained.
- Mahanagar Gas Ltd. and ULB should take initiative to sensitize people from the slum & non slum to make the shift from conventional domestic fuel (LPG, Kerosene, wood) to Piped Natural Gas (PNG).
- Development of roads - Navi Mumbai is interconnected by Asphalt /Cement roads however; internal roads in MIDC area require improvement. There are internal roads of 95 km in TTC MIDC area, Navi Mumbai Municipal Corporation authority informed that 98% construction work of internal roads in MIDC area is completed and the remaining work will be completed at the earliest. Dusty materials such as sand and cement should be kept covered. City pathways and footpath design needs a norm. UTTIPEC design manual has been recently created by Delhi Development authority for

<table>
<thead>
<tr>
<th>Year</th>
<th>PM2.5</th>
<th>PM10</th>
<th>Area Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>09-10</td>
<td>23</td>
<td>55</td>
<td>200</td>
</tr>
<tr>
<td>10-11</td>
<td>27</td>
<td>48</td>
<td>194</td>
</tr>
<tr>
<td>11-12</td>
<td>20</td>
<td>51</td>
<td>148</td>
</tr>
<tr>
<td>12-13</td>
<td>18</td>
<td>45</td>
<td>129</td>
</tr>
<tr>
<td>13-14</td>
<td>19</td>
<td>47</td>
<td>187</td>
</tr>
<tr>
<td>14-15</td>
<td>18</td>
<td>41</td>
<td>142</td>
</tr>
<tr>
<td>15-16</td>
<td>21</td>
<td>47</td>
<td>148</td>
</tr>
<tr>
<td>16-17</td>
<td>21</td>
<td>47</td>
<td>111</td>
</tr>
<tr>
<td>17-18</td>
<td>23</td>
<td>47</td>
<td>105</td>
</tr>
</tbody>
</table>
uniform roadside, drains, footpath and related design. The same should be adopted for all future design for roads and pathways.

- Resuspension of dust can be minimized through regular sweeping and application of treated sewage for roadside bioswale system, which will not only keep the kerb-side green but also help in arresting air pollution. Appropriate barricading of the under construction site to avoid dispersion of the dust and particulate matter in the ambient air. Water spraying on the tires of trucks and vehicles at the entry/exit point of construction site. Constructing a water pit at the entry/exit points of the construction site to avoid dispersion of particulate matter through movement of trucks while entering and exiting the site.

**Point Source**

As per MPCB Navi Mumbai had aggregate Comprehensive Environmental Assessment of Industrial Cluster in December 2009 having CEPI Score of 73.77. The CEPI Score of June 2018 is 41.78 which shows that there is a tremendous depletion in the pollution of Navi Mumbai Region. There are 541 Air Polluting industries in area/cluster. Major pollutants are TPM/SPM, SO2, NOx, NH3, Cl2, and VOC from pesticide and bulk drug units. All the Air polluting industries have provided emission control systems as required i.e. Dust collectors, Scrubbers, and Stack of sufficient height. The number of D.G sets in the region is very high and emissions from their stacks are accountable. Total 69 industries have changed their fuel pattern and are using PNG as fuel and the remaining 13 industries using coal as fuel has been directed to switch over for use of PNG. However because of economic viability out these 13 units 11 has upgraded ECS (Energy Conservation Scheme) and provided Bag filter and ventury scrubbers. Work is in progress for remaining 2 units. Based on the survey and assessment, following recommendations emerge:

- Inventorisation of prominent industries with inclusion of technological gaps. Use of Furnace Oil should be regulated.
- Industries should adopt stack emission norms beyond those prescribed by CPCB Industries/power plants, which should be followed by regular QA/QC & performance audit.
- M/s. Mahanagar Gas Ltd. is lying down gas pipeline, which is to be commissioned in the next year. All the industries are proposed to use natural gas soon after commissioning of Gas supply. 17 industries have changed their fuel pattern and are using CNG as fuel.
- Presently, 16 industries identified as a Hazardous Air Pollutant emitting units. They have issued directions to install Leak detection & repair system (LDAR) within months. Presently, 10 industries
are installed with LDAR.

- All the bulk drug and pesticides manufacturing units should be proposed to improve efficiency of their VOC scrubbers. Total 16 industries have been identified to install VOC analyzer. Out of this 10 industries have installed VOC analyzer system. 2 units are not in operation. And remaining 4 units has been directed for compliance.

- The chemical and dyes units should improve their scrubbers and dust collectors.

- NMMC, MIDC & MPCB should survey for the identification of illegal SSI and their levels of operation and their contribution in each of the grids in the city. Need for regulations for such units.

**Line Source**

The presences of increased truck traffic in the area apart from construction activity are the reasons for the increased pollution. The Agricultural Produce Market Committee (APMC) market, Asia’s largest market, has pulled in huge truck traffic in the area. The number of vehicles has increased above estimates here and there is no check on their emissions. As per RTO, the vehicle population in Navi Mumbai is around 3,51,620 for the year 2015-16 and the year wise growth in number of registration of vehicle is observed to be in the range of 15-18%. As per current study the emission from vehicular source is calculated to be around 448 Tonnes/Yr. Heavy Duty vehicles contributing 82% of total vehicular emissions of PM.

Regional Transport officer in collaboration with ULB and private and PPP entity should be directed to give information about the time bound strategy to control the vehicular pollution and traffic management for:

- Synchronizing traffic line strategy to phase out of the old commercial vehicles say more than 15 years old, most of which are diesel driven. Stringent Emission standards for the new vehicle in line with Bharat Stage VI Emission Standards should be adopted.

- Need to frame legislation for the Retro-fitment of new engine/Emission Control Devices (Diesel Particulate Filter (DPF) /Diesel Oxidation Catalyst (DOC) that could help in major reduction of PM. Cost sharing by the agencies will help in immediate provision.

- Better quality fuel by adopting stricter fuel supply & dispensing system along with Chemical marker system to keep check on adulterations in fuel. The current fuel specification are too board and therefore, analysis of conventional parameters does not reflect adulteration. Finer fuel specifications are needed for implementation. Success of marker system shall be highly dependent upon the collaboration of Oil Companies and Anti Adulteration Cell. Fiscal Measures for development of alternative fuel technology.
Conversion of existing public transport buses/tempos/mini buses to CNG fuel operation. Concession/rebates by NMMC for erecting CNG fuel.

Prepare a traffic dispersal model for efficient mobility & connectivity and should be undertaken by regulatory bodies like NMMC, RTO, MIDC and Departments of Police. Develop North-South road links in the suburbs including Mass Rapid Transit connectivity. Appropriate quality and smooth surface roads should be developed. Facilitate safe and convenient movement for pedestrian (Subways/ FOBs/ Footpaths including Skywalks).

NMMC, RTO, MSRDC & MIDC should collaborate to formulate time bound design and construction of under passes, fly-overs and widening of roads to control the traffic jams and congestion along Thane - Belapur and Mumbai - Pune Highway and pre-determined junctions. All buses (STC/PVT/PPP/School/Airport) in the city should be regulated to run only on clean fuels (LPG or CNG) or clean diesel of 10 ppm sulphur with particulate trap for exhaust.

To provide easy access to commuters travelling from south Mumbai towards Thane-Nashik and Panvel-Pune, 16.9 Km long Eastern freeway is constructed by MMRDA. This freeway is built up in three parts, Part-I is Eastern Freeway and it is constructed to cater the mobility demand from Mumbai port trust. It is 9.29 Km long and 17.2 m wide. Hybrid buses can be introduced in NMMTs fleet of buses. Biodiesel (B5/B10:5 – 10% blends) should be considered as an fuel option for public transport. Promotion of electric public transport. Battery Operated transport vehicles providing point to point service can also be initiated.

Finally, awareness programme should be undertaken with no vehicle day and assessment for air pollution to share the benefits among the general population.
Here are some of the subsidiary benefits from government and emission reduction study conducted at Delhi explained with examples for various hybrid/electric models available in the market.

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Technology</th>
<th>Segment</th>
<th>Curb Weight (kg)</th>
<th>Length (mm)</th>
<th>Displacement (cc)</th>
<th>Price Range (INR Lac)</th>
<th>Price Equivalent Fuel Consumption (liter/100 km)</th>
<th>CO₂ Emissions (Tonnes/5 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maruti Ciaz</td>
<td>Mild Hybrid (Diesel)</td>
<td>Midsize</td>
<td>1,115</td>
<td>4,490</td>
<td>1,248</td>
<td>8 to 10.5</td>
<td>5.98</td>
<td>6.73</td>
</tr>
<tr>
<td>Maruti Ertiga</td>
<td>Mild Hybrid (Diesel)</td>
<td>Utility Vehicle (UVI)</td>
<td>1,235</td>
<td>4,265</td>
<td>1,248</td>
<td>7.5 to 9.5</td>
<td>4.55</td>
<td>7.71</td>
</tr>
<tr>
<td>Toyota Camry</td>
<td>Strong Hybrid (Gasoline)</td>
<td>Premium</td>
<td>1,635</td>
<td>4,050</td>
<td>2,494</td>
<td>28 to 32</td>
<td>5.22</td>
<td>8.12</td>
</tr>
<tr>
<td>Mahindra e2o</td>
<td>Battery-Operated Electric</td>
<td>Mini</td>
<td>830</td>
<td>3,280</td>
<td>NA</td>
<td>4.5 to 7.5</td>
<td>0.86</td>
<td>5.06</td>
</tr>
<tr>
<td>Mahindra eVerito</td>
<td>Battery-Operated Electric</td>
<td>Midsize</td>
<td>1,40</td>
<td>4,277</td>
<td>NA</td>
<td>9.5 - 10</td>
<td>1.47</td>
<td>9.94</td>
</tr>
</tbody>
</table>

Passenger Cars Currently Eligible for Demand Incentives Under FAME Scheme

<table>
<thead>
<tr>
<th>Technology</th>
<th>Hybrid/Electric Model (BEE Fuel Efficiency Star Rating)</th>
<th>Non-Hybrid/Non-Electric Base Model (BEE Fuel Efficiency Star Rating)</th>
<th>Gasoline Equivalent Fuel Consumption Reduction over Base Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel-Based Mild Hybrid</td>
<td>Maruti Ciaz VDI SHVS (5-Star)</td>
<td>Maruti Ciaz VDI (5-Star)</td>
<td>7%</td>
</tr>
<tr>
<td>Diesel-Based Mild Hybrid</td>
<td>Maruti Ertiga VDI SHVS (5-Star)</td>
<td>Maruti Ertiga VDI (4-Star)</td>
<td>15%</td>
</tr>
<tr>
<td>Gasoline-Based Strong Hybrid</td>
<td>Toyota Camry Hybrid (5-Star)</td>
<td>Toyota Camry AT 2.5 L (2-Star)</td>
<td>32%</td>
</tr>
<tr>
<td>Battery-Operated Electric</td>
<td>Mahindra E-Verito D2 (5-Star)</td>
<td>Mahindra Verito D2 (4-Star)</td>
<td>68%</td>
</tr>
<tr>
<td>Battery-Operated Electric</td>
<td>Mahindra e2o (5-Star)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fuel Consumption Savings of Models Under FAME Scheme Compared with Base Models.

