Action Plan for Clean Air, Ludhiana

30th April 2019

Directorate of Environment and Climate Change
Department of Science, Technology and Environment
Government of Punjab

Table of Contents

Chapter 1 – Introduction

1.1 About Air Pollution

1.1.1 Air pollutant means any solid, liquid or gaseous substance present in the atmosphere in such concentration as may be or tend to be injurious to human being or other living creatures or plants or property or environment. Air pollution means the presence of air pollutants in the atmosphere. The most common sources of air pollution include particulates, oxides of nitrogen, sulphur dioxide and ozone.

1.1.2 The health effects caused by air pollution may include difficulty in breathing, wheezing, coughing, asthma and worsening of existing respiratory and cardiac conditions.

1.2 About Ludhiana

1.2.1 Brief

Geographically, Ludhiana is the most centrally located district which falls in the Malwa region of the State of Punjab. It lies between North Latitude 30°-34' and 31°-01' and East longitude 75°-18' and 76°-20'. It is bounded on the north by River Sutlej which separates it from Jalandhar district. The River also forms its northern boundary with Hoshiarpur district. On other sides it shares common boundaries with Roopnagar district in the East, Moga district in the West and Sangrur, Fatehgarh Sahib & Patiala districts in the South and South east.

1.2.2 Area and Population

Ludhiana has predominantly mixed land use especially in residential, industrial and commercial sectors. The expansion of residential population has come up because of the development of industrial belts in the outskirts of city and massive commercialization in city centre.

Ludhiana is a Municipal Corporation and India's largest city north of Delhi, with an area of 310sq. km and an estimated population of 1,618,879 as of the 2011 census. The projected population of Ludhiana city is about 17.68 Lacs in 2017.

1.2.3 Industry and Trade

Ludhiana, the first metropolitan city of the State of Punjab, located on National Highway-I, has emerged as the most vibrant and important business centre of Punjab. Being the hub of Indian small-scale Industry especially hosiery & Cycle parts, it is popularly known as “Manchester of India.”

1.2.4 Topography

The topography of the District is typical representative of an Alluvial plain, it owes its origin to the aggravation work of the Sutlej River. The alluvium deposited by the river has been worked over by the wind which gave rise to a number of small dunes and sand mounds. Most of these dunes have been levelled by the brave hard working agriculturists of the district. The District can be divided into the flood plains of the Sutlej and the Up land plains.

1.2.5 Meteorology of the study area

The wind rose plotted for three seasons are shown in figure 1-3. Figure shows that the predominant wind direction during post-monsoon, winter and summer seasons was towards South-Westerly, South-Westerly and South-Easterly respectively. Calm condition was observed to be 0% for all the three seasons. Wind speeds were comparatively higher in summer (ranging from 0.1 to 2.23 m/s with meanof 0.64 m/s) followed by winter season (ranging from 0.1 -1.3 m/s with meanwind speed of 0.44 m/s) and post monsoon season (ranging from 0.07-1.61 m/s with meanwind speed of 0.3 m/s). Temperature for post-monsoon, winter and summer seasons varied between 5.1 – 31.5 (20.3) °C, 5.6 – 25.4 (13.9) °C and 21.3 – 43.6 (33.4)°C respectively whereas the relative humidity ranged between 25.4-95 (66.5) %, 15.6-99 (76.8) % and 4.4 – 98.9 (38.2) % for post-monsoon, winter and summer seasons respectively

Figure-1 : Wind Rose: Post monsoon Season

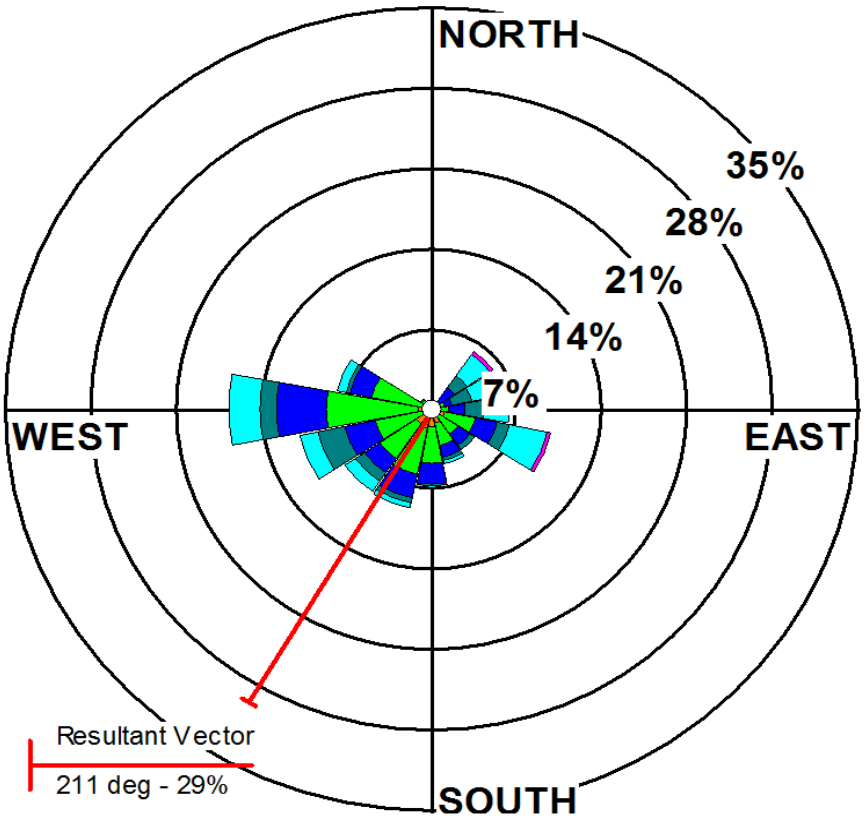


Figure 2-Wind Rose :Winter Season

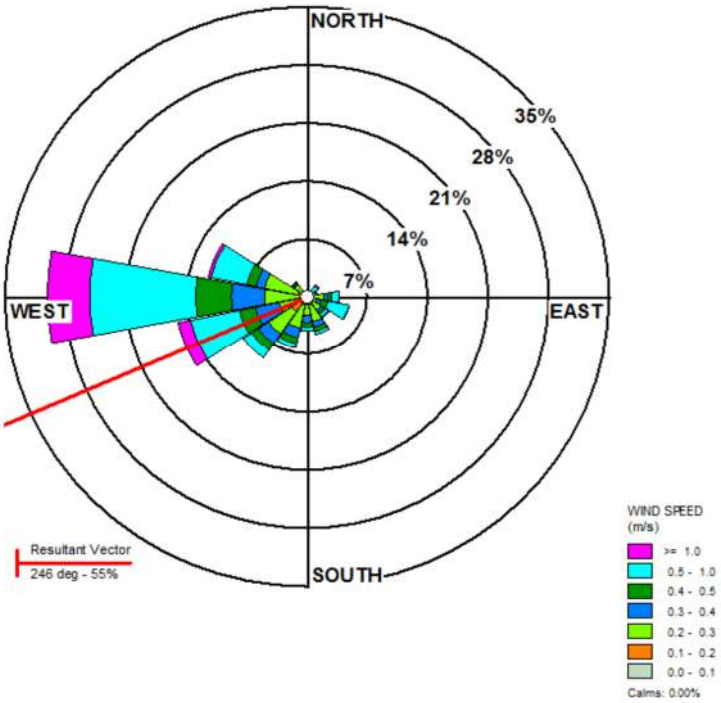


Figure-3- Wind Rose :Summer Season

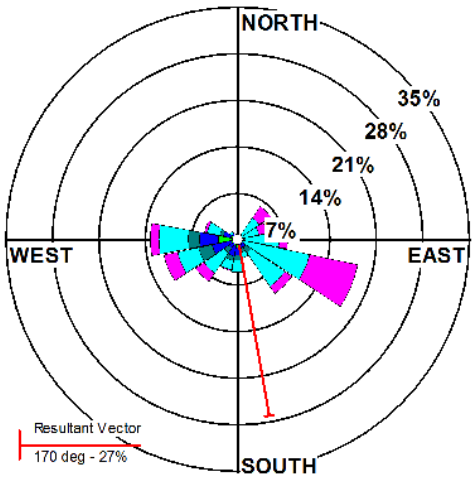


Figure 1, 2, 3- Wind rose diagram for post monsoon, winter & summer seasons

Source:- Draft Final Report on SourceApportionment Study to prepare Action Plan to improve Air Quality of Ludhiana prepared by PSCST, Chandigarh

1.2.6 Land Use and Land Cover

Ludhiana has predominantly mixed land use especially in residential, industrial and commercial sectors. The expansion of residential population has come up because of the development of industrial belts in the outskirts of city and massive commercialization in city centre. The land use distribution in the city does not follow a definitive pattern. The only definite concentration is of the industries. Commercial activity is virtually spread throughout the city.

Population density of Ludhiana Municipal Corporation (LMC) is expanding for the past decades i.e. 5519 persons per Square kilometres in 1981 which was further increased to 7743, 8775 and 10127 persons per Square kilometres in years 1991, 2001 and 2011 respectively (Census of India various years). Correspondingly there was a remarkable increase in Municipal Corporation area as well, i.e 41.7 sq.km. in 1971 to 110 sq.km. in 1981 and 159.37 sq.km in 2011 (Municipal Corporation of Ludhiana).

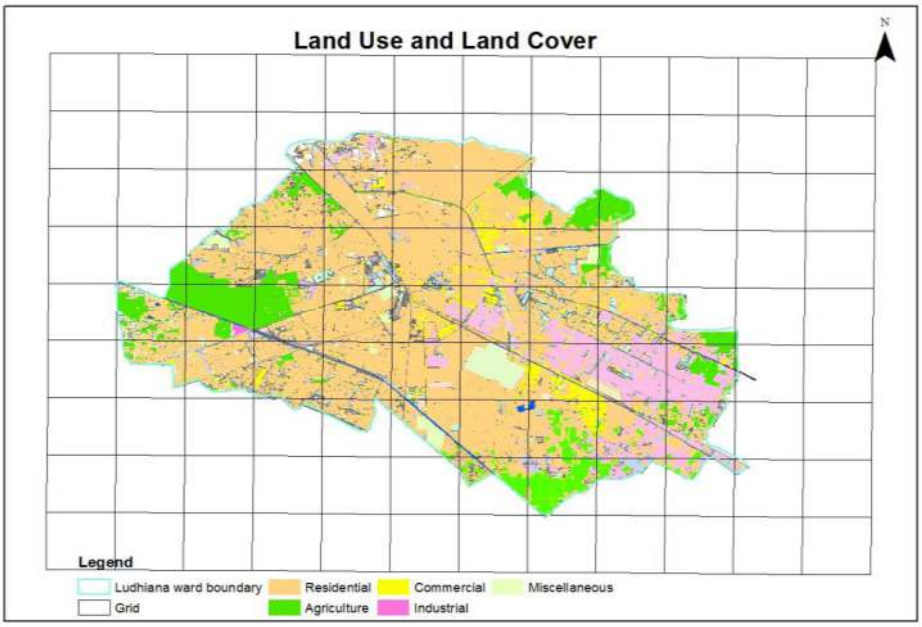


Figure 4: Land Use Land Cover pattern in Ludhiana City

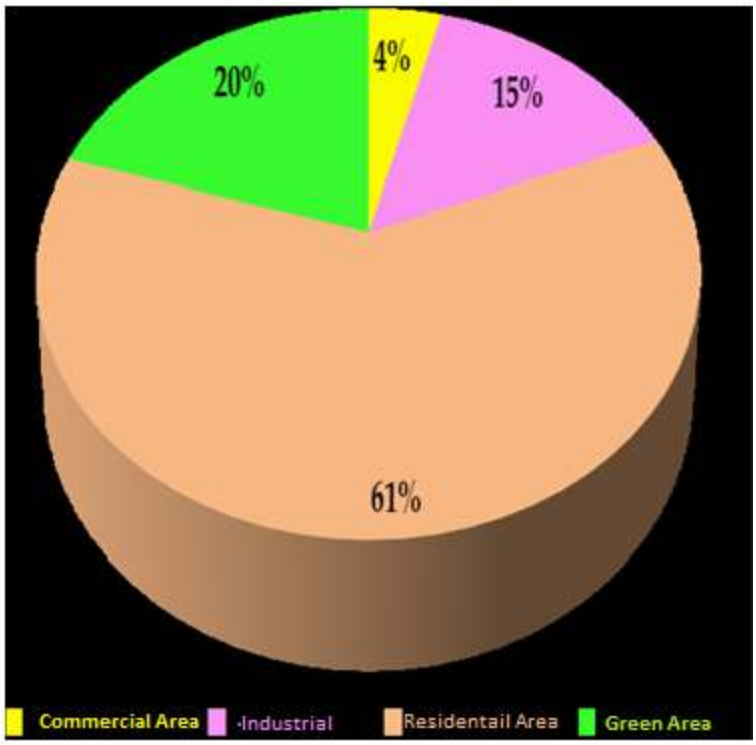


Figure 5: Land Use Land Cover distribution in Ludhiana City

Ferozepur Road, Delhi Road, GT Road Bypass, MataraniChowk Area, Chaura Bazar, Focal Point Area, Malerkotla Road, Pakhowal Road and Fountain Chowk Area will continue to attract a large number of people for their employment, shopping, trading, medical, education, tourism and other requirements. Ludhiana is the first metropolitan centre of Punjab. Ludhiana was envisaged as a business-oriented city of State of Punjab.

The Land Use Land Cover (LULC) of Ludhiana city as per the details provided by Municipal Corporation, Ludhiana (Figure 5) indicates that 61% of the city area is residential followed by green area (20%), industrial area (15%) and commercial area (4%). The land use pattern and its distribution in Ludhiana city is shown in Figure 4 & 5 respectively.

The City is spread over an area of 159.37 sq km and is divided into 75 wards which accommodate approximately 16.18 lacs population as per 2011 Census.

