

Action Plan
for
Clean Air, Nangal, District Roopnagar



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

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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, ozone, oxides of nitrogen, and sulphur dioxide.

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 Nangal

1.2.1 History

- (i) The town was named Nangal when it acquired the land of the villages of Nangal Nikku, Hambewal and Dubheta. It sits at the foot of the Shiwalik Hills and is surrounded by beautiful hills, the Satluj River and canals. It is an important center for tourists. There is a Gurdwara Bhabour Sahib, a Sikh place of worship, which is located at a distance of 5 km from Nangal and presents a majestic view. Sh Guru Gobind Singh, 10th Guru of Sikhs is said to have mediated at this spot.
- (ii) The town gained importance with the starting of construction of the Bhakra Dam on the Satluj River in November, 1955. Now it is a flourishing township attracting tourists due to the mighty multi-purpose Bhakra Project, which includes, apart from Bhakra Dam, the Nangal Dam, Nangal Hydel Channel, and the Ganguwal and Kotla Power Houses. The artificial lake created upstream of the dam christened 'Gobind Sagar' is still considered as the biggest man-made lake in the world.
- (iii) With the coming up of Bhakra Dam and surplus power available from the hydel project, Govt. of India decided to set up Fertilizer Factory at Naya Nangal, which went on stream in 1961. Naya Nangal serves mainly as a fertilizer complex of M/s National Fertilizers Limited (NFL), a public sector undertaking of the Government of India. Nangal Fertilizer unit has started production in the year 1961 and was the single largest consumer of electricity from the Bhakra Power House till some years ago. The Heavy Water Plant was shut down later primarily due to national security considerations. Besides this, there is a chemical factory named as M/s Punjab Alkalies and Chemicals Limited (PACL), Naya Nangal. These two factories have given rise to some more small factories in their vicinity. Due to presence of NFL & PACL, Nangal is proud to have biggest Truck and Tanker Unions in India.

1.2.2 Area and Population

Nangal falls in district Roopnagar. The town is divided into three parts: Nangal, Nangal Township and Naya Nangal, which is spread over an area of about 20.00 sq. kms. and accommodates a population of about 48,497 as per census 2011. Most of the Population is from the townships of M/s National Fertilizers Ltd. (NFL), M/s Punjab Alkalies and Chemicals Limited (PACL) and Bhakra Beas Management Board (BBMB).

1.2.3 Industry and Trade

Nangal town is known because of three big units Bahkra Dam, M/s National Fertilizers Limited (NFL) and M/s Punjab Alkalies and Chemicals Ltd. (PACL). Bhakra Dam was completed by the end of year 1963 and it was the only dam in Asia at that time, which could produce 1500 MW power. At present, the town produces 15.5 percent of the total urea production of India from M/s National Fertilizers Ltd. (NFL), which is having installed capacity of 478500 MTPA and is producing Ammonia @ 950 MTD, Urea @ 1450 MTD as its main products and nitric acid @ 554 MTD, methanol @ 67 MTD, Ammonium Nitrate @ 690 MTD, Sodium Nitrate @ 9 MTD. Besides this, there is M/s Punjab Alkalies Chemicals Ltd. (PACL), which is the largest unit for manufacturing Caustic Soda in India. This unit is engaged in the business of manufacturing of Caustic Soda @ 99000 MTA, Chlorine Gas @ 87714 MTA and Hydrogen Gas @ 2475 MTA.

1.2.4 Topography

The town is located at the foot of the Shiwalik Hills and this town comprises of the residential areas such as Shivalik Avenue, Naya Nangal Township, BBMB Township and Downtown Nangal (Railway Road). It has an average elevation of 326 metres (1069 ft). The town, lying in the northern plains, has vast fertile and flat land. The surrounding cities are the Historical town Shri Anandpur Sahib and Mehatpur Industrial area of Himachal Pradesh.

1.2.5 Climate

The climate is warm and temperate in Nangal. In winter, there is much less rainfall in Nangal than in summer.

1.2.6 Rainfall

Nangal receives moderate to heavy rainfall and sometimes heavy to very heavy rainfall (generally during the month of August or September), during monsoon period. The average annual temperature in Nangal is 23.7 °C. The average annual rainfall is 1119 mm.

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

- 1.3.1 The Air quality of Nangal town might have degraded during the last few years due to activities of mainly two industrial units namely M/s NFL & M/s PACL and their ancillary units. Since, there is bulk production of urea in M/s NFL and the caustic soda in M/s PACL due to which

there is a substantial movement of heavy vehicles which are used to carrying raw materials and finished products from both these units.