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Maximum Speed (kmph)</th>
<th>Maximum Power Output (W)</th>
<th>Gasoline Equivalent Fuel Consumption (liter/100 km)</th>
<th>CO₂ Emissions (Tonnes/5 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Speed Electric Scooters</td>
<td>25</td>
<td>250</td>
<td>&lt; 0.51</td>
<td>&lt; 3.04</td>
</tr>
<tr>
<td>High-Speed Electric Scooters</td>
<td>45 - 55</td>
<td>1,500 - 1,800</td>
<td>&lt; 0.82</td>
<td>&lt; 4.86</td>
</tr>
<tr>
<td>Honda Activia 3G</td>
<td>82</td>
<td>5,966</td>
<td>1.5</td>
<td>2.33</td>
</tr>
</tbody>
</table>

Fuel Consumption Limits for Two-Wheelers Under FAME Scheme Compared with Non-Electric Benchmark

Source: International Council On Clean Transportation
Environment Pollution (Prevention and Control) Authority (EPCA) for Delhi NCR for submitted a “Report of assessment of Pollution Under Control (PUC) Programme in Delhi and NCR: Recommendations for improvement to ensure pollution from in-use vehicles is under control” to Supreme court. Some of the measures can be followed as recommendation for existing PUCs of the city:

EPCA states that without a robust system of emissions monitoring and compliance, the investments in emission monitoring of on-road vehicles as well as advanced emissions control systems in new vehicles to meet tighter emissions standards, can go waste and negate air pollution control efforts in our cities. Management of emissions from on-road vehicles will require an integrated approach to ensure all generations of vehicles – old and new remain low emitting for as long as the vehicles are on the road.

This will require strengthening of the PUC systems for all on-road vehicles – Bharat stage (BS) I to IV generations of vehicles combining both physical tests as well as On-board Diagnostic (OBD) tests. This will also require appropriate emissions monitoring system for the new generation of BSVI vehicles to come within three years. PUC will not be the relevant programme for that genre of vehicles. The BSVI standards and regulations have already provided for real driving emissions testing when vehicles move on the road. But the roadmap for its implementation needs to be charted quickly to allow Delhi and NCR to be prepared in time.

Simultaneously, the newly amended Motor Vehicle Act and Rules has given the opportunity to implement emissions recall programme so that the vehicle manufacturers can be held responsible for any manufacturing defect that increase on-road emissions. Both EPCA and Auto Fuel Policy committee had recommended emissions recall programme in 2003. Thus, addressing all the three element of the programme – PUC – both physical testing and OBD testing; real driving emissions testing for in-use compliance; and manufacturer responsibility for manufacturing defects, are the critical steps to get a robust system to keep vehicles low emitting on roads. This is needed for both consumers as well as manufacturers’ responsibility. In view of this the following recommendations are made:

1. Limit the numbers of PUC centres, upgrade them and bring them under strong supervision and quality control:

The current practice of allowing mushrooming of small time and numerous PUC centres in refuelling stations across the NCR must be stopped. It is more important to limit their numbers, upgrade their capacity to carry out proper credible and authentic testing and bring them within a strong accountability framework

2. For improving compliance with the PUC programme, MoRTH and state transport departments should do the following:
2.1. Ensure 100 per cent compliance by linking annual vehicle insurance with PUC
certificates.

Annual vehicle insurance cannot be obtained without all the requisite PUC certificates. 
Currently, PUC certificates need to be obtained every quarter in Delhi and every six months 
in the NCR. This periodicity of PUC certification can be made uniform across Delhi and 
NCR later only after PUC norms and oversight systems have been adequately upgraded 
and made stringent. Issue of authentic certificates must be ensured based on authentic and 
credible tests.

2.2. Introduce automatic online network for transmission of PUC data to the central server 
to minimize manual interference and allow proper analysis of data for remote auditing of 
PUC centres. Adopt uniform and standardized data recording and reporting format and 
uniform software across Delhi NCR.6 Mandate periodic analysis of data to refine 
enforcement and for monitoring and submission of compliance report every six months. 
Software used in different make of testing equipment across NCR needs to be standardized 
to prevent fake values. MoRTH needs to develop the standardized protocol for uniform 
application across Delhi-NCR.

2.3. Mandate pre-payment of PUC fees before the tests are conducted7. No test should be 
conducted without taking the fee in advance. The software should be modified accordingly.

2.4. Strengthen inspection of the PUC centres for quality control and strengthen the 
licensing programme to ensure proper calibration, authentic tests; annual maintenance 
contact for the maintenance of all testing equipment and accessories; training of operators, 
calibration of equipment etc are carried out.

Make quality audit of centres and calibration quarterly. Introduce annual third party 
inspection of PUC centres immediately. State Pollution Control Boards with guidance from 
Central Pollution Control Board should coordinate this.

2.5 Phase in big centralized emissions testing centres capable of conducting automatic and 
upgraded tests for commercial vehicles on a priority basis. Delhi already has Burari vehicle 
inspection and fitness centre in Delhi for commercial vehicles. The commercial vehicles 
visit it for annual vehicle fitness and roadworthiness tests. This needs to be upgraded for 
high level of automatic emissions testing so that operators and vehicle drivers do not come 
in contact to influence the test results and credible and upgraded tests are conducted. 
MoRTH is also setting up centralised inspection centres in NCR as in Rohtak. These should 
be aligned to firm up the roadmap. Add more such centres as needed.

2.6. Introduce well equipped mobile test centres and a programme to check visibly 
polluting vehicles:
In addition to stationery testing centres, mobile units are also needed for surprise checks as well as to catch the visibly polluting vehicles on road. There should be appropriate penalty for visibly polluting vehicles.

Enforce stringent penalty for PUC centres for non-compliance and malpractices.

3. For improving the effectiveness of the PUC tests and inspection, MoRTH should do the following:

3.1. Tighten the PUC emissions norms for pre-Bharat Stage IV vehicles: Analysis of large data set on actual emissions concentration tested in large number of PUC centres in Delhi and UP has also brought out that the actual observed emissions values of pre-Bharat Stage IV vehicles are significantly lower than their prescribed norms. In most cases 80 per cent lower than the limits. These norms cannot identify at least 15 to 20 per cent grossly polluting vehicles in the on-road fleet. Nearly all vehicles pass the tests. Due to poor recording of failed tests and due to very lax norms the overall failure rate in Delhi is 4.69 per cent. For the diesel vehicles tested, the failure rate stands at 1.68 per cent, compared to 5.18 per cent for petrol vehicles and 4.65 per cent for all other fuel categories requires urgent attention and action. In UP NCR cities, the overall failure rate is abysmally low, at 0.49 per cent – 0.39 per cent in two-wheelers and 0.59 per cent in four wheelers. The MoRTH needs to tighten the PUC standards for the pre-Bharat Stage IV emissions standards. This will also help to weed out very old non-compliant vehicles and speed up fleet renewal based on improved standards.

3.2. Overhaul emissions tests and tighten norms for diesel vehicles: The review of available data shows that the smoke density tests – the only test that is carried out in diesel vehicles is very lax for the pre Bharat Stage IV diesel vehicles. More than 80 per cent of vehicles tested show smoke density levels that are below the norm prescribed for the Bharat Stage IV vehicles. Therefore, the current norms for Bharat Stage IV norms should be made uniform for the pre-Bharat Stage IV vehicles as well. This can be further weed out the very old and polluting vehicles and speed up fleet renewal.

Moreover, as explained earlier globally smoke tests are being upgraded with more advanced test procedures to make these tests more rigorous and effective. MoRTH may review those advanced testing procedures and provide a roadmap for the introduction of these tests in the large centralized testing centres for commercial vehicles quickly.

3.3. Make lambda test for petrol cars mandatory across NCR: Lambda testing for petrol cars equipped with three way catalytic converters – introduced in BSII-III level is already mandatory in Delhi as per the MORTH 2004 notification, but not in NCR. Lambda value represents the air to fuel ratio. It is important to maintain the optimum ratio for proper functioning of the catalytic converters that play a crucial role in cleaning up the exhaust
gases from petrol cars. It is not possible to directly test the efficacy of the catalytic converters. That is why it is important to ensure that the operative systems in the vehicles needed for its optimum performance are maintained. Lambda is an indicator of that. Such tests will require upgradation of the test equipment from two gas analysers to four gas analyzers capable of doing lambda testing. Petrol cars are already tested for carbon monoxide, hydrocarbon based on two speeds. If done along with lambda measurement, the test procedures for petrol cars can become more robust and effective. As the MoRTH has already provided for lambda tests in its 2004 notification, the concerned state governments need to issue orders for implementation in the NCR.