1.2.7 Existing Road network of Ludhiana

The existing road network of Ludhiana is radial in pattern conversing in to the heart of the city. As per Ludhiana Municipal Corporation report on “Comprehensive Mobility Plan for Ludhiana”, the present road network is spread over 12.72 sq km of area, which accounts for 8% of the total municipal area. Further all the roads were classified into one of the three categories, namely: arterial, connector and local based on their properties. The total road length of arterial, sub arterial (connecting road) and minor (local) roads in the study domain is 102.3 km, 234.4 km and 1844.4 km respectively thereby making a total road length of 2181.1 km comprising of all the three categories of roads in the study area. The city is very well connected with other areas of the state. The major road network connecting the city with other parts of the state/country

is Ludhiana-Ambala, Ludhiana-Amritsar, Ludhiana-Chandigarh, Ludhiana-Ferozepur, Ludhiana-Malerkotla and Ludhiana-Bathinda.

1.3 Government's past and current efforts for control of Air pollution:

1.3.1 The environment of Ludhiana has degraded a lot during the last few years due to rapid urbanization, industrialization, increase in population, vehicles and commercialization of land available within the town. The industrial cluster of Ludhiana had been identified as one of the critically polluted clusters by the Ministry of Environment & Forests vide office memorandum J-11013/5/2010-IA II (I) dated 13/1/2010. This had resulted in imposition of a temporary restriction of 8 months for establishment of new industrial units, which were covered in Schedule-I appended to the EIA notification dated 14/9/2006.

1.3.2 Punjab Pollution Control Board had taken this as a challenge and also as an opportunity in order to achieve significant improvement in environmental quality and pave the way for sustainable development in the area. A comprehensive remedial environmental action plan was prepared in consultation with all the stakeholders, including Industrial Associations. The multi-disciplinary action plan was based on Prevention, Promotion and Mitigation (PPM) principles emphasizing on a time bound implementation of effective measures.

1.3.3 The Action Plan was monitored by high level steering committee, to ensure collaborative efforts among various implementing agencies and industries. Regular meetings are conducted to review the progress made by various departments. After fresh monitoring of Ludhiana area, the moratorium imposed was lifted by MoEF&CC in year 2011 due to improvement in the environmental parameters.

1.3.4 A source apportionment study for controlling Air Pollution in Ludhiana city has been carried out by Punjab State Council for Science & Technology, Chandigarh along with The Energy & Resources Institute, New Delhi. They have submitted the Draft Final Report on 01.03.19 for comments of PPCB, subsequent to which, Final report would be submitted

1.3.5 The Draft Final Report cover the following: -

(i) Emission Inventory
(ii) Ambient Air Quality status
(iii) Simulation of Air Quality
(iv) Future Projections
(v) Summary and Conclusion

As per the Draft Final Report, air pollution levels violate the prescribed standards in Ludhiana city. The levels were highest during winters and post-monsoon seasons. While in winters, the adverse meteorological conditions lead to accumulation of pollutants, high concentrations during post monsoon season may be attributed to agricultural residue burning which acts as an additional stressor over the already existing year-round sources of pollution such as industries, transport, etc.

The two techniques used for assessment reveal that industries, transport, and biomass burning are the major contributors to PM2.5 concentrations in Ludhiana. Industrial and biomass burning contributions are not only from within the city but also from outside the city-limits. There is a significant share of dust from local as well as far-off sources. The assessment for PM shows that other than transport, biomass burning, and industries, road dust also contributes significantly to PM10 concentrations. There is also a significant share of dust from far-off sources.

1.3.6 The key observations mentioned in the draft final report of the source apportionment study is as under: -

(i) The results showed that PM (both PM_{10} and $PM_{2.5}$) is a matter of concern and exceeds the NAAQS at all the locations throughout the study period for all the three seasons.

(ii) The average PM_{10} levels across different locations during post-monsoon, winter and summer varied between 146-452 µg/m^3, 142-277 µg/m^3 and 144-298 µg/m^3 respectively.

(iii) The average $PM_{2.5}$ levels across different locations during post monsoon, winter and summer varied between 92-309 µg/m^3, 95-158 µg/m^3 and 56-130 µg/m^3 respectively.

(iv) PM_{10} at different locations are approx. 2.5-4.5 times the standard while $PM_{2.5}$ is 2-5 times the standard for post monsoon.

(v) Both PM_{10} and $PM_{2.5}$ at different locations are approx. 1.5-3 times the standard during winter.

(vi) PM_{10} at different locations are approx. 1.4 - 3 times the standard while $PM_{2.5}$ is 1-2 times the standard for summer season.

(vii) The average PM levels at all the locations were higher in post-monsoon than in winter and summer seasons indicating the impact of stubble burning during post-monsoon season.

(viii) The study also projected the future in a BAU scenario based on prevailing sectorial growth rates and current plans and policies. The scenario shows a decline in share of transport sector contributions due to penetration of BS-VI vehicles from 2020 onwards, while the industrial shares are expected to increase with growth in industrial productions. With greater number of vehicles, road dust re-suspension is expected to increase further. Enhanced LPG penetration is expected to reduce the share of the domestic sector in PM concentrations. Despite, reductions due to these measures, air quality simulations for BAU scenario show that the average modelled concentrations of $PM_{2.5}$ (3-season avg.) will increase slightly from 103 □g/m^3 to 106 □g/m^3 in 2025 and 116 □g/m^3 in 2030. Similarly, the average modelled concentrations of PM_{10} (3-season avg.) will increase slightly from 137 □g/m^3 to 151 □g/m^3 in 2025 and 171 □g/m^3 in 2030. This also emphasize on the fact that more stringent interventions will be required for further control of air quality in Ludhiana.

(ix) For this purpose, the study analysed various interventions and estimated their possible impacts over $PM_{2.5}$ and PM_{10} concentrations in Ludhiana city. An alternative scenario has been developed considering the interventions which can provide maximum air quality benefits. The alternative scenario results in a reduction of 73% in $PM_{2.5}$ and 77% in PM_{10} in 2030, with respect to the BAU scenario, and achieves ambient air quality standards for PM_{10} and $PM_{2.5}$. The interventions have identified those that have the highest impact on PM concentrations in 2030.

1.4 About National Green Tribunal directions:

1.4.1 Nine cities of Punjab namely DeraBassi, Nangal, Patiala, MandiGobindgarh, Khanna, Ludhiana, Jalandhar, Pathankot and Ludhiana were declared non-attainment cities by Central Pollution Control Board (CPCB) on the basis of Ambient air data for the period of 2011-2015 for not meeting the annual average of 60 µg/m3 for PM10.Directions were issued to the Board by CPCB to prepare action plans for the above stated non-attainment cities of Punjab.

1.4.2 Subsequently, National Green Tribunal has taken cognizance of draft National Clean Air Program and passed directions in the matter of application no. 681 of 2018 dated 8/10/2018. The important points of the said directions given as under:

(i) Action plans to be prepared within two months aimed at bringing the standards of air quality within the prescribed norms within six months from date of finalization of the action plans.

(ii) The action plans may be prepared by six-member committee comprising of Director of Environment, Transport, Industries, Urban Development, Agriculture and Member Secretary, State Pollution Control Board under the overall supervision of Principal Secretary, Environment and further supervised by Chief Secretary.

(iii) The Action plans may take into account the GRAP, the CAP and the action plan prepared by CPCB as well as all other relevant factors.

(iv) The Action Plan will include components like identification of source and its apportionment considering sectors like vehicular pollution, industrial pollution, dust pollution, construction activities, garbage burning, agricultural pollution including pollution caused by burning of crop residue, residential and indoor pollution etc.

(v) The Action plan shall also consider measures for strengthening of Ambient Air Quality (AAQ) monitoring and steps for public awareness include issuing of advisory to public for prevention and control of air pollution and involvement of schools, colleges and other academic institutions and awareness programmes.

(vi) The Action plan will indicate steps to be taken to check different sources of pollution having speedy, definite and specific timelines for execution.

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

(viii) The CPCB and SPCBs shall develop a public grievance redressal portal for redressal of public complaints on air pollution along with a supervisory mechanism for its disposal in

a time bound manner. Any visible air pollution can be reported at such portal by email/SMS.

(ix) The CPCB and all SPCBs shall collectively workout and design a robust nationwide ambient air quality monitoring programme in a revised format by strengthening the existing monitoring network with respect to coverage of more cities / towns. The scope of monitoring should be expanded to include all twelve (12) notified parameters as per notification no. B-29016/20/90/PCl-L dated 18th November of CPCB. The Continuous Ambient Air Quality Monitoring Stations (AAQMS) should be preferred in comparison to manual monitoring stations. The CPCB and States shall file a composite action plan with timelines for its execution which shall not be more than three months.

1.4.3 Earlier, NGT had also issued various directions in OA No. 21 of 2014 titled as VardhamanKaushik V/s Union of India and Others for combating air pollution.

Chapter 2- Vision, Mission and Strategy

2.1 MissionTandrust Punjab

The Government of Punjab envisions to make Punjab the healthiest State with healthy people by ensuring the quality of air, water, food and a good living Environment.

2.2 Vision for Clean Air, Ludhiana

To restore the quality of air in Ludhiana totheprescribed standards to ensure health of the people, ecological balance and socio-economic well-being of the people.

2.3 Mission Clean Air, Ludhiana

To prepare and implement a comprehensive action plan for clean Ludhiana:

(i) Creating awareness about the adverse impact of air pollution
(ii) Identifying the sources of air pollution, their apportionment
(iii) Setting up facilities for treating the pollutants
(iv) Ensuring effective operations of the facilities
(v) Ensuring effective monitoring of the quality of air
(vi) Mitigating adverse impact on health of the people due to air pollution

2.4 Strategy for Clean Air, Ludhiana

The key elements of strategy for Clean Air campaign for Ludhiana will include:

(i) Identification of Government Stakeholders
(ii) Identification of Non-Government Stakeholders
(iii) Integration of Departmental plans – Creating synergies
(iv) Nodal Department
(v) Citizen Participation
(vi) Monitoring and Governance

2.5 Identification of Government Stakeholders

In order to combat the challenges of air pollution, all the Stakeholders will have to make concerted efforts. Following Departments and agencies have been identified along with their responsibilities:

(i) **Punjab Pollution Control Board**
  (a) Ensure necessary regulatory action under Air Act, 1981
  (b) Monitoring of air pollution control devices installed by industries
  (c) Up-gradation of existing air pollution control devices
  (d) Monitoring of ambient air quality and stack emissions
  (e) Provisions of canopies on the existing D.G sets in Industrial sector

(ii) **Department of Local Government/ MC, Ludhiana**

(a) Handling and disposal of municipal solid waste effectively
(b) Improvement of Road infrastructure for smooth traffic movement
(c) Upgrading traffic lights for smooth traffic movement
(d) Promotion of green buildings
(e) Increasing green cover in city
(f) Provide canopies on the existing D.G sets in commercial and residential buildings
(g) Regular and mechanical cleaning of roads
(h) Sprinkling of treated wastewater in the parks and maintenance of fountains.
(i) Imposing ban on burning of garbage or other materials.
(j) Handling construction and demolition waste
(k) Blacktopping and pothole free roads
(l) Mechanicals sweeping and water sprinkling
(m) Road design improvement

(iii) **Department of Transport**

(a) Plan for introduction of battery-operated E-Rickshaws/three wheelers
(b) Plan for effective traffic management
(c) Plan for phasing out old polluting vehicles
(d) Monitoring of vehicles without PUC certificate
(e) Banning of pressure horns

(iv) **Department of Police**

(a) Checking of vehicles running without PUC certificate
(b) Planning and Implementation of traffic management plan
(c) Impounding and challan of vehicles running without permission/ registration.
(d) Control of noise from D.G. sets and other non-point sources.

(v) **Department of Forests**

(a) Preparation of afforestation plan
(b) Organizing awareness camps for Greener City
(c) Providing green belt around the industrial areas and along the roads.
(d) Inventory of flora and fauna in the City

(vi) **Deptt. of Industries and Commerce / Punjab Small Industries & Export Corporation**

(a) Shifting of industries from non-designated areas
(b) Provision of environment infrastructure in Industrial Areas
(c) Good mining practices

(vii) **PWD (B&R)**

(a) Improving road conditions for smooth movement of traffic
(b) Increasing green cover on roadside under their jurisdiction
(c) Road design improvement

(viii) **Punjab State Council for Science and Technology**

(a) Evolving cost-effective cleaner technologies
(b) Providing training for effective operation of APCD's.

(ix) **Department of Agriculture**

(a) Promotion of bio-methanization and compost facilities for agri waste

(b) To provide Machinery for in-situ management
(c) To create awareness about ill-effects of stubble burning
(d) To create awareness regarding alternative crops to break wheat-rice cycle.

(x) **District Administration**
(a) Coordination with all the Stakeholders promoting collaboration and resolving local issues
(b) Public Awareness Campaign

(xi) **National Highway Authority**
(a) Construction of express ways /bypasses
(b) Mechanical sweeping of roads
(c) Providing green area
(d) Road design improvement

2.6 Non-Government Stakeholders

2.6.1 There is need to involve various Industry associations of Ludhiana in this plan. Following Industry Associations of Ludhiana will be associated with the plan:

(i) The President, Chamber of Industrial & Commercial Undertaking, Ludhiana
(ii) The President, Ludhiana Textile Dyeing & Processors Association
(iii) The President, United Cycle Parts manufacturing Association
(iv) The President, Ludhiana Machine Tool Manufacturers Association
(v) The President, Ludhiana Foundries Association
(vi) The President, Ludhiana Induction Furnace Association
(vii) The President, Ludhiana Re-rolling mills Association

2.6.2 These association will help in the following activities:

Generic
(i) To stabilize the vehicular movement area within premises of the industries
(ii) To persuade the member industries to comply with emission norms by PPCB
(iii) To evolve more efficient machinery, boiler furnace and air pollution control devices which may be adopted by all the industries for better environment

Specific
(i) To shift over the industries from coal / pet coke to PNG.
(ii) To upgrade the existing APCD.

2.6.3 Apart from Industry Associations, the support of various NGOs in the city will be sought. The NGOs will assist in the following:

(i) To create awareness among the public regarding ill-effects of air pollution
(ii) To motivate residents of city Ludhiana for adopting the practices to minimize the use of fresh water, planting more trees, to promote pooling by minimal use of private vehicles. Parking of vehicles in the designated zones, minimum use of electricity etc
(iii) To give suggestions to District Level Committee to control or minimize the air pollution.
(iv) To give feedback on enforcement activities

2.7 Nodal Department

The clean air plan for Ludhiana is part of State-wide campaign to control air pollution in non-attainment cities. In order to bring necessary impetus, support from other stakeholder departments, uniformity and consistency, there is need to have a Nodal Department. The Department of Science, Technology and Environment will be the nodal department for coordinating and monitoring activities of the plan. The Department has recently set up Directorate of Environment and Climate Change, which will provide necessary support at the headquarter for coordination and oversight and PPCB will provide necessary technical and field support.