- 1.3.2 The Govt. of India had made an effort in year 2012-13 to convert the heavy stock based NFL unit to gas based, keeping in view the pollution potential of the unit. In addition, the GOI has also framed a New Urea policy in the year 2015 to bring the specific energy consumption of urea unit from 7.011 Gcal / MT of Urea to 6.36 Gcal / MT of Urea to make the unit energy efficient. Under this policy, there is a proposal to change one coal fired boiler of 117 TPH capacity with 100 TPH steam generation capacity gas fired boiler. All these efforts are being made for conservation of energy and to improve the Air quality of the town.
- 1.3.3 It will not be out of place to mention here that after construction of Nangal dam there is rapid increase in the urbanisation as BBMB has established a township at Nangal town. The ambient air quality data for the last one & half year shows that the AQI for SO₂ & NO_x parameter falls in good category, as such, no action is required as far as improvement ambient air quality with respect of both these parameters are concerned. However, the annual average value of PM₁₀ in the ambient air quality of Nangal falls in the range of 61-129 µg/m³ for most of the times. In year 2018, the maximum value of PM₁₀ in the ambient air quality is 119 µg/m³.

1.4 **About National Green Tribunal directions:**

- 1.4.1 Nine cities of Punjab namely Dera Bassi, Nangal, Patiala, Mandi Gobindgarh, Khanna, Ludhiana, Jalandhar, Pathankot and Amritsar 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/towns 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 including issuing of advisory to public for prevention and control of air pollution and involvement of schools, colleges and other academic institutions and awareness programmes.
- (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 alongwith 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/PCI-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 Vardhaman Kaushik Vs. Union of India and Others for combating air pollution.

Chapter 2 – Vision, Mission and Strategy

2.1 Mission Tandarust 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, Nangal

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

2.3 Mission Clean Air, Nangal

To prepare and implement a comprehensive action plan to clean Nangal:

- (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, Nangal

The key elements of strategy for Clean Air campaign for Nangal 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) Monitoring of air pollution control devices installed by industries
 - (b) Upgradation of existing air pollution control devices
 - (c) Monitoring of ambient air quality and stack emissions
 - (d) Provision of canopies on the existing D.G sets

- (ii) **Department of Local Government/ MC, Nangal**
 - (a) Development of engineered municipal solid waste dump site
 - (b) Improvement of road infrastructure for smooth traffic movement
 - (c) Regular and mechanical cleaning of roads
 - (d) Sprinkling of in the parks and maintenance of fountains
 - (e) Increasing green cover in city
 - (f) Upgrading traffic lights for smooth traffic movement
 - (g) Provide canopies on the existing D.G sets
- (iii) **Department of Transport**
 - (a) Plan for effective traffic management
 - (b) Plan for phasing out old polluting vehicles
 - (c) Shift to cleaner fuels viz. CNG etc.
 - (d) Monitoring of vehicles without PUC certificate
 - (e) Banning of pressure horns
- (iv) **Department of Police**
 - (a) Planning and enforcement of traffic management plan
 - (b) Checking of vehicles running without PUC certificate
 - (c) Impounding and challan of vehicles running without permission/ registration.
- (v) **Department of Forests**
 - (a) Preparation of afforestation plan
 - (b) Organizing awareness camps for Greener City
 - (c) Providing green belt around the industrial areas
- (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
- (vii) **PWD (B&R)**
 - (a) Improving road conditions for smooth movement of traffic
 - (b) Increasing green cover on roadside under their jurisdiction
- (viii) **Punjab State Council for Science and Technology**
 - (a) Evolving cost-effective cleaner technologies
- (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

2.6 Nodal Department

The clean air plan for Nangal is part of Statewide 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.

2.7 Integration of Departmental plans

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

2.8 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.

2.9 Design of Monitoring System

2.9.1 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

2.9.2 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.

2.9.3 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.

2.10 **Governance**

The monitoring of progress, coordination of various activities, corrective measures required and fixing of accountability will be done by Air Quality Monitoring Committees 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 Nangal

3.1 Monitoring of Air Quality:

In Nangal the Board is monitoring ambient air quality for which two no. Ambient Air quality monitoring stations were installed at M/s Punjab Alkalies and Chemicals Ltd., Naya Nangal and M/s National Fertilizers Ltd., Naya Nangal under the National Ambient Air Quality Scheme. The station, which was installed at M/s National Fertilizers Ltd., Naya Nangal has been shifted to M/s Ambuja Cements Ltd., Village Daburji, Tehsil Ropar, in the month of January 2018. The year wise data of PM₁₀, SO₂ and NO_x for the period 2014-17 is placed as **Annexure-A**.

3.2 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), $\mu\text{g}/\text{m}^3$	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), $\mu\text{g}/\text{m}^3$	Annual	100	100
		24 hours	400	400
9	Benzene (C_6H_6) $\mu\text{g}/\text{m}^3$	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

3.3 Air Quality Index (AQI)

- 3.3.1 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.
- 3.3.2 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 (PM_{10} , $\text{PM}_{2.5}$, NO_2 , SO_2 , CO, O_3 , NH_3 and Pb) having short-term standards have been considered for near real-time dissemination of AQI.
- 3.3.3 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.

- 3.3.4 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.