3.4. Integrate OBD with inspection and maintenance programme: The MoRTH needs to develop the protocol for implementation of OBD for vehicle inspection programme that will be implemented by the state governments. This will complement the physical testing. It is also important to detail out how this will be operationalised at the ground level and how the transport department will implement this programme.

3.5. Detail out the strategy for advanced real driving emissions monitoring of new generation vehicles to come with BSVI emissions standards in 2020: Any roadmap for improving vehicle inspection programme at this juncture will have to keep in view the dramatic transition in emissions control technologies within a short span of three years when BSVI emissions standards will be enforced. The current PUC is not designed to address those vehicle technologies. The notification of MoRTH on BSVI standards has already provided for the introduction of Real Driving Emissions Test Procedures and Standards based on portable emissions monitoring system to monitor emissions as vehicles move on the road. This is needed to ensure that all the advanced emissions control devices that to be fitted in the new vehicles will continue to perform effectively in real world conditions.

This has become necessary in view of the rapid deterioration in emissions noted in new Euro VI vehicles in Europe and the US and also to prevent use of defeat devices to cheat emissions standards. The data available from Europe shows that the actual NOx emissions from Euro VI diesel cars can be as bad or worse than a Euro I diesel car as on-road emissions can be as higher as upto 16 times higher than their certification level. EPCA strongly believes that as India is now making this crucial transition to a very advanced genre of vehicles proactive and preventive policies and systems should be put in place to these advanced systems continue to perform efficiently on road and for emissions to all generation of vehicles remain low emitting during their useful lifetime. MoRTH along with the state governments of the NCR-Delhi need to put in place the systems for introduction of Real Driving Emissions testing for BSVI vehicles.
On August 16, 2017, the government of India, in consultation with the Bureau of Energy Efficiency (BEE), published final fuel efficiency standards for commercial heavy-duty vehicles (HDVs). The regulations are aimed at reducing fuel consumption and greenhouse gas (GHG) emissions from diesel-powered trucks and buses with a gross vehicle weight (GVW) of 12 tonnes or greater. The new standards include two phases of regulatory compliance. Phase 1 goes into effect April 1, 2018, while Phase 2 is effective beginning April 1, 2021. The regulatory classes affected by this rule are as follows (Vahan Sewa, 2017):

» Category M3: motor vehicles for the carriage of passengers, comprising nine or more seats in addition to the driver’s seat with GVW exceeding 5 tonnes
» Category N3: motor vehicles for the carriage of goods with GVW exceeding 12 tonnes

Although, the M3 regulatory subclass includes vehicles 5 tonnes and above, the rule applies only to vehicles greater than 12 tonnes GVW. Tables 1 and 2 summarize the limit value equations for all of the subcategories within the M3 and N3 vehicle classifications.

### Stringency equations for Phase 1 (effective April 1, 2018)

<table>
<thead>
<tr>
<th>Vehicle Category</th>
<th>Gross vehicle weight (Tonnes)</th>
<th>Axle configuration</th>
<th>Equation</th>
<th>Fuel consumption (l/100km)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N3 Rigid Vehicles</strong></td>
<td>12.0-15.0</td>
<td>4x2</td>
<td>$Y = 0.362X + 10.327$</td>
<td>14.7</td>
</tr>
<tr>
<td></td>
<td>16.2-25.0</td>
<td>6x2</td>
<td>$Y = 0.603X + 6.415$</td>
<td>16.2</td>
</tr>
<tr>
<td></td>
<td>16.2-25.0</td>
<td>6x4</td>
<td>$Y = 0.723X + 4.482$</td>
<td>16.2</td>
</tr>
<tr>
<td></td>
<td>25.0-31.0</td>
<td>8x2</td>
<td>$Y = 0.527X + 8.333$</td>
<td>21.5</td>
</tr>
<tr>
<td></td>
<td>25.0-31.0</td>
<td>8x4</td>
<td>$Y = 0.928X + 0.698$</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td>31.0-37.0</td>
<td>10x2</td>
<td>$Y = 0.016X - 5.100$</td>
<td>24.7</td>
</tr>
<tr>
<td><strong>N3 Tractor Trailers</strong></td>
<td>35.2-40.2</td>
<td>4x2</td>
<td>$Y = 0.986X + 7.777$</td>
<td>27.0</td>
</tr>
<tr>
<td></td>
<td>40.2-49.0</td>
<td>6x2</td>
<td>$Y = 0.526X + 6.048$</td>
<td>31.9</td>
</tr>
<tr>
<td></td>
<td>40.2-49.0</td>
<td>6x4</td>
<td>$Y = 1.255X - 18.523$</td>
<td>31.9</td>
</tr>
<tr>
<td><strong>M3 Vehicles</strong></td>
<td>12.0 and above</td>
<td>4x2 and 6x2</td>
<td>$Y = 0.502X + 11.062$</td>
<td>17.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vehicle Category</th>
<th>Gross vehicle weight (Tonnes)</th>
<th>Axle configuration</th>
<th>Equation</th>
<th>Fuel consumption (l/100km)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N3 Rigid Vehicles</strong></td>
<td>12.0-15.0</td>
<td>4x2</td>
<td>$Y = 0.738X + 5.003$</td>
<td>18.5</td>
</tr>
<tr>
<td></td>
<td>16.2-25.0</td>
<td>6x2</td>
<td>$Y = 0.795X + 9.546$</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>16.2-25.0</td>
<td>6x4</td>
<td>$Y = 1.131X + 3.122$</td>
<td>21.8</td>
</tr>
<tr>
<td></td>
<td>25.0-31.0</td>
<td>8x2</td>
<td>$Y = 0.650X + 12.160$</td>
<td>28.4</td>
</tr>
<tr>
<td></td>
<td>25.0-31.0</td>
<td>8x4</td>
<td>$Y = 0.966X + 7.592$</td>
<td>31.9</td>
</tr>
<tr>
<td></td>
<td>31.0-37.0</td>
<td>10x2</td>
<td>$Y = 0.646X + 12.160$</td>
<td>32.3</td>
</tr>
<tr>
<td><strong>N3 Tractor Trailers</strong></td>
<td>35.2-40.2</td>
<td>4x2</td>
<td>$Y = 0.208X + 32.198$</td>
<td>39.5</td>
</tr>
<tr>
<td></td>
<td>40.2-49.0</td>
<td>6x2</td>
<td>$Y = 0.678X + 15.298$</td>
<td>40.5</td>
</tr>
<tr>
<td></td>
<td>40.2-49.0</td>
<td>6x4</td>
<td>$Y = 1.342X - 13.390$</td>
<td>40.6</td>
</tr>
<tr>
<td><strong>M3 Vehicles</strong></td>
<td>12.0 and above</td>
<td>4x2 and 6x2</td>
<td>$Y = 0.199X + 19.542$</td>
<td>21.7</td>
</tr>
</tbody>
</table>

The standards are represented in an equation based on GVW and axle configuration, providing normalized values of fuel consumption in liters per hundred kilometres (l/100 km). The regulations are a minimum performance requirement, similar to the existing Bharat Stage (BS) emission norms.
To demonstrate compliance, each vehicle model and configuration is required to meet the fuel consumption levels shown in Tables 1 and 2. This stands in contrast to the fuel consumption and greenhouse gas standards in the United States and Canada, which are based on sales-weighted averaging.

For evaluating the performance of the vehicles, manufacturers are required to use a constant speed fuel consumption (CSFC) driving cycle. This means that the fuel consumption is measured over a set speed without any transient behavior. In this particular regulation, the CSFC test is run at two separate speeds one at 40 km/h, and the other at 60 km/h. The CSFC testing has been used in India as part of the vehicle certification process for several years (Sharpe & Delgado, 2015). The CSFC cycle is different from the regulatory cycles adopted in HDV standards for other countries. The efficiency standards are required for both vehicle manufacturers and importers. The conformity-of-production test will be undertaken by MoRTH once every two years. The CSFC testing and reporting also needs to be done at least once before April 1, 2020. There is no such requirement before Phase 1 goes into effect April 1, 2018, because the standards reflect averages found in HDV baseline testing between 2014 and 2015.

As per internal government records, the Phase 1 stringency for each vehicle subcategory represents the average fuel consumption from CSFC testing. Thus, starting April 1, 2018, for every segment of the market, the maximum allowable fuel consumption is equal to the average fuel consumption
from the baseline testing campaign. The Phase 2 stringency represents the 20th percentile of the baseline testing data, meaning that 20% of the baseline vehicles had fuel consumption levels lower than the limit curve.

**FUEL CONSUMPTION STRINGENCY: PHASE 1 TO PHASE 2**

Assuming equal weighting for the two test cycles, an estimated fuel-consumption reduction from Phase 1 to Phase 2 can be calculated as shown in Table 3. The average stringency is calculated using sales weighting, which comes from data that was acquired from Segment Y Automotive Intelligence for the year 2013-2014.