2.8 Integration of Departmental plans

The Nodal department will integrate plan of individual department for control of pollution from various sources and prepare a comprehensive plan.

2.9 Citizen participation

Citizen participation will be key to the success of the plan. Effort will be made to seek citizen participation in various public awareness activities, feedback and support in various enforcement related activities. A strong social media and technology driven platform will be set up to seek citizens particularly youth participation.

2.10 Design of Monitoring System

2.10.1 Various measures envisaged under the action plan for control of pollution can be classified in the following categories:

(i) Public Awareness
(ii) Effective Enforcement
(iii) Creation of new infrastructure
(iv) Maintenance related activities
(v) Policy Advocacy
(vi) Technology Support

2.10.2 Monitoring of various activities of the Action Plan will be key to achieve the outcomes envisaged under the Action Plan. Different kind of monitoring systems will be required for different categories of activities:

(i) Design of effective online platform including social media to disseminate air pollution related information and seek citizen feedback and participation in the campaign. It will have a monitoring mechanism to see the level of participation and measures to increase the same.
(ii) Design of effective online system to capture various enforcement activities by various agencies to monitor them, evaluate them and provide feedback and enforce accountability.
(iii) Design of an effective monitoring system to monitor the progress of various infrastructure related activities as envisaged under the plan.

(iv) Design of an effective monitoring system for policy advocacy within the Government for expediting formulation of various policies.

(v) Design of an effective monitoring system for various technological interventions to reduce the air pollution.

2.10.3 Directorate of Environment and Climate Change and PPCB will set up a dedicated team for design of monitoring system and setting up of IT platform for tracking progress of the plan.

2.11 Governance

The Monitoring of progress, coordination of various activities, corrective measure required and fixing of accountability will be done by Air Monitoring Committee at the District level under Deputy Commissioner, State Level under Principal Secretary, Environment and Apex committee under Chief Secretary.

Chapter 3 – Current Status and Trends of Air Quality in Ludhiana

3.1 Parameters of Air pollution

Depending upon the various activities mentioned above and type of fuels being used in the industries. The pollutants impacting the quality of air in Ludhiana are as under:

3.1.1 PM_{10}

Coarse dust particles (PM10) are 2.5 to 10 micrometers in diameter. Sources include crushing or grinding operations and dust stirred up by vehicles on roads. These tiny particles which are about 30 times smaller than the width of a hair on your head are small enough to get inhaled past our defensive nose hairs and into our lungs.

3.1.2 $PM_{2.5}$

Fine particles (PM2.5) are 2.5 micrometers in diameter or smaller, and can only be seen with an electron microscope. Fine particles are produced from all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes.

3.1.3 NO_x

NOx is produced from the reaction of nitrogen and oxygen gases in the air during combustion, especially at high temperatures. In areas of high motor vehicle traffic, such as in large cities, the amount of nitrogen oxides emitted into the atmosphere as air pollution can be significant. NOX react with ammonia, moisture, and other compounds to form nitric acid vapor and related particles. Human health concerns include effects on breathing and the respiratory system, damage to lung tissue, and premature death.

3.1.4 SO_x

It is produced from the burning of fossil fuels (coal and oil) and the smelting of mineral ores (aluminum, copper, zinc, lead, and iron) that contain sulfur. Sulfur dioxide dissolves easily in water to form sulfuric acid. Sulfuric acid is a major component of acid rain. Sulfur dioxide affects human health when it is breathed in. It irritates the nose, throat, and airways to cause coughing, wheezing, shortness of breath, or a tight feeling around the chest.

3.2 Monitoringof Air Quality

The ambient air quality monitoring is being carried out regularly at 4 no. manually operated stations installed at Ludhiana under National Air Monitoring Programme (NAMP). The year wise data of PM_{10}, SO_2 and NO_x for the period 2014-18 is placed at **Annexure-A.** Further, the Board has also commissioned one Continuous Ambient Air Quality Monitoring Station (CAAQMS) at Ludhiana and the real time data of the same is being displayed at Gate of Punjab Agriculture University, Ludhiana. The AQI data of 2017 and 2018 has been given in **Annexure-B.**

3.3 CPCB's norms for Air Quality

The CPCB on 18/10/2009 has revised National Ambient Air Quality Standards (NAAQS) which are reproduced as under:

S.N.	Pollutants	Time weighted average	Concentration of Ambient Air	
			Industrial, Residential, Rural and other areas	Notified Ecologically sensitive area
1	Sulphur Dioxide (SO_2) µg/m^3	Annual	50	20
		24 hours	80	80
2	Nitrogen Dioxide (NO_2) µg/m^3	Annual	40	30
		24 hours	80	80
3	Particulate Matter (size<10 µm) or PM_{10} µg/m^3	Annual	60	60
		24 hours	100	100
4	Particulate Matter (size<2.5 µm) or $PM_{2.5}$ µg/m^3	Annual	40	40
		24 hours	60	60
5	Ozone (O_3) µg/m^3	8 hours	100	100
		1 hour	180	180
6	Lead (Pb), µg/m^3	Annual	0.50	0.50
		24 hours	1.0	1.0
7	Carbon Monoxide (CO), mg/m^3	8 hours	02	02
		1 hour	04	04
8	Ammonia (NH_3), µg/m^3	Annual	100	100
		24 hours	400	400
9	Benzene (C_6H_6) µg/m^3	Annual	05	05
10	Benzo (a) Pyrene (BaP)-particulate phase only ng/m^3	Annual	01	01
11	Arsenic (As) ng/m^3	Annual	06	06
12	Nickel (Ni) ng/m^3	Annual	20	20

3.4 Air Quality Index (AQI)

3.4.1 Awareness of daily levels of air pollution is important to the citizens, especially for those who suffer from illnesses caused by exposure to air pollution. Further, success of a nation to improve air quality depends on the support of its citizens who are well-informed about local and national air pollution problems and about the progress of mitigation efforts. Thus, a simple yet effective communication of air quality is important. The concept of an air quality index (AQI) that transforms weighted values of individual air pollution related parameters into a single number is widely used for air quality communication and decision making.

3.4.2 The AQI system is based on maximum operator of a function (i.e. selecting the maximum of sub-indices of individual pollutants as an overall AQI). The objective of an AQI is to quickly disseminate air quality information (almost in real-time) that entails the system to account for pollutants which have short-term impacts. Eight parameters (PM10, PM2.5, NO2, SO2, CO, O3, NH3 and Pb) having short-term standards have been considered for near real-time dissemination of AQI.

3.4.3 The AQI has further been classified in six categories as shown below:

AQI	Quality	Impact on health
0-50	Good	Minimal impact
51-100	Satisfactory	Minor breathing discomfort to sensitive people
101-200	Moderately polluted	Breathing discomfort to people with lungs, asthma and heart diseases
201-300	Poor	Breathing discomfort to most people on prolonged exposure
301-400	Very poor	Respiratory illness on prolonged exposure
>401	Severe	Affects healthy people and seriously impacts those with existing diseases.

3.4.4 Based on this, the CPCB evolved a Graded Response Action plan (GRAP) which is implemented in the NCR, Delhi when the air quality deteriorates and various steps have been mentioned in GRAP to be taken to immediately control the deterioration of the air quality.

3.5 Trends of Quality of Air

3.5.1 The Board has commissioned one no. Continuous Ambient Air Quality Monitoring Station (CAAQMS) at Ludhiana and the real time data of the same is being displayed at Gate of Punjab Agriculture University, Ludhiana. Annual average of AQI for the last 2 years is given as under:

Year	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	AQI
2017	159.64	73.34	5.24	58.04	147
2018	112.57	51.86	7.92	29.53	114

3.5.2 The trend of AQI in the ambient air quality shows that the concentration of NOx and SPM in the ambient air has decreased in 2018 as compared to 2017.

3.6 Major Parameters of concern

The major concern of air quality is PM_{10}. All other parameters are within prescribed limits.The perusal of the data in **Annexure-B** clearly indicates that air quality index of Ludhiana generally remains moderate (101-200) and sometimes remains satisfactory (51-100). The sources of pollution and their apportionment is given in the next chapter.

Chapter 4 – Sources of Air Pollution in Ludhiana

4.1 Major Sources

4.1.1 The following are the major identified sources of air pollution:

(i) Vehicular Emissions
(ii) Road Dust
(iii) Burning of Bio-mass & Garbage
(iv) Industrial Emissions
(v) Mining
(vi) Construction and Demolition Activities
(vii) Other Sources

4.1.2 As per the Source Apportionment Study carried out by Punjab State Council For Science & Technology (PSCST) jointly with The Energy Resource Institute (TERI), the apportionment of various sources w.r.t PM_{10}, is as under: -

Sr. No.	Source	Contribution of PM_{10}
1.	Industries	35 %
2.	Road Dust	28%
3.	Vehicular Pollution	16%
4.	Biomass & Garbage burning	16 %
5.	Others	5 %

4.2 Vehicular Emissions

4.2.1 Transport sector is one of the significant contributors to air pollution in Ludhiana due to movement of heavy goods vehicles carrying raw materials and products of the industries and commercial establishments located in and around the city. With the rapid growth of urban population, there is an ever-increasing demand on the city's infrastructure to serve the population. The rapid motorization rates have further complicated issues. The trips per household have increased over the years, with increasing per capita incomes and increase in vehicle ownership. As per Ludhiana Municipal Corporation report on "Comprehensive Mobility Plan for Ludhiana", the city has been sub-divided into 3 cordon areas by inner, middle and outer cordon lines. A total traffic volume which enters the city at the outer cordon is about 55,000 vehicles. At middle cordon, it increases to 1,50,000 vehicles and at the inner cordon it is 1,05,000 vehicles. This indicates that the local traffic mixes with through traffic as soon as it enters the city and further densifies towards the central part of the city. The peak hours of traffic normally 9 AM to 10 AM and 5.30 PM to 6.30 PM comprise 8% to 10% of average daily traffic volume. The city has roads ranging from 6 to 35 m width with total road length as 1356 km. The data w.r.t. different type of registered vehicles in Ludhiana has been collected from the office of State Transport Commissioner, Chandigarh. The year wise registration of different type of vehicles from 2001-02 to 2016-17 with annual growth rate is as shown below:

4.3 Total registered vehicles in Ludhiana

Sr. No.	Year	Registered Vehicles	Annual Growth Rate (%)
1	No. of registered vehicles up to March, 2001 as per CMP report	680494	---
2	2001-02	719702	5.76
3	2002-03	762552	5.95
4	2003-04	805672	5.65
5	2004-05	859921	6.73
6	2005-06	921370	7.14
7	2006-07	983125	6.70
8	2007-08	1041191	5.90
9	2008-09	1090651	4.75
10	2009-10	1172759	7.52
11	2010-11	1257574	7.23
12	2011-12	1371753	9.07
13	2012-13	1497278	9.15
14	2013-14	1621191	8.27
15	2014-15	1746325	7.72
16	2015-16	1875646	7.40
17	2016-17	**2003252**	6.80

Source:- Interim Report II- Source Apportionment Study to prepare Action Plan to improve Air Quality of Ludhiana prepared by PSCST, Chandigarh

4.3.1 The registered vehicles in Ludhiana have increased significantly over the years. The number has climbed from 6.80 to 20.03 lakhs in sixteen years from 2001 to 2017. The share of two wheelers registration is highest about 78.6% in 2016-17. The sharp increase of two-wheelers could be attributed to deficient public transport system and dense concentration of traffic on roads.

There are about 17500 registered three wheelers. However, the total numbers of three wheelers are estimated to be about 1lakhwhich are plying in the city.

4.4 Road Dust

4.4.1 The particles of dust that deposit from the atmosphere and accumulate along road sides are called road dust particles and originates interaction of solid, liquid and gaseous metals. Two main sources of road dust are deposition of previously suspended particles (atmospheric aerosols) and displaced soil. Some other common factors are enlisted as under:

(i) Emissions from the vehicular traffic
(ii) Construction and demolition activities, corrosion of metals structures etc.
(iii) Presence of potholes on the road.
(iv) Absence of metalled roads / stabilized roads / un-stabilized movement area within industries.

(v) Presence of un-stabilized berms along the roads.

(vi) Movement of overloaded transport vehicles.

4.5 Burning of Biomass and Garbage

4.5.1 There are only small patches of agricultural land within the Ludhiana city, however, the city is surrounded by agricultural area and a lot of biomass is generated during post harvesting paddy and wheat seasons. During wheat season biomass burning is lesser than paddy season as the farmers use the wheat crop residue as cattle fodder. The effect of biomass burning in the paddy season is augmented due to the climate conditions.

4.5.2 Around 1100 TPD Municipal Solid Waste is being generated from city Ludhiana and is shifted to Municipal Solid Waste dumping site at Jamalpur. For the disposal of Municipal Solid Waste being generated from the City Ludhiana, one RDF plant of capacity 60 TPH has been commissioned at Municipal Solid Waste Dumping site situated at Village Jamalpur, Tajpur Road, Ludhiana. The reject-derived fuel generated from this plant is being used in the power plant situated at Nakodar, for the production of electricity.