3.4 Trends of Quality of Air

- 3.4.1 The Board had installed 2 no. manually operated AAQM stations and the monitoring of PM₁₀, SO₂ & NO_x. Annual average of these parameters for the last 3 years is given as under:

Year	Station (installed at)	PM₁₀ (µg/m³)	SO₂ (µg/m³)	NO_x (µg/m³)
2016	M/s NFL, Naya Nangal	90	5	12
	M/s PACL, Naya Nangal	91	5	12
2017	M/s NFL, Naya Nangal	90	6	12
	M/s PACL, Naya Nangal	91	6	12
2018	M/s PACL, Naya Nangal	88	6	13

- 3.4.2 The ambient air quality data for the last one & half year shows that the AQI for SO₂ & NO_x parameter falls in good category, as such no action is required as far as improvement in ambient air quality with respect of both these parameters are concerned. This may be due to rigorous efforts made by PPCB.

3.5 **Major Parameters of concern**

The perusal of data above the annual average value of PM₁₀. All other parameters are within the prescribed limits. A perusal of data in **Annexure-A** clearly shows that ambient air quality of Nangal falls in the range of 61-129 µg/m³ for most of the time. In year 2018 the maximum value of PM₁₀ in the ambient air quality is 119 µg/m³.

Chapter 4 – Sources of Air Pollution in Nangal

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 Due to paucity of time, detailed studies regarding source apportionment and carrying capacity could not be done, however, the Board has made some projections based on its in house projections for Nangal. The estimated contribution of various sources in air pollution is given as under:

1.	Industrial Emissions	35%
2.	Road Dust	30%
3.	Vehicular Pollution	30%
4.	Burning of Garbage and Biomass	3%
5.	Construction and Demolition Activities	2%

4.1.3 PPCB shall carry out source apportionment for the city involving Expert Agency. The estimated cost to be incurred on the Source Apportionment study is Rs. 5.00 lacs.

4.2 Vehicular Emissions

4.2.1 Transport sector is one of the most important contributors to air pollution in Nangal due to movement of heavy goods vehicles carrying raw materials and products of the industries located in and around the city. At present about 15903 vehicles (heavy transport vehicles, LMVs, cars & jeeps, two wheelers and three wheelers) are plying on the roads of Nangal.

4.2.2 Also, an NH-503 passes through Nangal, which is connecting Una, Dharamshala & Bilaspur etc. of Himachal Pradesh and Chandigarh. Most of the tourist vehicles travelling towards Himachal Pradesh passes through Nangal near M/s NFL factory. There is movement of lot of trucks carrying fuel, raw material, finished products and miscellenous items from mainly two factories M/s NFL & M/s PACL, Nangal. Further, major Goddesses temples are situated

upstream of Nangal, due to which lot of movement of pilgrims pass through Nangal town. Therefore, Air quality of Nangal area has been deteriorated due to movement of lot of tourist vehicles, trucks carrying industrial commodities and pilgrim vehicles. As the Himachal barrier is near M/s NFL and Ambient Air Quality Monitoring Station (AAQMS) was also installed at M/s NFL by the Board, therefore, vehicular pollution is also one of the major contributor for the deterioration of Air quality of Nangal.

4.3 Road Dust

The particle 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. Additionally the emissions from the vehicular traffic, building construction and renovation, corrosion of metals structures etc. contribute directly to the road dust. Some other common factors are enlisted as under:

- (i) Emissions from the Vehicular traffic.
- (ii) Construction and demolition activities.
- (iii) Presence of potholes on the road.
- (iv) Absence of metaled roads / stabilized roads / un-stabilized movement area within industries.
- (v) Presence of un-stabilized berms along the roads.
- (vi) Movement of overloaded transport vehicles.

4.4 Burning of Biomass and Garbage

- 4.4.1 There are only small patches of agricultural land within the Nangal town, however, the town is surrounded by agricultural area and a very less quantity 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.
- 4.4.2 At present, Municipal solid waste generation of the city is estimated as 10 TPD, which is being dumped scientifically in the present dumping site on the Bhalaan Nangal road in the Mojowal area. The garbage burning increases during winter season as the general public tend to burn the waste for heating purposes.

4.5 Industrial Emissions

- 4.5.1 The environment of Nangal has degraded a lot during the last few years due to rapid urbanization, increase in population, large number of tourist vehicles and commercialization of land available within the town. The main stationary sources of air pollution are the two big industrial units namely M/s PACL Ltd., and M/s National Fertilizer Ltd., which are emitting particulate matter, sulphur di-oxide and oxides of nitrogen etc. The movement of heavy tippers carrying crushed stone/sand and bad roads are major causes for dust emissions.

- 4.5.2 The category wise detail of air polluting industries situated in the vicinity of Nangal area are given as under:

S.No.	Category	No. of Industries
1	Fertilizer Plant	1
2	Alkali Plant	1
3	Concrete/cement blocks	2
4	CO ₂ filling units	2
	Total	6

- 4.5.3 It is pertinent to mention here that emission standards for most of the above said industries are the most stringent for such type of industries i.e. 150 mg/Nm³. The industrial pollution is only due to 2 large industries namely M/s NFL and M/s PACL are situated in close proximity.