*Required reduction in fuel consumption from Phase 1 to Phase 2 and market shares by vehicle category in fiscal year 2013-14*

<table>
<thead>
<tr>
<th>GVW Bin (tonnes)</th>
<th>Axle Configuration</th>
<th>Required fuel-consumption reduction between Phases 1 and 2</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0-16.2</td>
<td>4x2</td>
<td>8.2%</td>
<td>23.3%</td>
</tr>
<tr>
<td>16.2-25.0</td>
<td>6x2</td>
<td>10.7%</td>
<td>13.9%</td>
</tr>
<tr>
<td>16.2-25.0</td>
<td>6x4</td>
<td>9.6%</td>
<td>16.8%</td>
</tr>
<tr>
<td>25.0-31.0</td>
<td>8x2</td>
<td>13.3%</td>
<td>12.9%</td>
</tr>
<tr>
<td>25.0-31.0</td>
<td>8x4</td>
<td>8.9%</td>
<td>6.5%</td>
</tr>
<tr>
<td>31.0-37.0</td>
<td>10x2</td>
<td>11.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>35.2-40.2</td>
<td>4x2</td>
<td>5.4%</td>
<td>8.9%</td>
</tr>
<tr>
<td>40.2-49.0</td>
<td>6x2</td>
<td>7.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td>40.2-49.0</td>
<td>6x4</td>
<td>10.0%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Bus</td>
<td>All Configuration</td>
<td>15.5%</td>
<td>14.5%</td>
</tr>
</tbody>
</table>

The Phase 1 to Phase 2 stringency analysis shows that transit buses face the largest reduction in fuel consumption from 2018 to 2021 at 15.5%. The fleet-wide fuel-consumption reduction from Phase 1 to Phase 2 is estimated at 10.4%. This is calculated on a vehicle-population weighted average and therefore is not necessarily representative of the overall fuel savings that will be achieved as a result of the regulation. This is due to the difference in fuel consumption that the different vehicle configuration may have. For example, changing the stringency of for a tractor-trailer by 1% will not have the same result as changing the value for a rigid truck. Because the regulation applies only to trucks and buses greater than 12 tonnes GVW, a significant percentage of the HDV market in India is not subject to these standards. Sales data from Segment Y provides evidence that nearly half of the HDV market is less than 12 tonnes and thus is not covered by this regulatory program.

*Source: International Council On Clean Transportation*
Buses are critical as spine of city mobility – 40-60 per cent of daily trips. These allow greater flexibility to allow more efficient geographical coverage and score high on space efficiency. Buses move people in most cost-effective way and emit a lot less per person.

Yet city have Inadequate and unreliable services, poor fleet utilisation, under-utilisation of passenger carrying capacity, no route rationalisation and poor geographical and population coverage, operated kilometer are much less than scheduled kilometer and no dedicated right of way for buses.

Bus numbers of the state transport corporations are extremely inadequate and dwindling over time. According to the bus transport guidelines of the Ministry of Urban Development framed with support from Asian Development Bank states that a city should ideally have at least 60 buses per lakh of population. Estimating this number for cities is extremely difficult as in most cities public transport buses are operated by both state owned city transport corporations and private agencies.

For example for one km of travel a car consumes nearly five times more energy than a 52-seater bus with an average load factor of 82 percent. The corresponding consumption factor for two-wheeler is 2.6. The comparative fuel costs of a car and two wheelers are 11.8 and 6.8 times respectively for the same distance. Besides, the major issues are that a car occupies 38 times more road space compared to a bus for a kilometer of travel. Two wheelers space requirement is even higher at 54 times that of a bus*.

Further, the emission from a two wheeler equivalent to a bus could add 27 percent higher, whereas the cars would cause 17 percent more pollution. The age of the bus can be of no major concern, when we compare the benefits that it could give in term of fuel savings, emission and safety. Report of the Expert Committee on Auto Fuel Policy, Chapter 15, Government of India, 2002.

**Promotion of NMT**

The vehicle ownership in India is low as compared to foreign countries and also traditional mixed-use design of the cities makes the majority share of trips by walk or cycle. In big cities with higher population density, in the absence of dedicated Non-Motorized Transport infrastructure (NMT), people owning two-wheelers and cars are encouraged to use their vehicles, even for walk-able distances. In the context of growing cities, the measures to improve air quality should include NMT policies as an integral part.

**Congestion Pricing**

Some economic measures should also be designed to force the use of public transport. One such measure is the congestion pricing where the motorists are charged to use a network of roads during periods of the peak hours. Its purpose is to reduce automobile (mostly car) use during peak congestion periods, thereby easing traffic and encouraging commuters to walk, bike, or take mass transit rail/bus as an alternative.

Congestion pricing programs were successfully implemented in Singapore, London, and Stockholm (Eliasson, 2009; Menon and Guttikunda, 2010; Litman, 2011). On average, in London, congestion pricing is estimated to have reduced 20-30% of the downtown passenger car
traffic and promote the non-motorized transport, whereas Stockholm experienced an immediate reduction of at least 20% in the daily car use. In Singapore, the average traffic speeds increased by at least 15 km/h. In all three cities, 10-20% reduction in eCO2 emissions was estimated, along with health benefits of reducing air pollution.

**Increased Parking Cost**

With increasing costs for private vehicles linked with their usage (fuel and other operational expenses), it is possible to achieve a shift to public transport, if combined with the provision of an adequate, reliable, and safe public transportation. One such measure is the increased parking cost. Currently, parking in most cities is either free or priced very low. Increased parking cost, if coupled with the parking locations, so that they are as far as the bus and the rail stops, will make public transportation an attractive option (Barter, 2012; CSE, 2012).

**Car Specific Taxes**

According to International Energy Agency IEA's World Energy Outlook (WEO) report, in the new policies scenario, passenger car ownership will grow from less than 20 vehicles per 1,000 inhabitants today to 175 cars per 1,000 people in 2040, and overall road passenger vehicle activity will increase more than six-times. While the congestion pricing and parking policies target reduced vehicle usage, some countries have used regulatory measures to reduce the growth of private vehicles. For instance, a Chinese national regulation enacted in September, 2008, raised taxes on big cars and reduced on smaller ones. Car owners with engines above 4- L capacity have to pay a 40% tax; 15%-25% for cars with engines above 3-L capacity; and 1%-3% for cars with engines below 1-L capacity. China also introduced a policy to limit the number of licenses issued every year, where the license plates are auctioned in the cities of Beijing, Shanghai, and Guangzhou. Similar to congestion pricing, for the time being, such measures are difficult to implement under democratic political context of India.

**Action on vehicle technology and fuels**

In urban landscape clean air action on vehicles and mobility is the weakest. Even though vehicles are one of the most rapidly growing sources of pollution local action has remained the minimal. Emissions standards for vehicles and fuel quality are common across cities. However, it is also important to know that the central government has issued notification to leap directly to Euro VI emissions standards in 2020. This has serious implications for the implementation and compliance strategies at city level. Bharat Stage VI will bring in new genre of technology and fuel that will be subjected to a new compliance regime for the first time in the country. For the first time monitoring of real world emissions with portable monitoring system along with in-service compliance regulations will be implemented to keep an eye on real world emissions. Real driving emissions (RDE) testing will be included as an additional requirement for vehicle certification. Emissions measurements will be carried out with the help of Portable Emission Measurement System (PEMS).
and onwards in-service conformity factor will be applied to ensure that emissions from vehicles remain within the stated margin. This can prevent emissions cheating and use of sub standards emissions control or defeat devices as was done by Volkswagen. However, adoption of more advanced on-board diagnostic system has been delayed until 2023. Cities will have to develop a compliance programme to integrate these emissions control approaches within this time frame for successful implementation.

Since 01 September 2017, Real Driving Emissions (RDE) has become mandatory with specific pollutant limits for new light duty vehicle approvals in Europe. This year, European Commission will finalize the RDE 4th package, with which, Europe will consolidate the most stringent approach worldwide for light duty vehicles emissions regulation. The new approach of RDE in measuring vehicle emissions during on-road driving is rapidly being adopted by many other countries. There is already a substantial diversity arising in the local applications of RDE, some examples are given below –this is not a complete list of those intending to apply RDE in future, nor does it contain a comprehensive list of all the differences in comparison to the European application:

India is developing its own RDE – currently investigations are running regarding driving speeds, conditions and potential limits as well as on the robustness of the measurement equipment under Indian driving conditions.
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Unit</th>
<th>Bharat Stage II</th>
<th>Bharat Stage III</th>
<th>Bharat Stage IV</th>
<th>Bharat Stage VI†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation date</td>
<td></td>
<td>2001 (selected cities), 2005 (nationwide)</td>
<td>2005 (selected cities), 2010 (nationwide)</td>
<td>2010 (selected cities), 2017 (nationwide)</td>
<td>2020†(nationwide)</td>
</tr>
<tr>
<td>Ash, max % mass</td>
<td></td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Carbon Residue (Ramsbottom) on 10% residue, max †</td>
<td>% mass</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Cetane Number (CN), min</td>
<td>–</td>
<td>48*</td>
<td>51</td>
<td>51</td>
<td>51</td>
</tr>
<tr>
<td>Cetane Index (CI), min</td>
<td>–</td>
<td>46*</td>
<td>46</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>Distillation 95% vol. Recovery at °C, max</td>
<td>°C</td>
<td>–</td>
<td>360</td>
<td>360</td>
<td>370</td>
</tr>
<tr>
<td>Flash point Abel, min</td>
<td>°C</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Kinematic Viscosity @ 40 °C</td>
<td>cst</td>
<td>2.0-5.0</td>
<td>2.0-5.0</td>
<td>2.0-4.5</td>
<td>2.0-4.5</td>
</tr>
<tr>
<td>Density @ 15 °C</td>
<td>Kg/m³</td>
<td>820-860 (820-870)*</td>
<td>820-845</td>
<td>820-845</td>
<td>820-860</td>
</tr>
<tr>
<td>Total Sulfur, max mg/kg</td>
<td></td>
<td>500</td>
<td>350</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Water content, max mg/kg</td>
<td></td>
<td>0.05% vol</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Cold filter plugging point (CFPP)</td>
<td>°C</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>a) Summer, max</td>
<td></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>b) Winter, max</td>
<td></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Total contaminations, max mg/kg</td>
<td>–</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Oxidation stability, max g/mg³</td>
<td>–</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Polycyclic Aromatic Hydrocarbon (PAH), max</td>
<td>% mass</td>
<td>–</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Lubricity, corrected wear scar diameter (wsd 1,4) @ 60 °C, max</td>
<td>μm (microns)</td>
<td>460</td>
<td>460</td>
<td>460</td>
<td>460</td>
</tr>
<tr>
<td>Copper Strip corrosion for 3 hrs @ 50 °C</td>
<td>Rating</td>
<td>Not worse than No. 1</td>
<td>Class I</td>
<td>Class I</td>
<td>Class I</td>
</tr>
</tbody>
</table>

Notes:† Proposed fuel quality

**Indian Diesel Specification** required meeting Bharat Stage II, III, & IV Emission Norms
Stone Crushers

Quarrying is being done for at least last 30 years in west side of the Parsik hill ranges. Till March 2017, there were 74 active quarries out of 94 quarries. Quarries in Navi Mumbai have been shut since April 1. Thane Collector office has allowed only 3 quarries in Navi Mumbai to operate as a special case, from where BMC can source raw materials for road works. During mining, crushing and transportation activity lot of dust was getting resuspended in the air. The roads outside the quarry are unpaved roads.