4.6 Industrial Emissions

Ludhiana city is one of the highly industrialized towns in the north India, having all categories of industries located within the city limits. But the predominant industries operating in the city are electroplating and dyeing having high pollution potential. The Punjab Pollution Control Board has identified following 10 industrial clusters within the jurisdiction of critically polluted area of Ludhiana city. The identified clusters are as under:

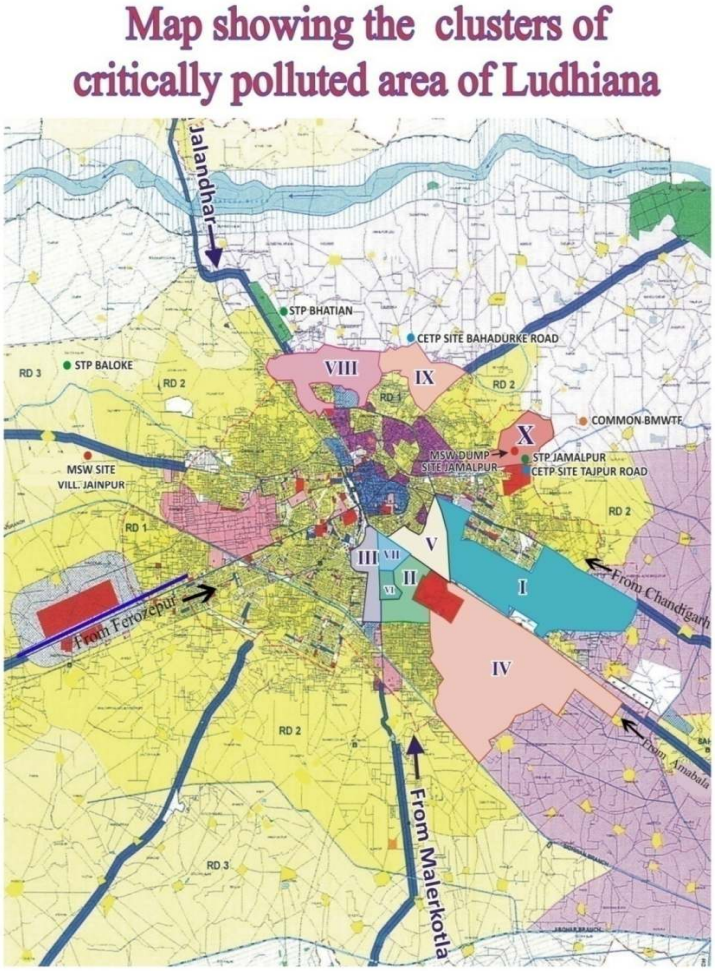
Cluster No.	Name of industrial cluster	Critically Polluted area of Ludhiana
I	Focal point along with NH-1 Total Eight Phase	
II	Industrial Area-B from SherpurChowk to Gill Road and Gill Road to Malerkotla Road (left side of the road)	
III	Mixed Industrial Area-Right side of Gill Road	
IV	Industrial Area-C (near Jugiana Village)	
V	Industrial Area-A and Extension: Area between old G.T. Road and Ludhiana bye pass road	
VI	Industrial Estate : Near DholewalChowk	
VII	Mixed Industrial Area (MIA) Miller Ganj	
VIII	Mixed Industrial Area (MIA) Bye Pass road	
IX	Bahadurke Industrial Area	
X	Tajpur Industrial Complex	

Figure-6 -Location of industries on Ludhiana city map

4.6.1 The main stationary sources of air pollution are the industrial units, which are emitting particulate matter, sulphur di-oxide and oxides of nitrogen etc. All the dyeing, cupola furnaces, rolling millsetc.are using pet coke coal / furnace oil as fuel in their furnaces emitting the aforesaid pollutants, besides the process / fugitive emissions.

4.6.2 The category wise detail of air polluting industries situated in Ludhiana area are given as under:-

Sr. No.	Category wise detail of air polluting industries	Number of unitsup to 5 Km of Municipal limits of Ludhiana
1.	Brick kilns	8

2.	Textile/Dyeing /printing	319
3.	Pulp &Paper Mills	2
4.	Forging (using fuel)	155
5.	Heat treatment (using fuel)	48
6.	Steel Rolling Mills	27
7.	Cupola Furnaces	90
8.	Induction Furnaces	74
9.	Arc furnaces	4
10.	Milk plants	2
11.	Waste Oil Reprocessing units	5
12.	Tyre & tubes units	27
13.	Pyrolysis plants	1
14.	Plywood manufacturing (with boilers)	13
15.	Beverages/Soft drink plants	2
16.	Rice shellers	7
17.	Other air polluting industries using fuel	231
	Total	1015

4.6.3 It is pertinent to mention here that emission standards for most of the above said industries falling within MC limitsvaries with the capacity of the boiler being used and type of fuel etc. As per the wind rose diagrams shown at figure 01, 02 & 03wind directions are south-east in summer season and south-west in winter & monsoon season.

4.7 Mining

Mining activities also contribute to the AQI. Majorsand mining activities are undertaken along the bed of Sutlej River. The Sutlej river channel does not pass through/within the limits of Municipal Corporation but the impact of mining activities being carried out on the quality of air cannot be ruled out.

4.8 Construction and Demolition Activities

4.8.1 Ludhiana is a large city having population about 17.68 lakhs in year 2017.Many major construction projects are being set up in the city. Further, small construction activities are being carried out by the individual house holders / industrial units / commercial units etc.

4.9 Others

4.9.1 Other than above mentioned sources, episodic incidents like Holi, Dushera, Diwali, Gurupurab, New Year etc. are celebrated by bursting crackers, spraying colours etc. which also contribute to the ambient air quality.

Chapter 5 –Control of Vehicular Emissions

5.1 Key Activities

5.1.1 The vehicles are major pollution contributor, producing significant amount of nitrogen oxides, carbon monoxides and other polluting gases and particulate matter. To minimize the pollution generated from the vehicles, various actions have to be taken, which have been classified into following categories:

(a) Public Awareness related,
(b) Enforcement related,
(c) Infrastructure related,
(d) Policy related

5.1.2 Some activities may have more than one category but they have been kept in the category where it has the major requirement. Following are the key activities for control on vehicular emissions:

Public Awareness

(i) CVE 1 - Public awareness campaign for control of vehicular emissions

Enforcement Related

(ii) CVE 2 -Remote sensor-based PUC system
(iii) CVE 3 - Extensive drive against polluting vehicles
(iv) CVE 4- Prevent parking of vehicles in non-designated areas.
(v) CVE 5 - Check fuel adulteration

Infrastructure Related

(vi) CVE 6 - Widening of roads and improvement of infrastructure for decongestion of roads
(vii) CVE 7 - Introduce intelligent traffic systems
(viii) CVE 8 - Construction of expressways/ bypasses to avoid congestion.

Policy Related

(ix) CVE 09 – Phasing out commercial diesel vehicles more than 15 years old
(x) CVE 10– Promotion of E- vehicles
(xi) CVE 11 – Introduction of CNG based public transport.
(xii) CVE 12 – Retrofitting of particulate filters in diesel vehicles for BS-IV fuels

5.1.3 Various actions to be taken for the above activities are given below. Further, the details such as baseline, target, timeline, milestones have been given in **Annexure – C**.

5.2 CVE 1 - Public awareness campaign for control of vehicular emissions

Public support is essential for clean air mission to be successful.As part of overarching mission of clean air, Ludhiana, the public must be made aware of ill effects of air pollution on health and contribution of vehicular emissions in the same. The public has to be motivated to play their role in curbing the air pollution. Following action shall be taken:

(i) Public awareness campaign in print and electronic media

(ii) Use of Social Media Facebook, Twitter, Instagram
(iii) Jingles on air pollution on local radio and tv
(iv) Awareness drives in educational institutions
(v) Public meetings
(vi) Nukarnataks

5.3 CVE 2 - Remote sensor-based PUC system

To check the health of the engine, PUC has been made mandatory. The PUC is being issued to the vehicles by pollution check centres manually, which may be forged and cannot be verified. Therefore, there is need to install centralized online system for issuing of online PUCs to the vehicles avoid malpractices.

The Department of Transport will implement remote sensor-based PUC system to eliminate the malpractices in the existing system of issuing PUCs. All PUC centers will be made online.

5.4 CVE 3 - Extensive drive against polluting vehicles

There is need to strictly enforce checking of PUC certificates so that unauthorized vehicles could be penalized. The traffic police shall place check points (Nakas) at differed locations and the performance of such check points shall be monitored. A whatsapp number shall be dedicated and publicized among general public so that complaints of public regarding polluting vehicles may be received and action taken.

Traffic Police and Department of Transport will be responsible for the activity.

5.5 CVE 4 - Prevent parking of vehicles in non-designated areas

4(a) Creating parking infrastructure: Presently, vehicles are being parked in a haphazard manner and on the roads as well, which leads to traffic congestion, thus, causing vehicular pollution. Hence, local government shall develop designated parking lots, Multi storey parking facilities, parking area for trucks/ commercial vehicles and ear –mark roadside parking by yellow line.

4(b) Enforcement: Traffic police shall impound vehicles parked in non-designated areas and shall compile the list of prominent areas of such violations & pay special attention to these areas. CCTV cameras shall be installed in such areas to capture the evidence. Number of challans shall be monitored.

5.6 CVE 5 - Check fuel adulteration

Online Automated System has been adopted by the State Level Coordinator, Oil industry, Punjab for transportation & checking the density of Petrol/Diesel.In case of complaint, Department of Food and Civil Supplies in coordination with local oil company officials shall check fuel adulteration & if any discrepancy is noticed then action against the violator shall be taken by State Level Coordinator, Oil industry, Punjab.

5.7 CVE 6 - Widening of roads and improvement of infrastructure for decongestion of roads

6(a) Widening of road: The major air pollution caused by dust emission along road sides as the condition of roads is very pathetic. Due to the movement of heavy goods vehicles like Trucks, tippers etc. carrying raw materials and final products of the industries, lot of dust / vehicular emissions are generated, which is affecting the ambient air quality of the city. Widening of Roads and construction of over-bridges, wherever possible, is required for smooth and speedy flow of traffic and the pending construction work should be completed in the time bound manner

6(b) Road design improvement: The roads constructed within the city having traffic congestion shall be identified by the MC. The concerned departments like NHAI, PWD (B&R),PUDA,PSIEC and Municipal Corporation shall suitably redesign identified roads to decongest the traffic.

5.8 CVE 7 - Construction of expressways/ bypasses to avoid congestion

Municipal Corporation, Ludhiana, NHAI and PWD (B&R) shall examine the need for expressways/by-passesto avoid congestions.

5.9 CVE 8 - Introduce intelligent traffic systems

The traffic lights installed in the area shall be synchronized in such a way so as to achieve minimal stoppage of vehicles for a stretch of at least 2 Kms. The traffic lights shall be placed at various intersections, so as to avoid traffic jams and smooth operation of the vehicles. Municipal Corporation in consultation with Traffic Police shall identify such places and provide traffic lights.

5.10 CVE 09 – Phasing out commercial diesel vehicles more than 15 years old

The Department of Transport will frame policy at State level to phase out commercial diesel vehicles more than 15 years old.

5.11 CVE 10 - Promotion of E-vehicles

The framing of E-Vehicle policy is at an advance stage of finalization. The Department of Transport shall notify the policy to promote battery operated vehicles. In Ludhiana City, Battery operated vehicles being named e-rickshaw are available. A handsome number of vehicle agencies are in operations who sell such vehicles. A Promotional and awareness campaigns about battery operated vehicles is a regular feature of these companies. Ludhiana city is gradually being shifted to battery operated e-rickshaws and diesel auto rickshaws are being replaced by these vehicles though replacing pace is yet slow but in coming time these battery-operated autos will become major mode of transportation. Gradual phasing out old Diesel operated Auto rickshaws and Public transport vehicles with CNG or Battery-operated vehicles is an important city specific goal which needs to be achieved to improve the Air Quality of Ludhiana.

5.12 CVE 11 – Introduction of CNG based public transport

11 (a) Infrastructure development: The Department of Food & Civil Supplies shall facilitate and expedite development of requisite infrastructure such as laying of pipe line and setting up of CNG filling station to promote CNG based public transport.

11 (b) CNG based City Bus Service: Local Government shall take necessary measures to promote CNG based City Bus service.

11 (c) CNG based Auto Rickshaws/Taxis: The Department of Transport shall take necessary steps to promote CNG based Auto Rickshaws/Taxis.

5.13 CVE 12 - Retrofitting of particulate filters in diesel vehicles for BS-IV fuels

State Level Coordinator (Oil Industry) has informed that as per Government of India guidelines, India is going to skip adopting BS-5 norms and progress directly to adopting BS-6 norms by 2020. The steps for retrofitting of particulate filters in diesel vehicles is to be undertaken by Automotive industry under directions from Government of India as and when BS-VI fuels are available.

Chapter 6–Control of Road Dust

6.1 Key Activities

6.1.1 The particles of dust that deposit from the atmosphere accumulate along road sides are called road dust particles. Two main sources of road dust are deposition of previously suspended particles (atmospheric aerosols) and displaced soil. Additionally, the emissions from the vehicular traffic, building construction and renovation, corrosion of metals structures etc. contribute directly to the road dust. To minimize the pollution generated from the dust emissions, following key activities are proposed:

Maintenance Related

(i) CRD1– Maintain pot holes free roads for free-flow of traffic
(ii) CRD 2 – Water sprinkling
(iii) CRD 3 – Mechanical sweeping

Infrastructure Related

(i) CRD4 -Creation of green buffers along the road sides
(ii) CRD 5 - Greening of parks, open areas, community places, schools and housing societies
(iii) CRD 6 - Water fountains at major traffic intersections
(iv) CRD 7 - Blacktopping of roads including pavement of road sides

6.1.2 Various actions to be taken for the above activities are given below. Further, the details such as baseline, target, timeline, milestones have been given in **Annexure-D**.

6.2 CRD 1 – Maintain potholes free roads for free-flow of traffic

All the agencies such as MC/ PWD/ PUDA/PSIEC/NHAI will put in place a system of regular inspections to identify the potholes and ensure that these arefilled up immediately. It shall be monitored on regular basis. A web based/ mobile app shall be set up for Public to lodge complaint against the pothole and it shall be monitored for prompt repair.

6.3 CRD 2 – Water sprinkling

2(a) Water sprinkling on dust prone roads: Municipal Corporation shall identify the dust prone roads and shall prepare schedule for regular sprinkling of water on these roads to suppress dust emissions. This activity shall be started immediately. In order to save the water, the Municipal Corporation shall utilize the treated wastewater of STPs installed in the city.

2(b) Procurement of Water sprinkler: Municipal Corporation need to make arrangements for regular sprinkling of water on dust prone roads for which it may procure suitable number of water sprinklers.

6.4 CRD 3 – Mechanical sweeping

Municipal Corporation shall procure adequate number of automatic sweeping machines for efficient and fast sweeping of the road / streets. The frequency of the sweeping shall be fixed appropriately by the Municipal Corporation.