4.6 Mining

Mining activities also contribute to the AQI, however in Nangal area no mining activity is carried out near Nangal town. As such, it has no contribution in the AQI of Nangal. However, at present no source apportionment study has been conducted at Nangal and the same is required for effective implementation of the action plan.

4.7 Construction and Demolition Activities

- 4.7.1 Nangal is a small town and there are only household level/commercial small construction projects and paving of streets by MC on routine basis are falling in Nangal and no large scale area development project/Group housing lies in the area. At present, MC Nangal has notified two construction and demolition waste disposal sites in the Nangal.

4.8 Others

- 4.8.1 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:

- (i) Public Awareness related,
- (ii) Enforcement related,
- (iii) Infrastructure related,
- (iv) 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

Policy Related

- (viii) CVE 8 – Phasing out commercial diesel vehicles more than 15 years old
- (ix) CVE 9 – Promotion of E vehicles
- (x) CVE 10 – Introduction of CNG based public transport
- (xi) CVE 11 – 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. A CAAQMS station must also be installed in Nangal to monitor the AQI of Nangal and thereafter the below given steps must be adopted in order to keep the Vehicular emissions in control. Further, the details such as baseline, target, timeline, milestones have been given in **Annexure-B**.

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, Nangal, 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:**

The Department of Transport will implement remote sensor based PUC system to eliminate the malpractices in the existing system of issuing PUCs. All PUC centres 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 earmark 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 to decongest roads

The roads constructed within the town having traffic congestion shall be identified by the MC. The concerned department like PWD (B&R)PUDA,PSIEC and Municipal Council shall widen these roads suitably to decongest the traffic.

5.8 CVE 7 - 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 atleast 2 Kms. The traffic lights shall be placed at various intersection, so as to avoid traffic jams and smooth operation of the vehicles. Municipal Council in consultation with Traffic Police shall identify such places and provide traffic lights.

5.9 CVE 08 – Phasing out commercial vehicles more than 15 years old

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

5.10 CVE 09 - 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.

5.11 CVE 10 – Introduction of CNG based public transport

10 (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.

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

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

5.12 CVE 11 - 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 and 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 potholes free roads for free-flow of traffic
- (ii) CRD 2 – Water sprinkling
- (iii) CRD 3 – Mechanical sweeping

Infrastructure Related

- (iv) CRD 4 -Creation of green buffers along along the road sides
- (v) CRD 5 - Greening of open areas community places, schools and housing societies
- (vi) CRD 6 - Water fountains at major traffic intersections
- (vii) CRD 7 - Blacktopping of metaled road including pavement of road shoulders

- 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-C**.

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 its filled up. 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 repair.

6.3 CRD 2 – Water sprinkling

2(a) Water sprinkling on dust prone roads: Municipal Council 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 Council shall utilize the treated wastewater of STPs installed in the city.

2(b) Procurement of Water sprinkler: Municipal Council 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 Council 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 Council.

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

Municipal Council 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 Council.

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

In order to increase greenery in the town, the Municipal Council shall identify open areas/ lawns/ vacant lands including community places and schools in the town 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 Council 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 Council 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 Nangal town, however, the town 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. At present, Municipal solid waste generation of the town is estimated as 10 TPD, which is being dumped scientifically in the present dumping site on the Bhalaan Nangal road in the Mojowal area. To minimize the pollution generated from the biomass and garbage, following key activities are proposed:

Enforcement Related

- (i) CBGB 1 –Control of open burning of bio-mass in town
- (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-D**.

7.2 CBGB 1 – Control on open burning of bio-mass in town

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 Council shall deploy its staff to have a check on various areas so as to forbid the inhabitants and sweepers open burning of the biomass.

A Whatsapp number shall provided to the public alongwith the setting up of the dedicated control room for receiving complaints of public through this system.

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.

7.3 CBGB 2 – Control on burning of municipal solid waste

Presently, Municipal Council has one municipal waste dumping site along the Mojowal road, which has not been developed scientifically for the disposal of the municipal solid waste and consequently it has become the source of burning of waste on this dump. Lot of smoke is generated which contribute to the air pollution index. Similarly at the collection point and after sweeping the streets, the garbage collected may be burnt, instead of transporting to the dumping site.

Municipal Council shall identify and develop municipal waste dumping site as per the provisions of Municipal Solid Waste Rules, 2016 and the construction work of the said site shall be completed.

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

The city is surrounded by agricultural area and due to hilly region, wheat and Rice is grown on a very less area and that too is used by Gujjars and a very less 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.

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 District 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 p.m to 6.00 a.m during crop harvesting seasons and attaching of the super SMS with the combine harvesters. Department of Agriculture to promote mechanical reincorporation of paddy straw to prevent its burning.

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. There are 02 no. (M/s PACL and M/s NFL) large scale industries in the close proximity. To minimize the pollution generated from the above mentioned sources, following key activities are proposed:

Enforcement Related

CIE 1 – Action against non-complying industrial units

- 8.1.2 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**.