Following measures can be adopted to control on/off-site emission and resuspension from Quarry site:
- Stringent Fugitive emission management practices and regulation should be implemented
- Most of the quarries have provided sprinkler system for dust suppression however, improvements are required. Use of water sprinklers should be made compulsory at the quarrying sites. All these units will be proposed to install efficient emission control system. Provision of chemical spray for dust suppression with R & D lab can be done.
- Trucks carrying the crushed stone material for transportation should be covered.
- Quarrying sites and activities should be regulated with strict vigilance as per the norms laid by CPCB and MPCB.
- Constructing a water pit at the entry/exit points of the construction site to avoid dispersion of particulate matter through movement of trucks while entering and exiting the site. Spraying of water on the tires of the truck and vehicles at the entry/exit of construction site.
- Tree plantation in and around the quarrying site.

Management

There are three AAQM locations covered under NAMP at Nerul, Mahape and Rabale. These station being monitored since 2006. Navi Mumbai Municipal Corporation has set up two CAAQM stations at Vashi and Airoli. These stations are in operation for the last three years. The Air Quality Index (AQI) of period April to March 2017 shows AQI is satisfactory (51-100) to moderate (101-200). In Nov 2016 Air quality at Turbhe & Koparkhairane is poor due to particulate matter and temperature inversion phenomenon in the winter season. The dominant parameter are Particulate matter & CO, attributed to growing vehicular traffic and construction projects as well as commercial and infrastructure development including road construction etc. Hierarchical and structured managerial system for efficient implementation should be introduced with data linkage to SPCB/CPCB (of monitoring devices).

There is a lack of collaborative policy initiative among the administrations and organisation with regard to air quality improvement. These policy initiatives can be sustained and kept up-to-date only if there is
an apex body, which from time to time gets feedback from various sources. These sources could be State Pollution Control Board, Regional transport office, Navi Mumbai Municipal Corporation, Truck Association for Navi Mumbai, CIDCO, MIDC, TBIA, MMRDA, Oil Companies, Anti-Adulteration cell, and representative from ULB and NGOs, school and colleges. As and when, it is felt by the apex body that particular information desired is either site specific or city specific it can commission studies/investigate on its own. Monitoring and regulatory agencies will provide all the information on monitoring to this body for data assimilation and dissemination. Regulatory framework, if needs can be communicated to the apex body for starting the initiative for policy formation.

It is not just sufficient to measure air pollutant concentrations and assess their sources and their apportionment. It is equally important to disseminate that information to the public through various channels such as web/mobile application, information boards in public spaces as well sharing important studies conducted on air pollution with the public. This ensures public awareness of the issues and can help build ground up pressure on the concerned agents to address the problem.

MPCB & TBIA should take initiative in creating awareness program at various schools, colleges, public places, etc. through road shows, posters, banners, hand bills and various programs etc.

Most of the actions can be done by adapting and reinforcing existing actions for a more integrated, comprehensive and effective approach to combating Air pollution. Other actions focus on identified gaps in our study response so far that requires new activities, the discovery of new knowledge and the creation of new partnerships. The action plan will strengthen collaboration and surveillance, will reduce data gaps and allow for the sharing of best practices within the city jurisdiction. It will create more synergies and coherence between different policies according to our study. The action plan will thus support the stakeholders in delivering innovative, effective and sustainable responses to Air Pollution.
3. **Monitoring Mechanism for Implementation**
   The action plan shall be implemented by Maharashtra State Pollution Control Board with coordination of concern departments/stake holders

4. **Implementation status**
   The Chief Secretary, Govt. of Maharashtra to convene the meetings with different concerned departments and direct for compliance of directions as per NGT order. The Principal Secretary, Environment, Govt. of Maharashtra to also convene the meeting for follow up of the directions. The Maharashtra Pollution control Board continuously conducted the meetings with all stakeholders for preparation of comprehensive action plan for city and its implementation.
Action Plan for Navi Mumbai Municipal Corporation prepared as per CPCB Standard Template
<table>
<thead>
<tr>
<th>SLN no</th>
<th>Source group</th>
<th>Control option</th>
<th>Action</th>
<th>Expected reduction &amp; impacts</th>
<th>Technical feasibility</th>
<th>Requirement of financial resources</th>
<th>Implementation period (short/mid/long-term)</th>
<th>Time target for implementation</th>
<th>Responsible agencies</th>
<th>Any other information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (i)</td>
<td>Vehicle emission</td>
<td>Launch extensive drives against polluting vehicles for ensuring strict compliance</td>
<td>Monthly special drive at toll plaza for random checking of PUC for vehicles.</td>
<td>Medium</td>
<td>Feasible</td>
<td>___</td>
<td>Short Term</td>
<td>Sep-19</td>
<td>R.T.O.</td>
<td>Continual Improvement Process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1) Conducting workshops under the SWACHHBHARAT Abhiyaan in schools, colleges &amp; road shows and Street Plays for awareness of air pollution control.</td>
<td>Medium</td>
<td>Feasible</td>
<td>___</td>
<td>Short Term</td>
<td>Continual</td>
<td>R.T.O., N.M.M.C.</td>
<td>Continual Improvement Process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2) Vehicle maintenance check by sensor base PUC equipments.</td>
<td>Medium</td>
<td>Feasible</td>
<td>___</td>
<td>Short Term</td>
<td>Sep-19</td>
<td>R.T.O.</td>
<td>Continual Improvement Process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2b) NMMC / NMMT vehicle check by sensor base PUC equipment</td>
<td>Medium</td>
<td>Feasible</td>
<td>___</td>
<td>Short Term</td>
<td></td>
<td>N.M.M.C. / N.M.M.T.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3) NMMT introduce air condition public city buses in the year 2015-16 public survey is conducted for that out of 6000 citizens, 1200 citizens switch over from using of private vehicle to city transport.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N.M.M.C.</td>
<td>Already implemented</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4) Existing Public Transport frequency of City buses now 472 nos. Increasing no of buses by detailed study of the City. It Minimising use of personal vehicles.</td>
<td>High</td>
<td>Feasible</td>
<td>___</td>
<td>Long Term</td>
<td>Jun-21</td>
<td>N.M.M.C.</td>
<td>Continual Improvement Process</td>
</tr>
</tbody>
</table>