6.5 CRD 4 – Creation of green buffers along the road sides

The Municipal Corporation, Ludhiana /PSIECshall undertake a special drive to identify the areas and make plantation thereby increasing the green belt in and around the industrial areas, residential areas and road sides etc. in collaboration with the Deptt. of Forests. The possibility may also be explored for provide vertical gardening along the pillars / sides of the bridges.

Municipal Corporation, Ludhiana and /PSIEC shall identify the trees with the help of Deptt. of Horticulture which may be grown along the roads without any obstruction to the traffic. These trees shall be planted at the suitable places. The maintenance of these trees shall be done by the Municipal Corporation, Ludhiana and NHAI on their respective areas of jurisdiction. After one year, survival rate of the plants be calculated and new plants be planted.

6.6 CRD 5 –Greening of parks, open areas, community places, schools and housing societies

In order to increase greenery in the city, the Municipal Corporation shall identify open areas/ lawns/ vacant lands including community places and schools in the city and these places be allocated to the NGOs or Industrial Associations for tree plantation and their maintenance. The activity of identification of the suitable sites shall be completed in a time bound manner and shall be allotted to the NGOs or Industrial Associations.

6.7 CRD 6 – Water fountains at major traffic intersections

Municipal Corporation shall explore the possibility of setting up of the water fountains at important traffic junctions to reduce the emission level including dust at these points.

6.8 CRD 7 – Blacktopping of roads including pavement of road sides

7 (a) Kaccha/Brick Paved Roads to be made Pucca road: Some of the city roads are not properly metalled, which are the source of dust and gaseous emissions. These roads shall be converted into metalled road. Municipal Corporation shall undertake this activity in a time bound manner.

7 (b) Existing roads requiring re carpeting: Roads require regular upkeep & re carpeting. The responsible agencies (MC/PWD/NHAI/PSIEC/PUDA) shall ensure re carpeting of damaged existing roads.

7 (c) Pavement of road side using interlocking tiles to prevent road dust emissions: Berms along the roads need to be stabilized with interlocking tiles to prevent road dust emissions.

Chapter 7–Control on Burning of Garbage and Biomass

7.1 Key Activities

7.1.1 There are only small patches of agricultural land within the Ludhiana city, however, the city is surrounded by agricultural area and a lot of biomass is generated during post harvesting paddy and wheat seasons. During wheat season biomass burning is lesser than paddy season as the farmers use the wheat crop residue as cattle fodder. The effect of biomass burning in the paddy season is augmented due to the cold climate conditions. To minimize the pollution generated from burning of garbage and biomass, following key activities are proposed:

Enforcement Related

(i) CBGB 1 –Control of open burning of bio-mass in City
(ii) CBGB 2 – Control of burning of municipal solid wastes
(iii) CBGB 3 –Control of burning of agriculture waste and crop residue

7.1.2 Various actions to be taken for the above activities are given below. Further, the details such as baseline, target, timeline, milestones have been given in **Annexure-E**.

7.2 CBGB 1 –Control of open burning of bio-mass in City:

7.2.1 The burning of biomass like leaves of the trees creates lot of smoke in the area particularly during winter season, as such, the open burning of these biomass must be stopped. Municipal Corporation shall deploy its staff to have a check on various areas so as to forbid the inhabitants &sweepers open burning of the biomass.

7.2.2 Municipal Corporation shall provide education to the educational institutions, government offices, residents welfare associations regarding horticulture waste collection and its benefits by way of disposing the waste in the form of composting and encouraging the organic farming in the gardens and fields.

7.2.3 A Whatsapp number shall be generated and publicized by Municipal Corporation alongwith the setting up of the dedicated control room for receiving complaints of public through this system.

7.3 CBGB 2 – Control of burning of municipal solid wastes:

7.3.1 Around 1100 TPD Municipal Solid Waste is being generated from city Ludhiana and is shifted to Municipal Solid Waste dumping site at Jamalpur. For the disposal of Municipal Solid Waste being generated from the City Ludhiana, one RDF plant of capacity 60 TPH has been commissioned at Municipal Solid Waste Dumping site situated at Village Jamalpur, Tajpur Road, Ludhiana. The reject-derived fuel generated from this plant is being used in the power plant situated at Nakodar, for the production of electricity.

7.3.2 It has been observed that municipal solid waste has been became the source of burning of waste. Lot of smoke is generated which contribute to the air pollution index.

7.3.3 Municipal Corporation shall collect the municipal solid waste properly for carrying the same to the disposal sites in the scientific way in closed vehicles.

7.3.4 Municipal Corporation shall comply with the provisions of Municipal Solid Waste Rules, 2016.

7.4 CBGB 3 – Control of burning of agriculture waste and crop residue:

7.4.1 The city is surrounded by agricultural area and a lot of agricultural waste is generated during post harvesting paddy and wheat season. During wheat season stubble burning is lesser than paddy season as the farmers use the wheat crop residue as cattle fodder.

7.4.2 Punjab Pollution Control Board shall engage Punjab Remote Sensing Centre, Ludhiana for real time monitoring and reporting of stubble burning incidents. The District Administration shall constitute Sub-Divisional Level Committees to verify the reported sites and issue challans to the violators besides filing of proceedings u/s 133 CrPC. Necessary directions / instructions shall be issued by the District Administration u/s 144 IPC to restrict harvesting of crops between 6.00 pm to 6.00 am during crop harvesting seasons and attaching of the super SMS with the combine harvesters. The department of Agriculture shall promote mechanical reincorporation of paddy straw and make necessary awareness in the farmers to use the stubble either as manure or to use the samefor other useful purposes. The farmers should also be provided with adequate machinery for in-situ management of stubble in the fields.

7.4.3 Punjab Pollution Control Board, Deptt. of Agriculture, Deptt. of Horticulture and Municipal Corporation shall move publicity vans in the city to aware the public about the ill-effects of burning of biomass / crop residue /garbage / leaves etc.

7.4.4 These Departments shall distribute pamphlets indicating the level of air pollution in the area of Ludhiana and steps to be taken to carry out various activities to bring the air quality index within the norms. The pamphlets shall also contain the type of diseases which are caused due to burning of biomass / crop residue / garbage / leaves etc. These pamphlets shall also be affixed on city buses and auto rickshaws

7.4.5 Punjab Pollution Control Board has installed online continuous ambient air quality monitoring station at Ludhiana and the gaseous emissions like SO2, NOx, PM10and PM25etc. are monitored on real time basis. The high level of these gaseous generated during the burning of crop residue shall be disseminated through SMS system through the SAMEER app.

7.4.6 Punjab Pollution Control Board and Deptt. of Agriculture shall prepare jingles highlighting the activities relating to the ill-effects of the high level of emissions generated during crop residue burning. District Administration shall direct the local cable TV operator, FM radios and owners of the cinema hall to play these jingles during the starting and interval of the movies.

7.4.7 Municipal Corporation shall distribute pamphlets indicating the ill-effects of burning of municipal solid waste in the city besides fixing of these pamphlets on city buses and auto rickshaws for awareness of the public.

7.4.8 CCTV cameras shall be installed on the municipal waste dumping sites and secondary collection centers to check the burning of waste in these places having the control center with Municipal Corporation.

7.4.9 The Sanitary Inspector of the Municipal Corporation shall educate the sweepers of the area regarding ill-effects of burning of municipal solid waste and also check the sites randomly for verification. The sweepers of the area shall ensure that the solid waste must be shifted from the secondary collection center to the dumping sites on daily basis to avoid the burning of municipal solid waste at these places.

Chapter 8 – Control of Industrial Emissions

8.1 Key Activities

8.1.1 The main stationary sources of air pollution are the industrial units, which are emitting Particulate Matter, Sulphur Di-Oxide and Oxides of Nitrogen etc. All the dyeing units, rolling mills etc. are using coal / furnace oil/pet coke as fuel in their furnaces emitting the aforesaid pollutants, besides the process / fugitive emissions. To minimize the pollution generated from the industries, following key activities are proposed:

Technology Intervention

(i). CIE 1 – Conversion to side hood suction in furnaces

(ii). CIE 2 – Conversion to cleaner fuels from pet coke/coal.

(iii). CIE 3- Development of cleaner technologies to control fugitive emissions

Enforcement Related

(iv). CIE 4–Conversion of natural draft brick kilns to induced draft

(v). CIE 5 – Action against non-complying industrial units

(vi). CIE 6- Training for effective operation of Air Pollution Control Devices

Infrastructure Related

(vii). CIE 7 – Shifting of industries from non-designated areas to industrial areas

8.1.2 CIE 6 - Various actions to be taken for the above activities are given below. Further, the details such as baseline, target, timeline, milestones have been given in **Annexure-F.**

8.2 CIE 1 – Conversion to side hood suction in furnaces

PPCB with the technical support from Punjab Council for Science and Technology has improvised technology to provide for side hood suction in furnaces to reduce the emissions. The side hood suction shall be implemented in a time bound manner and shall be monitored by the Board monthly.

8.3 CIE 2 – Conversion to CNG/PNG from pet coke/coal

A large number of units in Ludhiana are using coal/pet coke as source of energy. PPCB will motivate the industry to convert from pet coke and coal to biomass-based fuels or CNG (whenever the pipeline is laid up to Ludhiana Industrial area). M/s Jai Madhok Energy Pvt. Ltd. is waiting for approval of NHAI for laying of pipeline to supply PNG in Focal Points of Ludhiana. The first phase of lying of pipeline shall be completed within 06 months till Jiwan Nagar Chowk.

8.4 CIE 3- Development of cleaner technologies to control fugitive emissions.

In the modern era, the manufacturing activities of various goods have become technologically advanced where the operations have become automatic with minimal human intervention. In such time it becomes imperative on the part of the industrial units to upgrade their APCDs as per latest technologies available. For this PSCST, Chandigarh shall be entrusted to carry out studies in various air polluting industries and suggest cleaner and latest technologies to improve the air quality.

8.5 CIE 4 - Conversion of natural draft brick kilns to induced draft

Punjab Pollution Control Board has issued directions to the existing brick kilns of the State to convert their conventional brick kilns to induced draft technology with zig-zag pattern of setting of bricks. The Brick kilns located in the District shall be monitored for conversion to the new technology in a time bound manner.

8.6 CIE 5 – Action against non-complying industrial units:

The regular monitoring of industries is being carried out as per the policy of the Board. In case, any industry is found violating the provisions of the Air(Prevention and Control of Pollution) Act, 1981, action under the provisions of the said Act is initiated against the violating industries. The number of inspections carried out and action taken will be monitored regularly by the District Level Committee.

8.7 CIE 6- Training for effective operation of Air Pollution Control Devices

PSCST, Chandigarh to provide training to various industrial units for effective operation of air pollution control devices.

8.8 CIE 7 – Shifting of industries from non-designated areas to industrial areas.

There are certain industries, which are located in non-designated areas and the PSIEC/ Department of Industries and Commerce shall develop new areas to shift the industries from non-designated areas in coordination with Local Govt./ Deptt. of Town & Country Planning / Deptt. of Industries.

Chapter 9 – Control on Construction and Demolition activities

9.1 Key Activities

9.1.1 Ludhiana area is a major cityof Punjab having population about 17.68lacs in year 2017.Many major construction projects are being set up in the city. Further, small construction activities are being carried out by the individual house holders / industrial units / commercial units etc. To minimize the pollution generated from the construction and demolition activities, following key activities are proposed:

(i). CCDA 1 –Enforcement of Construction & Demolition (C & D) Rules,2016.
(ii). CCDA 2 – Control measures for fugitive emissions
(iii). CCDA 3 – Ensure carriage of construction material in closed/covered vessels.

9.1.2 Various actions to be taken for the above activities are given below. Further, the details such as baseline, target, timeline, milestones have been given in **Annexure-H**.

9.2 CCDA 1 –Enforcement of Construction& Demolition (C& D) Rules,2016:

1(a)- Enforcement: The necessary provisions of the C&D Rules, 2016 shall be implemented in the city to ensure proper management of these wastes. Municipal Corporation shall frame mechanism for challaning the violators found dumping the C&D waste on non-designated areas. The enforcement will be monitored through the use of technology and regular review.

1 (b) – Infrastructure Development: Municipal Corporation shall identify suitable land and set up the processing plant for effective disposal of C&D waste.

9.3 CCDA 2 – Control measures for fugitive emissions

Municipal Corporation shall ensure that

(i) The builders provide proper curtains / sheets on the construction sites to avoid spreading of dust emissions into the environment.
(ii) No dust should be emitted during demolition.
(iii) No construction materials should be kept on the roads. The construction material inside the plots should also be kept in covered conditions and labour should be provided with required personal protective equipment's during the course of construction to safeguard from ill effects of fugitive emissions.

9.4 CCDA 3– Ensure carriage of construction material in closed/covered vessels

The relevant enforcement authorities will ensure that the construction material to be transported through trucks / vehicles shall be covered with tarpaulin to avoid the dust emissions.

Chapter 10 – Control through Other Steps

10.1 Key Activities

10.1.1 Apart from various measures being taken to control various sources of pollution, following activities will also be undertaken to control the pollution:

Public Awareness

(i) COS 1–Dissemination of information onAir Quality Index

Infrastructure

(ii) COS 2 – Establish an Air Quality Management Division at SPCB HQ

(iii) COS 3 – Setup helpline in each city/town as well as SPCB HQ

(iv) COS 4- Provisions of electricity-based crematorium

Enforcement

(v) COS 5 - Monitoring of DG sets and action against violations

10.1.2 Various actions to be taken for the above activities are given below. Further, the details such as baseline, target, timeline, milestones have been given in **Annexure-I.**

10.2 COS 1 – Dissemination of information on Air Quality Index

Punjab Pollution Control Board shall display the air quality index of the city at its prominent places for the awareness of the public including website, social media and print media.

10.3 COS 2 – Establish an Air Quality Management Division at SPCB HQ

There is need to strengthen technical capability pertaining to air pollution. The Board will identify the requisite skill sets and number of technical staff required along with future roadmap for the Board's activities

10.4 COS 3 – Setup helpline in each city/town as well as SPCB HQ

The Board shall set up a helpline system at headquarter and each city to receive the complaints from public and have effective feedback system.

10.5 COS 4- Provisions of electricity-based crematorium

Municipal Corporation shall setup an electricity-based crematoriums in order to reduce burning of wood.