8.2 CIE 1 – Action against non-complying industrial units:

The regular monitoring of the industries is being carried out as per the policy of the Board. In case, any industry is found violating the provisions of the Air 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.

Chapter 9 – Control on Construction and Demolition activities

9.1 Key Activities

Nangal is a small town of population 48,497 as per 2011 census. There are no major construction projects falling in the vicinity of Nangal area. There is no other kind of significant air pollution from the construction projects except the particulate matter emanation from construction as well as demolition activities. Also, small construction activities are being carried out by the individual house holders, commercial, industrial and paving of streets by the MC on routine basis. MC Nangal has notified 2 no. of construction & demolition waste disposal sites in the town. To minimize the pollution generated from the vehicles, following key activities are proposed:

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

9.1.1 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**.

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 Council 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 equipments 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 on Air Quality Index

Infrastructure

- (i) COS 2 – Establish an Air Quality Management Division at SPCB HQ
- (ii) COS 3 – Setup helpline in each city/town as well as SPCB HQ

Enforcement

- (i) COS 4 - 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-G**.

10.2 COS 1 – Dissemination of information on Air Quality Index

Punjab Pollution Control Board shall first install a CAAQMS Station and then display the air quality index of the town 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 - 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. Time bound action plan shall be prepared by the Municipal Council for removal of these DG sets. 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 Nangal

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 Nangal 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 .N.	Severe (AQI value becomes 401-500)	Agency responsible / Implementing Agency
1	Temporary closure of industries.	PPCB
2	Stop construction activity	MC, Nangal
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, Nangal
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, Nangal
7	To increase the frequency of mechanized sweeping on roads with heavy traffic and water sprinkling also on unpaved roads.	MC, Nangal
8	Stop entry of heavy good vehicles except essential commodities into Nangal	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:

S.N.	Very Poor (AQI value becomes 351-430)	Agency responsible / Implementing Agency
1	Restraining the operation of air polluting industries etc. for 8 hours/day	PPCB
2	Banning of construction activities	MC, Nangal
3	Stop of garbage burning in the landfill areas or in the open fields	MC, Nangal
4	Water sprinklings at the dust emission points etc.	MC, Nangal
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, Nangal and Distt. Administration

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

Following action shall be taken by the concerned authorities:

S.N.	Poor (AQI value becomes 201-300)	Agency responsible / Implementing Agency
1	Strictly enforce garbage burning in landfill and other places and impose heavy fines on person responsible	MC, Nangal
2	Increase frequency of mechanized cleaning of road and sprinkling of water on roads. Identify road stretches with high dust generation.	MC, Nangal
3	Stop use of coal / firewood in open eateries	MC, Nangal
4	Strictly enforce rules for dust control in construction activities and close non-complaint sites.	MC, Nangal
5	Close / Strictly enforce all pollution control regulations in the air polluting industries	PPCB
6	Restricting air polluting industries 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.	Moderately polluted (AQI value becomes 101-200)	Agency responsible / Implementing Agency
1	Increasing the frequency of mechanized cleaning the roads etc.	MC, Nangal
2	Sprinkling of water at the dust emitting points	MC, Nangal
3	To stop open burning of garbage and municipal solid waste	MC, Nangal
4	Close / strictly enforce all pollution control regulations in the air polluting industries 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 Construction and Demolition activities
- (vi) 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 Deputy Commissioner
- (ii). AQMC at State level under Principal Secretary, Environment
- (iii). Steering Committee under Chief Secretary

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

District Level Committee will be constituted under the chairmanship of Deputy Commissioner, Roopnagar 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. The district level committee shall constitute the followings:

1	The Deputy Commissioner, Roopnagar	Chairman
2	The Senior Superintendent of Police, Roopnagar	Member
3	The Environmental Engineer, Punjab Pollution Control Board, Regional Office, Sahibjada Ajit Singh Nagar	Convener
4	The Regional Transport Authority, Roopnagar	Member
5	The Divisional Forest Officer, Roopnagar	Member
6	Sub Divisional Magistrate, Nangal	Member
7	The Executive Officer, Municipal Council, Nangal	Member
8	The Civil Surgeon, Roopnagar	Member
9	The Executive Engineer, Punjab Water Supply & Sewerage Board, Division No. 2, Nangal	Member
10	The Executive Engineer, PWD (B & R), Nangal, Distt. Roopnagar	Member
11	The Executive Engineer, (Drainage), Deptt. of Irrigation, Drainage Division, Roopnagar	Member
12	The District Town Planner, Roopnagar	Member
13	The Executive Engineer, Punjab Small Industries & Export Corporation, 18, Himalya Marg, Udyog Bhawan, Sector-17-A, Chandigarh	Member
14	The General Manager, District Industries Centre, Roopnagar	Member

15	The Sub Divisional Engineer, Punjab Water Supply & Sewerage Board, Nangal	Member
16	The Asstt. Executive Engineer, Punjab Small Industries & Export Corporation, Nangal	Member
17	The District Agriculture Officer, Deptt. of Agriculture, Roopnagar	Member
18	The General Manager-cum- Project Director, NHAI, 17-L, Model Town, Ambala City.	Member
19	District Controller, Department of Food, Civil Supplies and Consumer Affairs, Roopnagar	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, Directorate of Environment & Climate Change	Member
5	ADGP, Traffic	Member
6	Director, Environment	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 Chief Secretary 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