**Development of Action Plan for Control of Air Pollution in Non-attainment Cities**


Launch public awareness campaigns for air pollution control, vehicle maintenance, minimising use of personal vehicles, lane discipline etc.
<table>
<thead>
<tr>
<th>SL No</th>
<th>Source group</th>
<th>Control option</th>
<th>Action</th>
<th>Expected reduction &amp; impacts</th>
<th>Technical feasibility</th>
<th>Requirement of financial resources</th>
<th>Implementation period (short/mid/long-term)</th>
<th>Time target for implementation</th>
<th>Responsible agencies</th>
<th>Any other information</th>
</tr>
</thead>
<tbody>
<tr>
<td>(iii)</td>
<td>Prevent parking of Vehicles at Non designated areas</td>
<td></td>
<td>1)Prepared parking plan for city by implementing multilevel parking scheme in open spaces, on covered open nullhas.</td>
<td>High</td>
<td>Feasible</td>
<td>___</td>
<td>Long Term</td>
<td>Jun-21</td>
<td>N.M.M.C.</td>
<td>Continual Improvement Process</td>
</tr>
<tr>
<td>(iv)</td>
<td>Initiate steps for retrofitting of particulate filters in Diesel vehicles, when BS-V fuels are available</td>
<td></td>
<td>1) NMMC will control for NMMT vehicle of city buses. BS-VI version launching in India by 2020.</td>
<td>High</td>
<td>Feasible</td>
<td>___</td>
<td>Long Term</td>
<td>Jun-22</td>
<td>R.T.O., N.M.M.T.</td>
<td>Continual Improvement Process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2) RTO will control private vehicles by 2020</td>
<td>High</td>
<td>Feasible</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>R.T.O.</td>
<td>Vehicle manufacturer will take precaution.</td>
</tr>
<tr>
<td>(v)</td>
<td>Prepare action plan to check fuel adulteration and random monitoring of fuel quality data</td>
<td></td>
<td>Vigilance &amp; checking is done by petroleum company.</td>
<td>Medium</td>
<td>Feasible</td>
<td>___</td>
<td>Mid term</td>
<td>Sep-19</td>
<td>Petro chemical Authority - PCRA</td>
<td>___</td>
</tr>
<tr>
<td>SLN o</td>
<td>Source group</td>
<td>Control option</td>
<td>Action</td>
<td>Expected reduction &amp; impacts</td>
<td>Technical feasibility</td>
<td>Requirement of financial resources</td>
<td>Implementation period (short/mid/long term)</td>
<td>Time target for implementation</td>
<td>Responsible agencies</td>
<td>Any other information</td>
</tr>
<tr>
<td>-------</td>
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<td>----------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------------------</td>
<td>--------------------------------</td>
<td>-------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>(vi)</td>
<td></td>
<td>Prepare action plan for widening of road and improvement of infrastructure for decongestion of Roads.</td>
<td>1) Along Thane Belapur road construction of 3 nos of flyover on existing road.</td>
<td>High</td>
<td>Feasible</td>
<td>Long Term</td>
<td>Dec-19</td>
<td>MSRDC</td>
<td>Complied</td>
<td></td>
</tr>
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<td></td>
<td>2) Agency appointed for traffic survey and impact assessment of all major roads in Navi Mumbai city for lay bye lane. Identify for accidental Black spot, junction improvement. Implementation will do according that.</td>
<td>High</td>
<td>Feasible</td>
<td>Short Term</td>
<td>For study- Sept'19 For implementation- June-2021</td>
<td>NMMC</td>
<td>Continual Improvement Process</td>
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<td>(vii)</td>
<td></td>
<td>Prepare Plan for the construction of expressways/bypass to avoid congestion</td>
<td>1) By pass cable stress road from Airoli to Vashi &amp; Vashi to C.B.D. Belapur i.e. Costal Road for the approach of new air port in Navi Mumbai</td>
<td>High</td>
<td>Feasible</td>
<td>Long term</td>
<td>Jun-22</td>
<td>N.M.M.C., CIDCO, M.S.R.D.C.</td>
<td>Continual Improvement Process</td>
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<td>(viii)</td>
<td></td>
<td>Steps for Promoting Battery operated vehicles</td>
<td>As a part of Eco city proposal of battery operated vehicles run from railway station to high foot fall area in city is under process</td>
<td>Medium</td>
<td>Feasible</td>
<td>Mid term</td>
<td>Jun-20</td>
<td>N.M.M.C.</td>
<td>Continual Improvement Process</td>
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<td>Requirement of financial resources</td>
<td>Implementation period (short/mid/long-term)</td>
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<td></td>
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<td></td>
<td>2) 3 &amp; 4 electric charging station for 3 &amp; 4 wheeler to promote electric/battery operated vehicle in the city.</td>
<td>Medium</td>
<td>Feasible</td>
<td></td>
<td>Mid term</td>
<td>Jun-20</td>
<td>N.M.M.C.</td>
<td>Continual Improvement Process</td>
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</tbody>
</table>
| (ix)  |              | Install weigh in Motion bridges at the borders of the cities/Towns and states to prevent overloading of vehicles | Check post at entry point of city to prevent and divert entry of vehicles  
   a) Those only use to pass city.  
   b) Entering in the city at APMC market. | Medium | Feasible | | Mid term | a. June-20  
   b. APMC |
| (x)   | Synchronize Traffic movements/Introduce Intelligent Traffic systems for Lane Driving | 1) Smart traffic management system could be exposed .  
   2) 292 CC TV cameras is installed at police headquarter with collaboration of NMMC fo smart traffic management. | Medium | Feasible | 4-5 cr | Long Term | Jun-21 | R.T.O. | Automatic traffic signal proposed |
<p>|       |              |                | 3)Making some roads oneway during pick hours. | Medium | Feasible | | Short Term | Dec-19 | R.T.O. |
| (xi)  | Installation of Remote Sensor based PUC systems | Computerised PUC check stations to avoid fake certificate. | Medium | Feasible | | Short Term | Dec-19 | R.T.O. |</p>
<table>
<thead>
<tr>
<th>SLN o</th>
<th>Source group</th>
<th>Control option</th>
<th>Action</th>
<th>Expected reduction &amp; impacts</th>
<th>Technical feasibility</th>
<th>Requirement of financial resources</th>
<th>Implementation period (short/mid/long term)</th>
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<th>Responsible agencies</th>
<th>Any other information</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCS-1</td>
<td>Sulphur reduction in diesel</td>
<td>City is supplied with BS IV stage diesel which has low sulphur content</td>
<td>Medium Feasible</td>
<td></td>
<td>Long Term</td>
<td>On Going</td>
<td>Petroleum &amp; Oil companies</td>
<td></td>
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<tr>
<td>SCS-3</td>
<td>Provide good public transport system</td>
<td>NMMC having good quality of public transport system. AC/ Non AC city buses. Trans Harbour railway.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N.M.M.C.</td>
<td>Already implemented</td>
<td></td>
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<tr>
<td>SCS-4</td>
<td>Standards for new and In-use vehicles</td>
<td></td>
<td>Medium Feasible</td>
<td></td>
<td></td>
<td></td>
<td>GOI Transport ministry</td>
<td></td>
<td></td>
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<tr>
<td>SCS-5</td>
<td>Alternative fuels</td>
<td>From MSW to CNG / Biogas at landfill site from biomass 200MTPD</td>
<td>Medium Feasible</td>
<td>100 cr.</td>
<td>Long Term</td>
<td>Jun-21</td>
<td>N.M.M.C.</td>
<td>Proposal for Expression of Interest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCS-6</td>
<td>Implementation of BS – V norms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ministry of petroleum natural gas</td>
<td>BS-VI norms will come in India</td>
<td></td>
<td></td>
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<tr>
<td>SCS-7</td>
<td>Electric / Hybrid Vehicles</td>
<td>1) Hybrid - 3 Nos city buses</td>
<td>Low Feasible</td>
<td>4 cr</td>
<td>Long Term</td>
<td>Jun-20</td>
<td>NMMT</td>
<td>Already in working</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Electric - 30No. Of city buses. Propose DPR submitted to state Govt.</td>
<td>Medium Feasible</td>
<td>80cr</td>
<td>Mid term</td>
<td>Jun-20</td>
<td>NMMT</td>
<td>Continual Improvement Process</td>
<td></td>
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<tr>
<td>SCS-8</td>
<td>OE-CNG for new public transport buses</td>
<td>Out of 472 nos 150 nos buses running on CNG 25 New buses will be added</td>
<td>Medium Feasible</td>
<td>12 cr</td>
<td>Mid term</td>
<td>Jun-20</td>
<td>N.M.M.C.</td>
<td>Already in working</td>
<td></td>
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<td>Implementation period (short/mid/long-term)</td>
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<tr>
<td>SCS-9</td>
<td>Ethanol blending (E10 – 10% blend)</td>
<td>---</td>
<td>Low</td>
<td>Not Feasible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ministry of petroleum natural gas</td>
<td>Supplier Not Available</td>
</tr>
<tr>
<td>SCS-10</td>
<td>Bio-diesel (B5/B10: 5 – 10% blend)</td>
<td>Bio diesel pilot project done for public transport</td>
<td>Low</td>
<td>Not Feasible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ministry of petroleum natural gas</td>
<td>Supplier Not Available</td>
</tr>
<tr>
<td>SCS-11</td>
<td>Retro-fitment of Diesel Oxidation Catalyst (DOC) in 4-wheeler public transport (BS-II and BS-III)</td>
<td>a) 50 nos of public transport buses are of BS-IV fuel. b)DOC in BS-II vehicle will be implemented.</td>
<td>Low</td>
<td>Feasible</td>
<td></td>
<td>b. Long Term</td>
<td>b. June-21</td>
<td>NMMT</td>
<td>Continual Improvement Process</td>
<td></td>
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<tr>
<td>SCS-12</td>
<td>Retro-fitment of Diesel Particulate Filter in 4- wheeler public transport (BS – III city buses)</td>
<td>a) 50 nos of public transport buses are of BS-IV fuel. b)DOC in BS-II vehicle will be implemented.</td>
<td>Low</td>
<td>Feasible</td>
<td></td>
<td>b. Long Term</td>
<td>b. June-21</td>
<td>R.T.O.</td>
<td></td>
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<tr>
<td>SCS-13</td>
<td>Banning of 10 year old commercial vehicles</td>
<td>NMNC not Operating vehicle with more than 10 year</td>
<td>Low</td>
<td>Feasible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R.T.O.</td>
<td></td>
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<tr>
<td>SCS-14</td>
<td>Inspection/ maintenance to all BSII &amp; BSIII commercial vehicles</td>
<td>No BS III NMMC vehicle operating in the city</td>
<td>Low</td>
<td>Feasible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R.T.O.</td>
<td></td>
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<tr>
<td>SCS-15</td>
<td>Restrict commercial vehicles entering city by having ring roads</td>
<td>Check post at entry point of city</td>
<td>Moderate</td>
<td>Feasible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R.T.O.</td>
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<td>2 I</td>
<td>Resuspension</td>
<td>Prepare plan for creation of green buffers along the Traffic corridors</td>
<td>Already in practice Green plantation/vegetation in divider &amp; Rotary, island is already done on PPP basis</td>
<td>High</td>
<td>Feasible</td>
<td>5.71 cr</td>
<td>Continuous</td>
<td>Continuous</td>
<td>N.M.M.C.</td>
<td>Already in practice</td>
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<td></td>
<td></td>
<td>Road side and at traffic junction plantation of specific trees which absorbs pollution.</td>
<td>High</td>
<td>Feasible</td>
<td>___</td>
<td>Mid term</td>
<td>Jun-20</td>
<td>N.M.M.C.</td>
<td>Continual Improvement Process Consultant appointed for study</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
<td>Maintain Pothole Free Roads for Free Flow Traffic</td>
<td>1) NMMC's concrete road length = 63.5 km Bituminous road length = 441.5 km.</td>
<td>High</td>
<td>Feasible</td>
<td>15 cr</td>
<td>Continuous</td>
<td>Continuous</td>
<td>N.M.M.C.</td>
<td>Already in practice</td>
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<tr>
<td></td>
<td></td>
<td>2) NMMC has sucessfully completed concretization of 19 junctions.</td>
<td>High</td>
<td>Feasible</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>N.M.M.C.</td>
<td>Already in practice</td>
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<tr>
<td>III</td>
<td></td>
<td>Introduce water fountains at Major Traffic intersection, wherever feasible</td>
<td>a. NMMC having water fountain at 3 junctions. b. Proposes water fountain after traffic survey feasible study at junction.</td>
<td>Moderate</td>
<td>Feasible</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>N.M.M.C.</td>
<td>Already Existing</td>
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<tr>
<td>IV</td>
<td></td>
<td>Greening of open areas, garden, community places, schools and housing societies</td>
<td>NMMC has undertaken tree plantation on the open spaces/area /Amrut yojana</td>
<td>High</td>
<td>Feasible</td>
<td>5Cr.</td>
<td>Mid Term</td>
<td>Jun-20</td>
<td>N.M.M.C.</td>
<td></td>
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<td>V</td>
<td></td>
<td>Blacktopping of metaled Roads including pavement of Road shoulders</td>
<td>Already Existing</td>
<td>___</td>
<td>___</td>
<td>___</td>
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<td>___</td>
<td>N.M.M.C.</td>
<td>Already Existing</td>
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<tr>
<td>SCS-1</td>
<td>Wall to wall paving (brick)</td>
<td>Already Existing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N.M.M.C.</td>
<td>Already Existing</td>
</tr>
<tr>
<td>SCS-2</td>
<td>Road design improvement</td>
<td>All road are plan and designed.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>N.M.M.C.</td>
<td>Already Existing</td>
</tr>
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<td></td>
<td>Road cleaning</td>
<td>Daily road sweeping is done manually on internal roads. On major roads sweeping is done by 6 nos of sweeping machine with dust collection vacuum suction system.</td>
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<td></td>
<td>M/s Anthony Waste Handling &amp; M/s BVG India</td>
<td>Reduction in PM10 &amp; PM 2.5 level in the city</td>
</tr>
<tr>
<td>(ii)</td>
<td>Regular check and control, of burning of Municipal Solid waste</td>
<td>Appointed Nuisance detection squad.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>M/s Anthony Waste Handling &amp; M/s Khillari Infra. Pvt. Ltd.</td>
<td>NA</td>
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<td>(iii)</td>
<td>Proper collection of Horticulture waste and its disposal following composting –cum –gardening approach</td>
<td>1) 8 dumpers separately deployed for collection of green waste, gasification / Composting in processing plant NMMC having 167 nos of garden composting pit is provided for composting of horticultural waste produce in that garden.</td>
<td>Moderate</td>
<td>Feasible</td>
<td></td>
<td>Already existing</td>
<td></td>
<td></td>
<td>M/s Khillari Infra. Pvt. Ltd.</td>
<td>NA</td>
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<td>Technical feasibility</td>
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<td>Implementation period (short/mid/long term)</td>
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<td>2) At society level: source segregation, composting and Urban farming is promoted.</td>
<td>Moderate</td>
<td>Feasible</td>
<td>NA</td>
<td>Already existing</td>
<td>NA</td>
<td>NMMCs Solid Waste Management Department</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>(iv)</td>
<td></td>
<td>Ensure ban on burning of agricultural waste and crop residues and its implementation</td>
<td>Not in City &amp; around the city.</td>
<td>Moderate</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>SCS-1</td>
<td></td>
<td>Strict compliance of ban on open burning</td>
<td>Nuisance detection squad.</td>
<td>Moderate</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<td></td>
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<td></td>
<td>4 (i) Industry Identification of Brick Kiln and their regular monitoring including use of designated fuel and closure of unauthorized units</td>
<td>No authorise / unauthorise brick kiln in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>MPCB</td>
</tr>
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<td></td>
<td>Conversion of natural draft brick kilns to induced draft</td>
<td>No authorise / unauthorise brick kiln in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>NA as no authorise / unauthorise brick activity in city.</td>
<td>MPCB</td>
</tr>
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<td></td>
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<td>Action against non-complying industrial units</td>
<td>regular compliance monitored during randomised visit</td>
<td>high</td>
<td>Fesable</td>
<td>NA as task alrady implemented</td>
<td>continuous</td>
<td>continuous</td>
<td>MPCB</td>
</tr>
<tr>
<td></td>
<td>SCS-1</td>
<td></td>
<td>Sulphur reduction in fuel</td>
<td>Change fuel pattern</td>
<td>Medium</td>
<td>Fesable</td>
<td>NA</td>
<td>short term</td>
<td>Jun-20</td>
<td>Industry / MPCB</td>
</tr>
<tr>
<td></td>
<td>SCS-2</td>
<td></td>
<td>Improved Combustion technology</td>
<td>Adapt modern Technology</td>
<td>Medium</td>
<td>Fesable</td>
<td>NA</td>
<td>short term</td>
<td>Jun-20</td>
<td>Industry / MPCB</td>
</tr>
<tr>
<td></td>
<td>SCS-3</td>
<td></td>
<td>Alternate fuel</td>
<td>Propmote PNG use</td>
<td>High</td>
<td>Fesable</td>
<td>NA</td>
<td>long Term</td>
<td>Jun-22</td>
<td>Industry / MPCB</td>
</tr>
<tr>
<td></td>
<td>SCS-4</td>
<td></td>
<td>Promoting cleaner industries</td>
<td>Recovery of Solvent by solvent using units.Installation of VOC analyzer</td>
<td>Medium</td>
<td>Fesable</td>
<td>NA</td>
<td>long Term</td>
<td>Jun-22</td>
<td>Industry / MPCB</td>
</tr>
<tr>
<td></td>
<td>SCS-5</td>
<td></td>
<td>Location specific Emission reduction</td>
<td>improvement in Air pollution control system in Stone crushers</td>
<td>High</td>
<td>Fesable</td>
<td>1 lakh per unit</td>
<td>short term</td>
<td>Jun-20</td>
<td>Industry / Reveneu /CIDCO/MIDC/ MPCB</td>
</tr>
<tr>
<td>SLN o</td>
<td>Source group</td>
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<td>Action</td>
<td>Expected reduction &amp; impacts</td>
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<tr>
<td>SCS-6</td>
<td>Fugitive emission control</td>
<td>Improvement in Air pollution control system in Stone crushers</td>
<td>High</td>
<td>Feseable</td>
<td>Nil</td>
<td>Short term</td>
<td>Jun-20</td>
<td>Industry / MPCB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCS-7</td>
<td>Banning of new industries in existing city limit</td>
<td>No NoC/consent grant in corporation area</td>
<td>High</td>
<td>Feseable</td>
<td>Nil</td>
<td>Short term</td>
<td>Jun-20</td>
<td>CIDCO/NMMC/ MPCB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCS-8</td>
<td>Installation/ upgradation of air pollution control systems</td>
<td>Issued directions to Solvent distillation units</td>
<td>Medium</td>
<td>Feseable</td>
<td>Nil</td>
<td>Short term</td>
<td>Jun-20</td>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCS-9</td>
<td>Use of high grade coal</td>
<td>Already using high grade coal having less sulphur content</td>
<td>Medium</td>
<td>Feseable</td>
<td>Nil</td>
<td>Short term</td>
<td>Continuous</td>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCS-10</td>
<td>Regular audit of stack emissions for QA/QC</td>
<td>Regular compliance monitored during randomised visit</td>
<td>High</td>
<td>Feseable</td>
<td>NA as task already implemented</td>
<td>Continuous</td>
<td>Continuous</td>
<td>MPCB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. (i) **Construction and Demolition Activities**