10.6 COS 5 - Monitoring of DG sets and action against violations

The concerned agency shall identify the commercial activities where the DG sets have been set up without fulfilling the norms for control of emissions and noise. Punjab Pollution Control Board shall identify the illegal DG sets manufacturers and necessary directions for their non-operation / closure shall be issued. Punjab Pollution Control Board shall also identify the

industries where the DG sets have been set up without fulfilling the norms for control of emissions and noise.

Chapter 11–Graded Response Action Plan for Ludhiana

11.1 Graded Responses

In order to mitigate the impact of higher level of pollution when AQI crosses satisfactory level, Graded Response Action Plan has been prepared for Ludhiana for implementation under different Air Quality Index (AQI) categories namely, Moderate & Poor, Very Poor and Severe.

11.2 Agency Responsible for Graded Response

The concerned authorities responsible for taking action when AQI reaches various levels have been indicated against the proposed action. The authorities will work in coordination with and under the overall supervision of the District Level Committee.

11.3 Action in case of Severe AQI (Value $\geq$ 401)

Following action shall be taken by the concerned authorities:

Sr. No.	Activity	Agency responsible / Implementing Agency
1	Temporary closure of brick kilns, hot mix plant, induction furnaces, rolling mills etc.	PPCB
2	Stop construction activity	MC, Ludhiana
3	Alert in newspapers / local cable TV to advice people with respiratory and cardiac patients to avoid polluted areas and restrict outdoor movement.	MC, Distt. Administration & PPCB
4	Sprinkling of water at the various dust emission points	MC, Ludhiana
5	Deploy Traffic police for smooth traffic flow at the identified vulnerable areas	Traffic Police
6	Stringently enforce / stop garbage burning in landfills and other places and impose heavy fines on person responsible.	MC, Ludhiana
7	To increase the frequency of mechanized sweeping on roads with heavy traffic and water sprinkling also on unpaved roads.	MC, Ludhiana
8	Stop entry of heavy good vehicles except essential commodities	Traffic Police
9	To take decision regarding closing of schools	District Administration

11.4 Action in case of Very Poor AQI (Value between 301 to 400)

Following action shall be taken by the concerned authorities:

Sr. No.	Activity	Agency responsible / Implementing Agency
1	Restraining the operation of air polluting industries i.e. induction furnaces, rolling mills, brick kilns etc. for 8 hours/day	PPCB
2	Banning of construction activities	MC, Ludhiana
3	Stop of garbage burning in the landfill areas or in the open fields	MC, Ludhiana
4	Water sprinklings at the dust emission points etc.	MC, Ludhiana
5	Strict vigil and enforcement of PUC norms	Traffic Police
6	Strict vigil and no tolerance for visible emissions from the vehicles and industries	PPCB and Traffic Police.
7.	Strictly enforce Supreme Court ban on fire crackers	MC, Ludhiana and Distt. Administration
8.	Strictly enforce all pollution control regulations in the air polluting industries like induction furnaces, rolling mills, brick kilns etc.	PPCB

11.5 Action in case of Poor AQI (Value between 201 to 300)

S.N.	Activity	Agency responsible / Implementing Agency
1	Strictly enforce garbage burning in landfill and other places and impose heavy fines on person responsible	MC, Ludhiana
2	Increase frequency of mechanized cleaning of road and sprinkling of water on roads. Identify road stretches with high dust generation.	MC, Ludhiana
3	Stop use of coal / firewood in open eateries	MC, Ludhiana
4	Strictly enforce rules for dust control in construction activities and close non-complaint sites.	MC, Ludhiana
5	Close / Strictly enforce all pollution control regulations in the air polluting industries like induction furnaces, rolling mills, brick kilns etc.	PPCB
6	Restricting air polluting industries i.e. induction furnaces, rolling mills, brick kilns etc. for 12 hours/day	PPCB

11.6 Action in case of moderately polluted AQI (Value between 101 to 200)

Following action shall be taken:

S.N.	Activity	Agency responsible / Implementing Agency
1	Increasing the frequency of mechanized cleaning the roads etc.	MC, Ludhiana
2	Sprinkling of water at the dust emitting points	MC, Ludhiana
3	To stop open burning of garbage and municipal solid waste	MC, Ludhiana
4	Close / strictly enforce all pollution control regulations in the air polluting industries like induction furnaces, rolling mills, brick kilns etc.	PPCB

Chapter 12–Monitoring Requirements and Formats

12.1 Monitoring Requirements

12.1.1 Following are the key components of monitoring requirements of the Plan:

(i). Monitoring of activities for control on Vehicular Emissions
(ii). Monitoring of activities for control on Road Dust
(iii). Monitoring of activities for control on Burning of Garbage and Biomass
(iv). Monitoring of activities for control on Industrial Emissions
(v). Monitoring of activities for control on Mining activities
(vi). Monitoring of activities for control on Construction and Demolition activities
(vii). Monitoring of activities for control on other sources

12.1.2 Further, various activities can be classified into one of the following categories:

(i). Public Awareness
(ii). Enforcement
(iii). New Infrastructure
(iv). Maintenance activities
(v). Policy Advocacy
(vi). Technology Support

12.2 Development of Environment Protection Monitoring System (EPMS)

In order to keep track of the progress made by concerned stakeholder departments on various projects, activities and initiatives, it is proposed to develop a dedicated IT platform namely Environment Protection Monitoring System (EPMS).

12.2.1 To work out detailed formats and setting up online system to track progress of various activities, a dedicated team of PPCB and NIC is working on it.

12.2.2 The system will ensure that information is captured at source and transmitted to the System and the system will be able to analyse and report it in the prescribed format. The system will generate different reports for use at different levels. The System will also have dashboard to present the key indicators and metrics.

Chapter 13–Governance and Supervision

13.1 Three Tier Monitoring

13.1.1 Monitoring will be done by the Departments concerned, which are executing or responsible for particular activities. In addition, there will be three level of Air Quality Monitoring Committees (AQMC) to review and monitor the status:

(i). AQMC at District Level under the Deputy Commissioner.

(ii). AQMC at State level under the Principal Secretary, Department of Science, Technology and Environment, Punjab.

(iii). Steering Committee under Chief Secretary, Punjab.

13.1.2 PPCB will set up a dedicated team for supporting coordination and monitoring of the Action Plan. It will also develop suitable IT platform for monitoring purposes.

13.2 AQMC at District Level

13.2.1 District Level Committee will be constituted under the chairmanship of Deputy Commissioner, Ludhiana and the 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 civil society organization and their participation will be ensured for achieving various targets mentioned in the Action plan.

13.2.2 The district level committee shall constitute the followings:

1.	The Deputy Commissioner, Ludhiana	Chairman
2.	The Senior Superintendent of Police, Ludhiana	Member
3.	The Commissioner, Municipal Corporation, Ludhiana	Member
4.	The Chief Administrator, GLADA Ludhiana	Member
5.	The Senior Environmental Engineer, Punjab Pollution Control Board, Ludhiana	Convener
6.	The Secretary, Regional Transport Authority, Ludhiana	Member
7.	The Divisional Forest Officer, Ludhiana	Member
8.	The Superintending Engineer, PWD (B & R), Ludhiana	Member
9.	The Executive Engineer, Punjab Small Industries & Export Corporation, 18, Himalya Marg, UdyogBhawan, Sector-17-A, Chandigarh	Member
10.	The General Manager, District Industries Centre, Ludhiana	Member
11.	The Project Manager, National Authority of India, PIU, 17-N, Model Town, Ambala City.	Member
12.	The Chief Agriculture Officer, Deptt. of Agriculture, Ludhiana	Member
13.	The District Food Supply Controller, Ludhiana	Member
14.	The President, Chamber of Industrial & Commercial Undertaking, Ludhiana	Member

15.	The President, Punjab Dyers Association, Ludhiana	Member
16.	The President, Ludhiana Induction Furnace Association, Ludhiana	Member
17.	The Executive Engineer-cum-District Mining Officer, Ludhiana	Member

13.3 AQMC at State Level

13.3.1 State Level Air Quality Monitoring Committee (AQMC) will comprise of the following:

1	Administrative Secretary, Department of Environment	Chairman
2	Director, Local Government	Member
3	Director, Transport	Member
4	Director, Industries and Commerce	Member
5	ADGP, Traffic	Member
6	Director, Directorate of Environment & Climate Change	Member
7	Chairman, PPCB	Member
8	Representatives of NGO/ Expert Members	Member
9	Representatives of NGO/ Expert Members	Member
10	Joint Director, Directorate of Environment & Climate Change	Convener

13.3.2 The State level Committee would meet every month to review the progress of the action plan and take corrective measures and also escalate issued to the Steering committee for intervention.

13.4 Steering Committee

13.4.1 There will be a Steering Committee under the Chief Secretary to Govt. of Punjab and comprising of Administrative Secretaries of relevant administrative departments for monitoring the progress, resolving issues and enforcing accountability.

13.4.2 The Committee will comprise of the following:

1	Chief Secretary	Chairman
2	Administrative Secretary, Environment	Member
3	Administrative Secretary, Local Government	Member
4	Administrative Secretary, Industries and Commerce	Member
5	Administrative Secretary, Transport	Member
6	Administrative Secretary, PWD	Member
7	ADGP, Traffic	Member
8	Director, Directorate of Environment & Climate Change	Member
9	Chairman, PPCB	Member
10	Additional Secretary, Environment	Convener

Chapter 14 – Risk Mitigation Plan

14.1 Identification of Major Risks

(i). Accuracy and completeness of baseline data, targets and milestones

(ii). Lack of formal analysis of implementation barriers.

(iii). Lack of formal analysis of costs and efforts for various control options.

14.1.1 Accuracy and completeness of baseline data, targets and milestones

The baseline data, targets and milestones have been incorporated after discussions with the stake holders. During the course of implementation detailed surveys and analysis will be carried out, accordingly, targets and milestones will be suitably updatedand same will be reviewed in the AQMC meeting at District Level.

14.1.2 Lack of formal analysis of implementation barriers

Various activities included in the action plan need to be carefully analysed with respect to implementation challenges so that suitable remedial measures could be envisaged. Efforts will be made to study various barriers and improving the efficacy and effectiveness of the proposed activities by overcoming the shortcomings in the present system.

14.1.3 Lack of formal analysis of costs and efforts for various control options

The formal cost and efforts of various control options needs to be explored by various stake holders.

Chapter 15 –Action plan for Training and Capacity Building

15.1 Importance

It is important to enhance the capability and skills of the officers of stakeholder departments for effective implementation of Air Action Plans. Therefore, training and capacity building programmes related to various technical aspects are required to be conducted for different functionaries of relevant departments & organizations at various levels of hierarchies.

15.2 Objectives

(i). Raising awareness and changing the mindset.
(ii). Building trust and appreciation for the purpose of various Environment Protection Plans, environmental concerns, issues, roles and responsibilities of different stakeholders.
(iii). Improving skills regarding existing practices, procedures and methodologies.
(iv). Promoting an integrated and holistic approach for addressing the concerns.
(v). Enhancing core competencies of concerned stakeholders in relevant areas of environment improvement.
(vi). Strengthening institutional arrangements
(vii). Reinforcing accountabilities and identifying aspects that require improvement
(viii). Understanding new challenges and requirements

15.3 Need Assessment

Specific modules for training of nodal and other responsible officers of various line departments involved in implementation of Air Action Plan are required to be developed for which need assessment would be carried out.

15.4 Involvement of Institutions and Experts

Organizations of national & international repute having expertise in the area of environment in general and air pollution in particular shall be involved for conducting need specific trainings & capacity building programmes for various target groups and officials of stakeholder departments. Experts would also be involved in developing knowledge products and information material on various issues & technologies for creating mass awareness to build a responsible society with an aim to reduce air pollution in cities. Further, the details such as baseline, target, timeline, milestones have been given in **Annexure-I**

Annexure-A – Trends in Air Quality of Ludhiana

1. Station at Milk Plant, Ludhiana

Month	PM_{10} (µg/m^3)					NO_x(µg/m^3)					SO_2(µg/m^3)				
	2014	**2015**	**2016**	**2017**	**2018**	**2014**	**2015**	**2016**	**2017**	**2018**	**2014**	**2015**	**2016**	**2017**	**2018**
January	157	116	119	114	138	21	27	25	22	26	8	10	8	10	5
February	155	114	118	118	108	21	29	22	22	34	9	10	10	8	7
March	86	61	99	99	103	16	26	23	23	36	8	9	10	8	10
April	65	98	105	107	119	19	26	23	23	31	7	10	10	8	8
May	117	107	142	107	106	26	31	22	22	33	9	10	11	9	9
June	137	84	166	108	190	24	29	20	25	34	8	9	10	8	9
July	76	110	107	101	102	17	23	17	24	28	6	8	8	8	8
August	56	119	109	91	105	19	20	18	22	29	7	8	8	7	8
September	58	108	105	98	96	23	18	20	23	26	8	9	9	8	10
October	122	148	122	150	152	26	31	22	25	23	10	10	11	8	8
November	113	160	187	222	287	27	29	28	36	36	10	11	14	7	12
December	112	119	143	143	156	26	25	21	21	23	9	12	11	11	8
Annual Avg.	**105**	**112**	**127**	**122**	**139**	**22**	**26**	**22**	**24**	**30**	**8**	**10**	**10**	**8**	**9**

2. Station at R.O. (Earlier Zonal Office Building), Ludhiana

Month	PM_{10} (µg/m^3)					NO_x(µg/m^3)					SO_2(µg/m^3)				
	2014	**2015**	**2016**	**2017**	**2018**	**2014**	**2015**	**2016**	**2017**	**2018**	**2014**	**2015**	**2016**	**2017**	**2018**
January	187	120	78	117	195	30	27	26	23	44	12	10	11	14	8
February	120	98	98	133	116	25	29	25	22	49	10	11	10	12	7
March	82	66	93	150	118	22	27	26	20	50	9	9	10	11	8
April	93	71	144	125	121	24	26	28	25	40	10	9	12	9	7
May	129	92	137	134	96	29	27	28	23	30	12	11	10	10	8
June	163	83	168	162	165	27	26	28	28	29	11	10	10	11	8
July	116	45	130	127	55	26	21	28	22	22	10	8	8	10	7
August	111	105	93	119	84	27	23	19	20	21	11	13	7	9	7
September	147	134	101	123	89	23	26	19	23	22	10	13	8	11	7
October	123	161	131	199	140	27	27	28	24	30	12	11	10	9	9
November	132	167	166	286	131	33	27	33	46	35	12	11	13	10	11
December	242	102	137	185	129	28	25	24	42	28	13	8	11	8	13
Annual Avg.	**137**	**104**	**123**	**155**	**120**	**27**	**26**	**26**	**27**	**30**	**11**	**10**	**10**	**10**	**8**