Following are the major risks

- (i). Lack of formal source apportionment study
- (ii). Accuracy and completeness of baseline data, targets and milestones
- (iii). Lack of formal analysis of implementation barriers

14.2 Source Apportionment Study

It is important to have the assessment of various sources and their contribution to the air pollution and accordingly focus on controlling those sources. Currently no such study has been done. In order to mitigate the risk, Punjab Pollution Control Board shall get source apportionment study of the city conducted to adjudge various sources contributing air pollution in the area and mitigation thereof. The same will be incorporated in the Action Plan.

14.3 Accuracy and completeness of baseline data, targets and milestones

The baseline data, targets and milestones are not very accurate or complete. During the course of implementation detailed surveys and analysis will be carried out and the baseline data, targets and milestones will be suitably updated and same will be reviewed in the AQMC meeting at District Level.

14.4 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.

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-H**

Annexure A – Trends in Air Quality of Nangal

1. Station at M/s NFL, Naya Nangal

Month	RSPM ($\mu\text{g}/\text{m}^3$)				NO _x ($\mu\text{g}/\text{m}^3$)				SO ₂ ($\mu\text{g}/\text{m}^3$)			
	2014	2015	2016	2017	2014	2015	2016	2017	2014	2015	2016	2017
January	79	96	96	95	14	11	12	12	4	5	5	6
February	84	69	78	83	6	11	11	11	4	4	4	6
March	70	64	94	85	11	10	11	11	4	4	4	5
April	86	60	101	85	12	11	12	11	4	4	5	5
May	98	76	97	86	11	12	12	11	4	4	5	5
June	110	89	96	84	12	14	12	11	5	4	5	5
July	84	64	78	73	12	10	11	12	4	4	5	5
August	69	69	82	67	11	15	12	10	4	4	5	6

September	83	61	76	74	12	12	12	11	5	4	5	5
October	113	114	88	131	13	13	12	16	5	4	6	7
November	100	120	100	131	16	16	11	13	5	5	6	7
December	71	127	89	81	13	14	12	10	4	5	5	6
Annual Avg.	87	84	90	90	12	12	12	12	4	4	5	6

2. Station at M/s PACL, Naya Nangal

Month	RSPM ($\mu\text{g}/\text{m}^3$)					NO _x ($\mu\text{g}/\text{m}^3$)					SO ₂ ($\mu\text{g}/\text{m}^3$)				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
January	72	95	97	98	77	16	11	12	12	11	4	4	5	6	5
February	97	77	96	81	60	10	11	12	11	10	5	4	5	5	5
March	74	60	95	84	59	11	10	12	11	13	4	4	5	5	6
April	89	70	102	87	77	11	11	12	11	15	4	4	5	5	7

May	81	73	106	83	80	11	12	12	11	18	4	4	5	6	5
June	76	82	-	86	119	12	13	-	11	14	4	4	-	6	6
July	80	58	79	83	84	12	10	12	11	13	5	4	5	5	6
August	76	59	78	61	79	11	10	12	10	16	4	4	5	6	6
September	75	71	74	61	116	12	13	12	10	11	4	5	5	5	7
October	81	88	90	129	112	11	12	12	16	11	4	5	7	7	7
November	103	121	100	158	115	14	15	11	14	11	4	5	6	6	7
December	88	115	88	83	82	11	14	12	10	10	4	5	5	6	6
Annual Avg.	83	81	91	91	88	12	12	12	12	13	4	4	5	6	6

Annexure B – 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	Department of Transport	Presently, awareness is being done in the Educational Institutes under SadakSurakhya Abhiyan	The public has to be motivated to play their role in curbing the air 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	NIL

							5. Public meetings- Monthly 6. Nukarnataks- Quarterly	
			Traffic Police	Organised 24 awareness camps 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 PCC centres will be linked with VAHAN 4.0 software of the Transport deptt.	31.03.2020	1. Preparation of RFP for selection of vendors - 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	NIL

							transport Deptt.- 1 Month	
3	CVE 3 - Extensive drive against polluting vehicles	Short Term	Traffic Police.	4 challans issued for violating vehicles with regard to invalid PUC certificates for month Jan & 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 improvement of parking infrastructure	NA	Municipal Council	No parking problem exists	No parking area has been proposed	-	-	NIL
	CVE 4 (b) – Enforcement	Short Term	Traffic Police.	4 challans issued uptoFeb 2019	Regular Challans of the vehicles parked at non- designated areas.	Regular activity	--	NIL
5	CVE 5 - Check fuel adulteration	Short Term	Department of Food and Civil	As informed by Deptt.of Food & Civil Supplies,	- State Level Coordinator, Oil Companies	Regular Activity	--	NIL