<table>
<thead>
<tr>
<th>Construction and Demolition Activities</th>
<th>Enforcement of construction &amp; demolition rules</th>
<th>1) Work order is issued for the C&amp;D waste Processing &amp; Disposal Plant at 20 MT/Hour</th>
<th>High</th>
<th>Feasible</th>
<th>11 Cr.</th>
<th>Mid Term</th>
<th>Jun-20</th>
<th>NMMC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2) Restoration of stone quarry by using C &amp; D waste</td>
<td>High</td>
<td>Feasible</td>
<td>25-30 Lakhs</td>
<td>Mid Term</td>
<td>Jun-20</td>
<td>Collector &amp; CIDCO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Letter of intent finalized with TERI Fund allocated for pilot project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. (ii) **Control measures for fugitive emissions from material handling, conveying and screening operations through water sprinkling, curtains, barriers and suppression units**

<table>
<thead>
<tr>
<th>Control measures for fugitive emissions from material handling, conveying and screening operations through water sprinkling, curtains, barriers and suppression units</th>
<th>High</th>
<th>Feasible</th>
<th>Nil</th>
<th>Continuous</th>
<th>NMMC</th>
<th>Already existing</th>
</tr>
</thead>
</table>

5. SCS-1 Better construction practices with PM reduction of 50%

<table>
<thead>
<tr>
<th>Direction issued to Construction agencies and contractor in tender condition</th>
<th>Moderate</th>
<th>Feasible</th>
<th>Nil</th>
<th>Continuous</th>
<th>NMMC</th>
<th>Already existing</th>
</tr>
</thead>
</table>

5. SCS-2 Banning of operation of brick kilns in city area

<table>
<thead>
<tr>
<th>Not exist</th>
<th>Nil</th>
<th>Nil</th>
<th>Nil</th>
<th>Nil</th>
<th>Revenue Dept.</th>
<th></th>
</tr>
</thead>
</table>

5. SCS-3 Ensure carriage of construction material in closed/covered Vessels

<table>
<thead>
<tr>
<th>Work order is issued for the C&amp;D waste Processing &amp; Disposal Plant at 20 MT/Hour</th>
<th>High</th>
<th>Feasible</th>
<th>11Cr</th>
<th>Mid term</th>
<th>Jun-20</th>
<th>NMMC</th>
<th>Continual Improvement Process</th>
</tr>
</thead>
</table>