3. Station Name at Nahar Spinning Mills (Earlier Rita Sewing Machine), Ludhiana

Month	PM_{10} (µg/m^3)					NOx (µg/m^3)					SO2(µg/m^3)				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
January	227	208	203	131	162	31	30	28	23	48	14	13	16	10	10
February	196	212	168	120	158	30	31	28	22	47	13	13	20	9	7
March	161	231	170	102	180	29	31	27	21	53	13	13	16	7	9
April	158	167	170	127	241	31	30	29	23	45	14	13	19	9	7
May	215	205	181	122	188	32	32	28	23	34	14	12	15	9	8
June	186	138	158	131	252	31	29	25	24	32	14	13	9	11	10
July	169	142	124	131	126	29	24	24	23	16	13	10	8	9	6
August	132	102	108	119	73	30	27	22	22	11	13	11	8	7	5
September	100	126	114	158	96	28	23	19	23	17	11	13	8	11	9
October	159	228	180	209	177	27	30	22	25	33	12	20	9	10	11

November	224	167	204	326	209	31	33	25	48	25	13	23	12	13	13
December	183	197	141	251	183	35	32	24	43	31	13	20	11	10	13
Annual Avg.	**176**	**177**	**160**	**161**	**170**	**30**	**29**	**25**	**27**	**33**	**13**	**15**	**13**	**10**	**9**

4. Station at Vishvakarma Chowk, Ludhiana

Month	**PM_{10} (µg/m^3)**					**NOx (µg/m^3)**					**SO2(µg/m^3)**				
	2014	**2015**	**2016**	**2017**	**2018**	**2014**	**2015**	**2016**	**2017**	**2018**	**2014**	**2015**	**2016**	**2017**	**2018**
January	220	173	226	158	212	29	28	30	27	33	11	10	12	9	7
February	248	176	157	183	201	21	29	30	26	39	10	10	10	8	9
March	197	128	107	189	254	26	27	28	28	44	9	10	9	9	11
April	186	142	126	211	292	26	28	27	31	38	11	9	8	10	10
May	230	236	116	220	267	28	32	29	33	39	11	10	9	10	11
June	186	165	157	177	166	29	33	30	30	37	12	11	9	10	11
July	185	111	91	160	126	24	22	28	28	31	7	7	8	9	10
August	167	154	75	141	169	25	23	26	23	30	9	10	8	7	11

September	124	208	109	230	146	25	30	26	27	23	9	12	9	8	10
October	216	197	186	306	237	30	30	32	31	31	11	11	12	10	12
November	161	169	211	322	294	30	29	33	42	35	11	10	13	8	14
December	176	264	197	232	194	26	28	26	42	25	10	10	9	8	10
Annual Avg.	**191**	**177**	**147**	**211**	**213**	**27**	**28**	**29**	**31**	**34**	**10**	**10**	**10**	**9**	**11**

Annexure B – AQI data from 2017 to 2018 depicting the air quality in Ludhiana

Month	AQI	Category	Month	AQI	Category
Jan-17	104	Moderate	Jan-18	162	Moderate
Feb-17	99	Satisfactory	Feb-18	94	Satisfactory
Mar-17	162	Moderate	Mar-18	96	Satisfactory
Apr-17	81	Satisfactory	Apr-18	130	Moderate
May-17	99	Satisfactory	May-18	185	Moderate
Jun-17	131	Moderate	Jun-18	153	Moderate
Jul-17	102	Moderate	Jul-18	74	Satisfactory
Aug-17	119	Moderate	Aug-18	58	Satisfactory
Sep-17	113	Moderate	Sep-18	59	Satisfactory
Oct-17	281	Poor	Oct-18	121	Moderate
Nov-17	277	Poor	Nov-18	118	Moderate
Dec-17	190	Moderate	Dec-18	121	Moderate
2017 annual Avg.	**146.5**	Moderate	**2018 Annual avg.**	**114**	Moderate

Annexure C – Action Plan for Control on Vehicular Emissions

Sr. No.	Activity	Implementation period (Short Medium/ Long term)	Responsible Agencies	Base Line	Target to be achieved	Target Date	Milestones (Monthly / Quarterly)	Financial Implications, if any (Estimated Cost)
1	CVE 1 - Public awareness campaign for control of vehicular emissions	Short Term	Deptt. of Transport	Presently, awareness is being created in Educational Institutes under Sadak Surakhya Abhiyan	The public to be educated & motivated to actively play their role in curbing the vehicular pollution.	Regular Activity	1.Public awareness campaign in print and electronic media-Twice a month 2. Use of Social Media Facebook, twitter, Instagram-Regular 3. Jingles on air pollution on local radio and TV-Local FM Radio will be hired 4. Awareness drives in educational institutions-Monthly 5. Public meetings-Monthly	Nil

							6. Nukarnataks- Quarterly	
		Short Term	Traffic Police.	Organised 1,221 awareness camps during year 2018 and 212 upto Feb 2019 by Traffic Education Cell	Public awareness campaigns to be continued	Regular activity	--	Nil
2	CVE 2 - Remote sensor based PUC system	Medium Term	Department of Transport	Manual checking at Pollution Check Centre (PCC) exists	All Pollution Check Centres will be linked with VAHAN 4.0 software of the Transport deptt.	31.01.2020	1. Preparation of RFP for selection of vendors by committee- Under Process 2. Allotment of work after selection of vendors – 2 Months 3. Development of software solution to link all PUC centres – 9 months 4. Linking of software to VAHAN 4.0 software of the transport Deptt.- 1 Month	Nil

3	CVE 3 - Extensive drive against polluting vehicles	Short Term	Traffic Police.	11,315 Challans were issued against polluting vehicles in 2018 and 994 challans issued upto Feb, 2019	Regular inspection to be continued and violators to be challaned.	Regular Activity	--	Nil
4	CVE 4 (a) – Prevent parking of vehicles in non-designated areas by creating parking infrastructure	Long Term	Municipal Corporation	• Designated parking lots : 23 Nos • Multi storey parkings : 2 Multi level parking already exists. • Parking for trucks/ commercial vehicles : 1 no. transport nagar exists.	• Designated parking lots being identified. • Multi storey parkings to be made : Following 3 nos. of multi-storey car parking's are proposed: i) Feroze Gandhi Market. ii) Books Market iii) Ghumar Mandi. • Need based additional Parking areas for trucks/ commercial vehicles being identified.	- 30.03.2022 -	- DPR—6month Tendering – 3 months Work allotment—1 month -	Rs 96.51 Crore -

		Short Term	Municipal Corporation	• Roadside parking earmarked by yellow line : 18 No. • "No Parking" sign Boards installed - 16	• Roadside parking for earmarking being identified. • Additional "No Parking" sign Boards being installed in non designated areas – 40 No. Under smart city.	NA 30.09.2019	-	- Rs. 1.5 lacs
	CVE 4b – Enforcement	Short Term	Traffic Police.	59,151 challans were issued in 2018 and 7734 challans issued upto Feb, 2019	Regular inspection to be continued and violators to be challaned.	Regular Activity	-	Nil
5	CVE 5 - Check fuel adulteration	Short Term	Department of Food and Civil Supplies/Oil Industry	As informed by Deptt.of Food & Civil Supplies, the Oil Companies have adopted Online Automated System for transportation & checking the density of Petrol/Diesel.	State Level Coordinator, Oil Companies will conduct inspections on annual, quarterly & random basis. - In case of complaint, Department of Food & Civil Supplies in coordination with local oil company officials shall check fuel adulteration & if any	Regular activity	-	Nil

					discrepancy is noticed then action against the violator shall be taken by State Level Coordinator of Oil Company.			
6	CVE 6 (a) - Widening of roads and improvement of infrastructure for decongestion of roads	Short Term	Municipal Corporation	Roads identified for widening 1) Sua road i.e. from Canal to Passi Chowk– 4.2 Km 2. Kanganwal Road 2.0 Km 3) Gen. Mohan Singh Road 1.0 Km 4) Dhandari Kalan to Surjit Palace 0.8 Km	Total 08 Km of road length to be widening.	30.09.2019	Estimate —Completed Tendering -- Completed Work allotment— Completed Completion—06 month	Rs 11.09 Crore
		Medium Term	GLADA	21.14 Km of road length has been identified for widening in Sector 32 A	Identified road length will be widened.	31.03.2020	1. DPR—Completed 2. Tendering – Under process	Rs. 25 Crore
	CVE 6(b) - Road design improvement	Long Term	Municipal Corporation	40 Km road has been constructed as	New roads identified for redesigning:	31.03.2021	Work allotted Completion -Dec 2019.	Rs 39.60 Crore

				concrete road after proper road designing.	• Malhar Road (1.1 Km) • Rotary Club Road (600 meters) & • Ghumar Mandi roads (1.0 Km) are being redesigned under Smart City Mission. 14 nos. chowks and junctions in the city are to be realigned and redesigned under smart city mission: • 6 nos. of chowks • 8 nos. of junctions		DPR- Completed Tender- 2 months Work Allotment-1 month DPR- 6 months Tender- 2 months Work Allotment-1 month	
7	CVE 7 - Introduce intelligent traffic systems	NA	Municipal Corporation	Already installed 42 nos. Of conventional traffic signals at different intersections in the City.	No. intelligent traffic system to be installed- NIL	-	-	NIL

8	CVE 8 - Construction of expressways/ bypasses to avoid congestion	Long Term	Municipal Corporation	Level crossing at Pakhowal Road railway line cause traffic congestion .	Flyover at Pakhowal Road railway crossing identified for construction Under Smart City to avoid congestion (length of Railway under Bridge portion is 600 meters and the length of Railway Over Bridge is 800 meters.)	30.06.2021	1. DPR-1 month 2. Tendering-6 months, 3. Work Allotment-1 month, 4. Completion-June 2021	Rs. 79 Crore
		Medium Term	GLADA	1.635 Km of road length has been identified (Malerkotla Road to Dugri Road.)	200' wide bye pass of length 1.635 Km to be constructed.	31.12.2019	1.Work allotted 2. Completion by 31.12.2019.	Rs.5.25 Crore
		Medium Term	NHAI	Identified Laddowal bypass to divert the NH-1 bound traffic coming from Ferozepur side & Doraha. Elevated corridor on Ferozepur road identified to	Laddowal bypass is under construction which would divert the NH-1 bound traffic coming from Ferozepur side & Doraha. Elevated corridor is also under construction in stretch	30.04.2020	Work in progress	Rs. 1148 Crore

				be congest traffic.	from chungi on Ferozepur road to Chandigarh road.			
9	CVE 09 – Phasing out of commercial diesel vehicles more than 15 years old	Long Term	Department of Transport.	New commercial diesel vehicles is registered for 2 years and thereafter, fitness certificate is being issued every year.	Matter of fixing the age of commercial diesel vehicle is being examined legally.	-	-	Nil
10	CVE 10 – Promotion of E- vehicles	Medium Term	Deptt. of Transport	Presently, most of the vehicles are running on diesel and petrol. -Framing of the E-vehicle policy is in the final stages.	After approval from Competent Authority E- Vehicle policy will be notified.	31.12.2019	1. Framing & Notification of E-vehicle policy – 9 months 2. Providing public charging points for E-vehicles as per Govt. policy.	NIL
11	CVE 11 (a) – Introduction of CNG based public transport	Long Term	Deptt. of food & civil supplies Ludhiana	• 03 nos. of CNG Stations exists • Work being executed	• To upgrade 01 no. conventional filling stations to CNG filling stations. • 01 no. new CNG station to be set up	31.03.2020	Upgradation & commissioning of CNG filling stations	Nil

	(Infrastructure development)			M/s Jay Madhok Co.				
	CVE 11 (b) – Introduction of CNG based city bus service	Long Term	Municipal Corporation	At present no CNG based city bus service exits.	To take measures to introduce CNG based city bus service.	-	-	Nil
	CVE 11 (c) – Introduction of CNG based autos / taxis	Long Term	Deptt. of Transport	At present, no CNG based auto/ taxis exits. PPCB has issued direction vide letter no 05 dated 03.01.2019 under section 31-A of Air Act 1981 to stop registration of new diesel / petrol driven auto rickshaw (s), in 5 districts including Ludhiana,w.e.f 01.02.2019.	To take measures to introduce CNG based auto/ taxis.	-	Implementation of PPCB orders dated 03.01.2019.	Nil
12	CVE 12 – Retrofitting of particulate filters in diesel vehicles for BS-IV fuels	Long Term	Department of Transport.	Presently, India is implementing BS-IV standards for diesel vehicles	India is going to skip adopting BS-5 norms and shift directly to adopting BS-6 norms by 2020	-	The steps for retrofitting of particulate filters in diesel vehicles is to be undertaken by Automotive industry	Nil

							under directions from Government of India as and when BS-VI fuels are available	

Annexure D – Action Plan for Control on Road Dust

Sr. No.	Activity	Implementation period (Short/ Medium/Long term)	Responsible Agencies	Base Line	Target to be achieved	Target Date	Milestones (Monthly / Quarterly)	Financial Implications, if any (Estimated Cost)
1	CRD 1 – Maintain pothole free roads for free-flow of traffic	Medium Term	Municipal Corporation	All major roads measuring 167 km of total length identified to make pothole free	Repair of 167km of identified road length	30.11.2019	1. Estimate Completed 2.Tendering under process.	Rs. 4.15 crore
		NA	GLADA	No repair work required in area under GLADA	NA	-	-	-
2	CRD 2 (a) – Water sprinkling	Short Term	Municipal Corporation	41.5 km of Road length Identified for water sprinkling .	Regular Water sprinkling on identified road	Regular Activity	-	Nil
	CRD 2 (b) – Procurement of Water sprinkler	Medium Term	Municipal Corporation	2 Nos water sprinklers-exists.	2 more sprinklers to beprocured.	31.12.2019	1. Estimation-Completed 2. Tendering - Under process.	Rs.46 lacs
3	CRD 3 – Mechanical sweeping	Medium Term	Municipal Corporation	-Presently manual sweeping being done. -120 km of Road length identified for mechanical sweeping.	4 no. mechanical sweepers to be procured.	31.03.2020	1. Estimation-Completed 2. Tendering - Under process.	Rs.5 Crore