			Supplies/ Oil Industry	the Oil Companies have adopted Online Automated System for transportation & checking the density of Petrol/Diesel.	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 discrepancy is noticed then action against the violator shall be taken by State Level Coordinator of Oil Company.			
6	CVE 6 - Widening of road and infrastructure	Short term	PWD (B&R)	Construction of H/L Bridge 5 span 22 meters each crossing	Flyover and Roundabout identified and	27.09.2019	Estimation and Tendering- Completed	Rs. 4.25 Crore

	for decongestion of roads			Barari to Nangal up to Nangal Una road	work under progress.			
		Medium Term		Construction of 1 No. ROB at L- Crossing 88-C (1.375 Km)	Railway over bridge to be completed	07.06.2020	Estimation andTendering- Completed	Rs. 123.80 Crore
7	CVE 7 - Introduce intelligent traffic systems	NA	Municipal Council	Presently, conventional traffic light exists	No requirement of traffic intelligent system after construction of flyover	-	-	NIL
8	CVE 8 – Phasing out of commercial diesel vehicles more than 15 years old	Long term	Department of Transport.	New commercial diesel vehicles are 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
9	CVE 9 – Promotion of E- vehicles	Medium Term	Department of Transport.	Presently, most of the vehicles are running on diesel and petrol.	After approval from Competent Authority E- Vehicle policy	31.12.2019	1. Framing & Notification of E- vehicle policy – 9 months	NIL

				-Framing of the E-vehicle policy is in the final stages.	will be notified.		2. Providing public charging points for E-vehicles as per Govt. policy.	
10	CVE 10 (a) – Introduction of CNG based public transport (Infrastructure Development)	--	Department of Food & Civil Supplies	No CNG Stations exists	No CNG station required.	--	--	Nil
	CVE 10 (b) CNG based city bus service	Long term	Deptt. of Transport	At present no CNG based city bus service exists.	To take measures to introduce CNG based city bus service.		-	Nil
	CVE 10 (c) CNG based Autos/ Taxis	Long term	Deptt. of Transport	At present, no CNG based auto/ taxis exists.	To take measures to introduce CNG based auto/ taxis	-	-	NIL
11	CVE 11 – Retrofitting of particulate filters in diesel vehicles for BS-IV fuels	Medium term	Department of Transport	Presently, India is implementing BS-IV standards	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 under	NIL

							directions from Government of India as and when BS-VI fuels are available.	
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Annexure C – 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 Council	1.175 Km has been Identified to make pothole free	Identified road length to be repaired	31.10.2019	Estimation& tendering - Completed	Rs. 17.19 lacs
		Short Term	PWD	9 Km has been Identified to make pothole free	Identified road length to be repaired	31.07.2019	Estimation& tendering - Completed	Rs. 10 Lacs
2	CRD 2 (a) – Water sprinkling	Short Term	Municipal Council	1 km of Road length Identified for water sprinkling .	Regular Water sprinkling on identified road	Regular Activity.	-	NIL
	CRD 2 (b) – Procurement of Water sprinkler	NA		2 no. sprinklers hired for water sprinkling having a	No new water sprinklers to be procured.	NA	-	NA

				capacity of 6 KL each				
3	CRD 3 – Mechanical sweeping	Medium term	Municipal Council	Presently manual sweeping being done. 10 Km of Road length identified for mechanical sweeping	2 no. mechanical sweepers to be procured.	31.03.2020	1. Estimation – Under process 2. Tendering-2 month 3. Procurement - 4 month	Rs. 1.10 Crore
4	CRD 4 - Creation of green buffers along roadsides	Short Term	Municipal Council	9 Km Roads have been identified to be green buffered.	600 nos. of trees to be planted in the identified areas.	30.09.2019	1. Identification of roads-completed 2. Plantation-To be started in rainy season	NIL
		Short Term	PSIEC	250 Plants have already been planted.	375 trees to be planted along the identified industrial area roads.	Regular activity	Plantation-To be started in rainy season	Rs. 10 lacs
5	CRD 5 - Greening of Parks, open areas, community places, schools and	Short Term	Municipal Council	42 No. parks exists under MC.	-To ensure all public parks/schools/community places have adequate green plantation. -2 new parks to be constructed 1) Lic office	30.09.2019	Identification of open areas-Completed Work allotted completed Completion by 30.10.2019	Rs 35 lacs

	housing societies				2) Kilan Area			
6	CRD 6 - Water fountains at major traffic intersections	Medium term	Municipal Council	Identified 2 traffic intersections for installation of water fountains: 1. Rajiv Gandhi chowk 2. Sri Guru Gobind Singh chowk	To install water fountain at identified traffic intersection	31.03.2020	1. Identification- Completed 2. Estimation – underprocess 3. Tendering, Development & Commissioning- Within 12 months	Rs.2.00 lacs
7	CRD 7 (a) Kaccha/Brick Paved Roads to be made Pucca road	NA	Municipal Council	Not required	NA	NA	NA	NA
	CRD 7 (b) Existing roads requiring re-carpeting	Short Term	Municipal Council	10 km of the roads identified for recarpetting	Identified roads to be recarpetted	30.09.2019	Tendering- Under process	Rs. 45.02 lacs
		Medium term	PWD	Identified 9 kms of the roads for recarpetting	Re-carpeting of identified roads to be completed	30.11.2019	Identification, Estimation & Tendering- Completed.	Rs. 60 Lacs