35
<table>
<thead>
<tr>
<th>SLN</th>
<th>Source group</th>
<th>Control option</th>
<th>Action</th>
<th>Expected reduction &amp; impacts</th>
<th>Technical feasibility</th>
<th>Requirement of financial resources</th>
<th>Implementation period (short/mid/long-term)</th>
<th>Time target for implementation</th>
<th>Responsible agencies</th>
<th>Any other information</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>SCS-1</td>
<td>Domestic fuel burning</td>
<td>Shift to LPG from solid fuel &amp; kerosene for domestic applications</td>
<td>1) Maximum PNG connection to home, balance is LPG</td>
<td>High</td>
<td>Feasible</td>
<td>NA</td>
<td>Long term</td>
<td>MNGL (Mahanagar Gas Ltd)</td>
<td>Review is performed at the time of Census</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2) Kerosene for domestic applications is not use</td>
<td></td>
<td></td>
<td>ANA</td>
<td>Long term</td>
<td>District Collector</td>
<td>Not in Use</td>
</tr>
<tr>
<td>7</td>
<td>SCS-1</td>
<td>Mining</td>
<td>Effort for good mining practices</td>
<td>issued circular for obtaining EC for mining activity, Committee formed under district collector</td>
<td>high</td>
<td>Feasible</td>
<td>NA</td>
<td>Long term</td>
<td>District Collector/ MPCB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCS-2</td>
<td></td>
<td></td>
<td>Greenbelt for activity zone and the buffer zone for each mining area</td>
<td>high</td>
<td>Feasible</td>
<td>1 Cr</td>
<td>Long term</td>
<td>District Collector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCS-3</td>
<td></td>
<td></td>
<td>Maintenance of mine area roads provide metalic/concrete road</td>
<td>high</td>
<td>Feasible</td>
<td>2 Cr</td>
<td>Long term</td>
<td>District Collector</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>(i)</td>
<td>DG sets</td>
<td>Monitoring of DG sets and action against violations</td>
<td>Squad shall be appointed</td>
<td>Medium</td>
<td>Feasible</td>
<td>NA</td>
<td>short term</td>
<td>MSEDCL/ MPCB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCS-1</td>
<td></td>
<td>Reduction in DG set operation/ Un-interrupted power supply</td>
<td>Squad shall be appointed</td>
<td>Medium</td>
<td>Feasible</td>
<td>NA</td>
<td>short term</td>
<td>MSEDCL</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>SCS-1</td>
<td>Bakeries / crematoria</td>
<td>Use of LPG in Hotels and “dhabas”</td>
<td>Already in practice</td>
<td></td>
<td></td>
<td>Already in practice</td>
<td></td>
<td>NMMC</td>
<td></td>
</tr>
<tr>
<td>SLN</td>
<td>Source group</td>
<td>Control option</td>
<td>Action</td>
<td>Expected reduction &amp; impacts</td>
<td>Technical feasibility</td>
<td>Requirement of financial resources</td>
<td>Implementation period (short/mid/long-term)</td>
<td>Time target for implementation</td>
<td>Responsible agencies</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Other (city specific)</td>
<td>Air Quality Monitoring Network</td>
<td>1) AQI for Nerul CAAQMS is being publish regularly on Safar website. CAAQMS data of Airoli, Turbhe &amp; Koparkhairne is being published on Navi Mumbai Municipal Corporation's &amp; MPCB website regularly. Environment status report is being submitted annually to MPCB as per their guideline. Complaints received from citizens are being attained by Environment department of Navi Mumbai Municipal Corporation and addressed to MPCB for further action. 2). Proposed 5 Low cost sensor based monitoring station 3 ). Proposed 3 NAMP (manual monitoring) stations</td>
<td>High</td>
<td>Feasible</td>
<td>1.2 cr planned per station</td>
<td>Already in practice</td>
<td>Jun-21</td>
<td>NMMC/ MPCB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Source Apportionment (SA) and Emission Inventory (EI)</td>
<td>NEERI and IIT (B) together conducting Study for Source Apportionment (SA) and Emission Inventory (EI). Current status of the study for Area, Point and Line source contribution is included in the report</td>
<td>High</td>
<td>Feasible</td>
<td></td>
<td>In process</td>
<td>NA</td>
<td>MPCB, NMMC</td>
<td>Current status of the study for Area, Point and Line source contribution is included in the report</td>
<td></td>
</tr>
<tr>
<td>SLN no</td>
<td>Source group</td>
<td>Control option</td>
<td>Action</td>
<td>Expected reduction &amp; impacts</td>
<td>Technical feasibility</td>
<td>Requirement of financial resources</td>
<td>Implementation period (short/mid/long-term)</td>
<td>Time target for implementation</td>
<td>Responsible agencies</td>
<td>Any other information</td>
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</tr>
<tr>
<td>10</td>
<td></td>
<td>Public Awareness and Complaint</td>
<td>Online complaint portal platform available on NMMC website where citizens can send complaints, track the status and provide feedback. Awareness programmes for policy makers, people, drivers-mechanic, traffic police, health professionals, academicians. Public transport saves valuable space and energy compared to private transport, and can make a healthy profit at the same time. Encouragement program for public transport by giving them some priority on the road over cars.</td>
<td>High</td>
<td>Feasible</td>
<td>Continuous</td>
<td>Continuous</td>
<td>Continuous</td>
<td>NMMC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Redressal Mechanism</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2) Navi Mumbai having coastal (creek) 25k.m. along the west coast. It is connected to Mumbai, promotion of water transport is under pipeline to reduce traffic congestions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NMMC , Meritime board</td>
<td>Continual Improvement Process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&amp; CIDCO</td>
<td>Process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Navi Mumbai having Parsik Hill range along the east coast is deteriorated because of quarrying activities, now quarrying operation is stopped through initiative by District collector office and MPCI, NMMC after refilling of abandant quarry by C&amp;D waste tree plantation is proposed on Parsik hill to increase green coverage of city.</td>
<td></td>
<td></td>
<td>Mid term</td>
<td>Jun-20</td>
<td>NMMC</td>
<td>Continual Improvement Process</td>
<td></td>
</tr>
</tbody>
</table>

Note: 1) Vehicle emmission (ii) 2b Action is added, SCS-7 & SCS-8, 2) Resuspension - tree plantation & in Other - refilling of quarry is added
Compliance Status as per CPCB Letter No. AQM/ AP/ 2019-20 dtd. 16/04/2019
<table>
<thead>
<tr>
<th>Key Component</th>
<th>Observations</th>
<th>Remarks</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality Monitoring Network</td>
<td>Expansion Plan Not Provided</td>
<td>Include Monitoring Network</td>
<td>Point No. 10 (1) : Other (city specific) \nExpansion Plan: 5 Low cost sensor based monitoring stations \n3 NAMP (manual monitoring) stations</td>
</tr>
<tr>
<td>Source Identification</td>
<td>Road dust, Vehicles, Open burning, Construction Activities, Industries, Domestic Fuel</td>
<td></td>
<td>Point No. 10 (2) \nMPCB awarded work order for conducting Source Apportionment (SA) and Emission Inventory study to IIT(B) and NEERI. The work is in the final stage of completion.</td>
</tr>
<tr>
<td>Source Apportionment (SA) and Emission Inventory (EI)</td>
<td>EI and SA not quantified</td>
<td>Carryout EI and SA estimates</td>
<td>Point No. 10(3) \n<strong>Area Source:</strong> contribution of regional ground level emission load of PM10 is 1.29 tons/day and from road resuspension is 19 tons/day out of the total PM10 emission load. Out of the total area source emission, the most contribution is from domestic and household consumption of fuels and construction activity. \n<strong>Point Source:</strong> There are 541 Air Polluting industries in area/cluster. Major pollutants are TPM/SPM, SO2, NOx, NH3, Cl2, and VOC from pesticide and bulk drug units. \n<strong>Line Source:</strong> As per current study the emission from vehicular source is calculated to be around 448 Tonnes/Yr. Heavy Duty vehicles contributing 82% of total vehicular emissions of PM. \nMPCB awarded work order for conducting Source Apportionment (SA) and Emission Inventory study to IIT(B) and NEERI. The work is in the final stage</td>
</tr>
<tr>
<td>Action Points</td>
<td>Addresses all major sources</td>
<td>Addressesed</td>
<td>Addressesed</td>
</tr>
<tr>
<td>Long term strategy</td>
<td>Long term actions proposed</td>
<td>Addressesed</td>
<td>Addressesed</td>
</tr>
<tr>
<td>Time Frame</td>
<td>Timelines proposed for various actions (upto 3 years)</td>
<td>Addressesed</td>
<td>Addressesed</td>
</tr>
<tr>
<td>Executive agencies</td>
<td>Not Identified</td>
<td>Identify executive agencies on P.N. 12-22</td>
<td>Responsible agencies identified</td>
</tr>
<tr>
<td>Public Awareness and Complaint Redressal Mechanism</td>
<td>Specific Plan and public complaint redressal mechanism not outlined</td>
<td>Detail proposal to be worked out</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td>Online complaint portal platform available on NMMC website where citizens can send complaints, track the status and provide feedback. Awareness programmes for policy makers, people, drivers-mechanic, traffic police, health professionals, academicians Public transport saves valuable space and energy compared to private transport, and can make a healthy profit at the same time. Encouragement program for public transport by giving them some priority on the road over cars</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Budget Support</th>
<th>Budget estimates given</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget estimation provided with respective action items.</td>
<td></td>
</tr>
</tbody>
</table>

Additional Modifications:

- Expected Impacts in terms of High/ Medium/ Low specified for respective action plans.
- Technical Feasibility, Implementation period (Short/Medium/ Long) and time target specified for respective action plan.