4	CRD 4 - Creation of green buffers along road side	Short term	Municipal Corporation	7.8 Km of Road length identified for green buffer: 1. Jeewan ngr chk to Phase VII 2. Metro Road to Vishkarma Colony 3. Viahawnath Mandir (U/E Ph-1 & 2) & Rly Colony 4. From phase- VI-B, 121 to 228 5. Focal Point D-210 to 228 Ph- VII 6. Subash Nagar	12000 plants to be planted in industrial & residential and along road sides.	Regular activity	1. Identification – Completed 2. Demand of plants send to forest department for procurement 3. Plantation- 30.09.2019 4. Maintenance – Regular	Rs.74 lacs
5	CRD 5 - Greening of parks, open areas, community places, schools and housing societies	Medium Term	Municipal Corporation	665 nos of parks out of total 870 nos in Ludhiana city are being maintained by MC and Park Management Committees.	To ensure all public parks have adequate green cover/ plantation.	Regular Activity	1. All public parks will be provided adequate green cover/plantation. 2. Schools & housing societies to be motivated for plantation.	
		Medium Term	DFO	Vacant land available for plantation.	1)5000 plants will be planted on Kasabad Forest under NPV scheme.	31.03.2020	1. Ist Quarter 2019: Earth work will be done 2. IInd Quarter:	Rs 20.57 lacs

					2)5000 plants will be planted on Tajpur Road, Central Jail to Khasi Kalan under NPV scheme. 3)10,000 plants will be planted on PF Laddowal under NPV Scheme. 4)2000 Plants will be planted on RF Ludhiana Compartment No. 7 & 8 under NPV Scheme. 5)2000 plants will be planted along BudhaNala from Central Jail to KhasiKalan under MGNREGA		Plantation will be done 3. IIIrd and IVth Quarter: Maintenance of plantation will be done	
6	CRD 6 - Water fountains at	NA	Municipal Corporation	Water fountains Installed at	No immediate proposal to	NA	No further proposal for fountains due to	NA

	major traffic intersections			a) Fountain chowk on Mall road near Guru Nanak Dev Stadium b) VishavkarmaChowk. c) SherpurChowk intersections.	install any fountain.		non-availability of space at chowks.	
7	CRD 7 (a) Kaccha/Brick Paved Roads to be made Pucca road	Short Term	MC	Identified 10.06 Km of Kaccha roads for making pucca roads .	Blacktopping of identified Kaccha roads to be done for control of road dust emissions.	31.03.2020	i) Estimation-Complete. ii) Tendering - Under process.	Rs 65 Crore
	CRD 7 (b) Existing roads requiring recarpeting	Short Term	MC	93.55 km of existing road within MC limit requiringre-carpeting identified	93.55 km of existing road to be re- carpeted	31.03.2020		
		Short Term	PWD	6.62 km of existing road within MC limit requiring re-carpeting identified	6.62 km of existing road to be re- carpeted	30.09.2019	1. Estimation-Under Process. 2. Tendering -Under process. 3. Work Allotment-After tendering 4. Completion : 6 Months	Rs.2.97 Crore
		Short Term	GLADA	5.24 km of existing road requires re carpeting	5.24 km of existing road to be re carpeted	30.05.19	Tendering completed & Work Allotted	Rs 44 Lacs

	CRD 7 (c) Pavement of road side using interlocking tiles/Greening to prevent road dust emissions	Short Term	MC	0.8 km main road identified for pavement of road side (Gill road)	Identified road to be completed	30.09.19	-	Rs. 88.5 lacs

Annexure E – Action Plan for Control on Burning of Garbage and Biomass

Sr. No.	Activity	Implementation period (Short/Medium/ Long Term)	Responsible Agencies	Base Line	Target to be achieved	Target Date	Milestones (Monthly / Quarterly)	Financial Implications, if any (Estimated Cost)
1	CBGB 1 – Control on open burning of bio-mass in City	Medium Term	Municipal Corporation	140 Kaccha pits have been made in different parks for collection of horticulture waste to avoid burning of Bio Mass.	126 nos. of Pucca compost pits are to be constructed in parks and green belts	31.03.2020	i) Estimate : Completed ii) Tender : Under process	Rs. 45 Lacs
2	CBGB 2 – Control on burning of municipal solid wastes	Medium Term	Municipal Corporation	No. Of inspections made – 85 No. No. Of challans issued – 50 No. No. Of awareness camps – 60 No. Burning of municipal solid wastes stands prohibited. Awareness among MC	Regular inspections to be continued for Control on burning of municipal solid wastes and Challans to be issued to the violators.	Regular Activity	-	Nil

				staff/Safai Sewak is being created.				
3	CBGB 3 – Control on burning of agricultu re waste and crop residue	Short Term	District Administrat ion, Department of Agriculture, Police, PSPCL, Revenue Department & PPCB	• Identification of sites by PRSC (PAU) • Regular monitoring under supervision of DC • In District Ludhiana, 150 challans issued imposing Rs 5,25,000/- as Environmental compensation in year 2018 by PPCB • Rs.1,00,000/- Environmental compensation recovered upto Dec 2018.	Enforcement by Team	During rice/ wheat harvesting season	1. To create awareness among farmers regarding health effects of residue burning 2. Deptt. of Agriculture to provide subsidy for equipment/ machinery as per Govt. policy 3. Teams will be constituted one month prior to start of each harvesting season. 4. Identification of no. of fire incidents by PRSC. 5. Visit to identified sites 6. Imposing Environmental compensation on defaulters 7. PSPCL shall ensure electricity for in-situ management 8. Progress review in District Level Air Quality Monitoring Committee meeting 9. Recovery of Environmental compensation	Rs. 3 Lacs

Annexure F – Action Plan for Control on Industrial Emissions

Sr. No.	Activity	Implementation period (Short/Medium/ Long term)	Responsible Agencies	Base Line	Target to be achieved	Target Date	Milestones (Monthly / Quarterly)	Financial Implications, if any (Estimated Cost)
1.	CIE 1 – Conversion to side hood suction in induction furnaces	Short Term	PPCB	74 nos. of units (64 within M.C. and 10 outside M.C. within 05 Km). No units have adopted side hood suction facility.	74 units to be converted	30.09.2019	Monthly review meetings. Steps:- 1) Taking design 2) Commissioning	Nil
2.	CIE 2 – Conversion to CNG/PNG from pet coke/coal.	Long Term	PPCB/Jay Madhok Energy Pvt Ltd.	-500 no. of industry are yet to converted. -M/s Jai Madhok Energy Pvt Ltd. is awaiting approval from NHAI for laying of pipeline to supply PNG	-500 no. units to be converted to CNG/PNG. -First phase of laying pipeline shall be completed by July 2019	31.03.2021 31.07.2019	1. Providing pipeline for transportation of PNG 2. Procurement of instruments 3. Installation 4. Commissioning	Nil
3.	CIE 3 – Development of cleaner technologies to control fugitive emissions	Short Term	PPCB	PSCST has developed cleaner technologies for brick kilns, induction furnaces, cupola furnaces, rice shellers and re-rolling mills. These technologies	The targets for implementation of these technologies are required to be finalized by PPCB in-consultation with respective industrial associations.	Regular Activity	-Finalization of targets of implementation by PPCB -PSCST can provide consultancy for cleaner technology to industry as and when approached by it.	Nil

				needs to be implemented/ replicated in these sectors in a time bound manner.				
4.	CIE 4 – Conversion of natural draft brick kilns to induced draft	Short Term	PPCB	One unit out of 8 (within 5 km of M.C. limits) have adopted induced draft technology.	7 units yet to be converted	30.09.2019	Work under process	Nil
5	CIE 5 – Action against non-complying industrial units	Short Term	PPCB	Regular inspection as per policy of the Board	• Action against defaulting industries. • Checking the adequacy of APCD installed by the industries	Regular activity	-Identification of industries in which APCD is installed. - Checking the adequacy of APCD already installed. - Issuing show cause notice to the industries violating norms. -Facilitating industry to get set right the inadequate APCD.	Nil
6	CIE 6 – Shifting of industries from non-designated	Long Term	Local Govt. / Distt. Town	Industries located in non designated areas need to be identified for shifting.	Identified Industries required to be shifted to the designated areas.	Upto 2021	As per the provisions of notified Master Plan	Nil

	areas to industrial areas		Planner / Deptt of Industries.	PSIEC has developed 15 acre pocket at Tajpur Road & developing HiTech Cycle Valley Dhanansu.				
7	CIE 7 –. Training for effective operation of Air Pollution Control Devices/Adequacy of APCD	Short Term	PPCB	Most of the industries have installed APCDs in the form of cyclones/ bag filters/ scrubbers. The industries are required to provide dedicated operators to operate and maintain these APCDs and the training of these operators are required on basis for their effective operation to achieve the prescribed emission norms.	The Council can provide training to operators for sectors such as brick kilns, cupola furnaces, inductionfurnaces, rice shellers and rolling mills. – PSCST can check the adequacy of APCD installed in above mentioned sectors as and when approached by the industry.	Regular Activity	PSCST can conduct training programs/Adequacy for brick kilns, cupola furnaces, induction furnaces, rice shellers and rolling mills on quarterly basis. However, the participation from industries needs to mobilize by PPCB.	Nil

Annexure G – Action Plan for Control on Construction and Demolition Activities

Sr. No.	Activity	Implementation period (Short/Medium/ Long term)	Responsible Agencies	Base Line	Target to be achieved	Target Date	Milestones (Monthly / Quarterly)	Financial Implications, if any (Estimated Cost)
1	CCDA 1 (a) – Enforcement of Construction & Demolition Rules.	Short Term	Municipal Corporation	Inspection is being carried out as per needs for bigger/commercial & road projects. No. Of inspections made – 120 No. No. Of challans issued – 95 No.	-Regular inspection will be made for Control of Construction & Demolition waste. -Counter verification to be done by ATP/EO.	Regular Activity	--	Nil
	CCDA 1 (b) – Infrastructure of Construction & Demolition waste	Long Term	Municipal Corporation	MC Ludhiana has notified 6 nos of secondary points for collection of C & D waste under MC limits vide house resolution No. 37 dated 04.09.2018.	-MC Ludhiana is going to install a C&D plant under Smart City Mission. -Installation of CCTV cameras at major construction sites.	3103.2021	-DPR-Approved forsetting up of processing/ recycling plant for C&D waste Tendering : under process.	Rs 14.18 cr

2	CCDA 2 – Control measure for fugitive measures	Short Term	Municipal Corporation	At present, minimal measures being taken by the building contractors.	Proper curtains / sheets on the construction sites to be provided &the construction material be kept in covered conditions Regular inspection to be made and challan issued to violators	Regular activity	Regular inspections	Nil
3	CCDA 3 – Ensure carriage of construction material in closed/covered vessels.	Short Term	Municipal Corporation	MC has already directed all contractors to carry building materials and malba in enclosed/ covered vessels.	Regular inspection will be made to ensure implementation of directions given to contractors to carry the building materials and malba in enclosed/ covered vessels.	Regular Activity	-	Nil

Annexure H – Action Plan for Control through Other Steps

Sr. No.	Activity	Implementation period (Short/ Medium/ Long term)	Responsible Agencies	Base Line	Target to be achieved	Target Date	Milestones (Monthly / Quarterly)	Financial Implications, if any (Estimated Cost)
1	COS 1 – Dissemination of Air Quality Index	Medium Term	PPCB	1No.CAAQMS installed	3 more CAAQMS to be installed	31.03.2020	1. Expected Allotment of Station by CPCB on 50:50 sharing basis- 31.03.2019. 2. Finalization of specifications by CPCB 31.05.2019. 3. Tendering- 31.07.2019 4. Identification of site and its approval from CPCB (Simultaneously with tendering- 31.07.2019). 5. Procurement& installation of CAAQMS- 31.01.2020 Calibration, Commissioning &data procurement – 31.03.2020.	Rs 30.0 lacs

2	COS 2 – Establish an Air Quality Management Division at SPCB HQ	Medium Term	PPCB	No such division exists	One required	31.03.2020	a. Develop methodology-Three months b. Providing infrastructure-Six months c. Implementation-Three months	Rs 2.0 lacs
3	COS 3 – Setup helpline in each city/town as well as SPCB HQ Policy	Medium Term	PPCB	No helpline exists	One help line number required	31.03.2020	1. Develop methodology-Three months 2. Providing infrastructure-Six months 3. Implementation-Three months	Rs 0.5 lacs
4.	COS 4- Provisions of electricity based crematorium	-	Municipal Corporation	One Electricity based crematorium at Daresi Shamshan Ghat.	No immediate proposal for establishment of another electricity based crematorium	NA	NA	Nil
5	COS 5 - Monitoring of DG sets and action against violations	Short Term	Punjab Pollution Control Board	Manual monitoring exists	No non-complying DG set to be operated	Regular Activity	1. Identification – Four months 2. Implementation- Two months	Nil
7	COS 6 – Source Apportionment Study	Short Term	PPCB	Source Apportionment Study have	Not required	--	--	Rs.1.10 Cr.

				been conducted through PSCST & TERI				

Annexure I – Action Plan for Training & Capacity Building Programmes

Sr. No.	Activity	Implementation period (Short/ Medium/ Long term)	Responsible Agencies	Base Line	Target to be achieved	Target Date	Milestones (Monthly / Quarterly)	Financial Implications, if any (Estimated Cost)
1	TCB1 – Training & Capacity Building Programmes	Short Term	PPCB	Officers get trainings under various programmes orgnanized by the concerned departments	• District/City level training programmes – 1 Nos. • State level training programmes – 1 Nos.	31.03.2020	Selecting agencies/ experts for organizing theme specific trainings. Organization of programmes at City/District and level.	Rs.2.00 lacs

Note: 'Short Term' refers to activities to be carried out during next 6 months, 'Medium Term' refers to activities to be carried out during next 2 years and 'Long Term' refers to activities to be carried out in more than 2 years time period.

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