		Short term	PSIEC	2.9 Km of existing roads identified for re-carpeting.	Identified roads to be recarpetted	31.03.2020	Estimation & Tendering - 6 months.	Rs.20.00 lacs
	CRD 7 (c) Pavement of road side using interlocking tiles to prevent road dust emissions	Short term	MC	16 km road length identified for Pavement by using interlocking tiles	Identified roads to be paved by using interlocking tiles	30.09.2020	Tendering- Under process	Rs. 1.05 Crore

Annexure D – 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	NA	Municipal Council	20 No. of compost pits already constructed 42 No. parks exists under MC	No new compost pits proposed.	-	-	NIL
2	CBGB 2 (a) – Control on burning of municipal solid wastes	Short term	Municipal Corporation	Burning of municipal solid wastes stands prohibited. No. of inspections - 28 No. of Challans - 17 No. Awareness camps in 2018 -3	Regular inspections to be continued for Control on burning of municipal solid wastes and Challans to be issued to the violators.	Regular activity	-	Nil
	CBGB 2 (b) – Infrastructure for Control on burning of municipal solid wastes	Short term	Municipal Council	MSW is being dumped unscientifically along Maujowal Nangal road.	To develop 2 dumping sites for scientific disposal at Ajauli road and Nangal Anandpur	30.09.2019	Identification-Completed.	NIL

					sahib road oppo. MP Kothi			
3	CBGB 3 – Control on burning of agriculture waste and crop residue	Short Term	Department of Agriculture, PSPCL, Police & PPCB, Revenue Department	Identification of sites by PRSC (PAU) Regular monitoring under supervision of DC In District Ropar, 4 challans issued in which total amount of Rs. 10,000/- imposed as Environmental compensation in year 2018 by PPCB	Enforcement by Team PPCB/ Department of Agriculture, PSPCL, Police & Revenue Department	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 the identified sites. 6.Imposing Environmental	NIL

							compensation on defaulters. 7. PSPCL shall ensure electricity for in-situ management 8. Progress review in District Level Air Quality Monitoring Committee meetings	
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Annexure E – 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 – Action against non-complying industrial units	Short Term	Punjab Pollution Control Board	Regular inspection as per policy of the Board	Action to be taken against defaulting industries	Regular activity	Regular inspections by PPCB	NIL

Annexure F – 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 Council	Inspection of bigger/commercial & road projects is being carried out as per need. No. of inspections - 5 No. of Challans - NIL	Regular inspection will be made for Control of Construction & Demolition waste. Counter verification to be done by ATP/EO.	Regular activity	Review in monthly meetings at District Level	Nil
	CCDA 1 (b) – Infrastructure of Construction & Demolition waste	Long term	Municipal Council	Presently no site for C&D waste disposal exists	2 No. of sites to be identified for handling of C&D waste.	31.03.2021	1. Land acquisition -One year 2. DPR -Three months 3. Tendering -Six months 4. Development & Commissioning - within 3 years.	-

2	CCDA 2 – Control measures for fugitive emissions	Short Term	Municipal Council	At present, minimal measures being taken by the building contractors.	Preventive measures to comply with the C&D Rules	Regular activity	1. Identification of construction sites 2. Checking for compliance of C&D Rules by challaning.	NIL
3	CCDA 3 – Ensure carriage of construction material in closed/ covered vessels.	Short Term	Municipal Council	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	Monthly review meetings at District Level	Nil

Annexure G – 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	NA	Punjab Pollution Control Board	One manual AAQM stations exists	-	-	Public awareness	NIL
2	COS 2 – Establish an Air Quality Management Division at SPCB HQ	Medium Term	Punjab Pollution Control Board	No such division exists	One required	31.03.2020	1. Develop methodology – 3 months 2. Providing infrastructure – 6 months 3. Implementation- 3 months	Rs 2.0 Lac
3	COS 3 – Setup helpline in city as well as SPCB HQ	Medium Term	Punjab Pollution Control Board	No such helpline exists	Providing helpline	31.03.2020	1. Providing infrastructure – 9 months 2. Implementation- 3 months	Rs 0.5 Lacs
5	COS 4 - Monitoring of DG sets and	Short Term	Punjab Pollution	1 challan issued by MC	No non-complying DG	Regular Activity	-	NIL

	action against violations		Control Board		sets should be allowed.			
6	COS 5 – Source Apportionment Study	Short Term	PPCB	Source Apportionment Study not carried out	Source Apportionment Study to be carried out through selected Agency.	31.03.2020	Selection of Agency Develop scope of work Allotment of work	Rs.5.00 lacs

Annexure H – 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 organized 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.
