BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,
Principal Bench, New Delhi
In
Execution Application No. 11/2017
IN
O.A. No. 159/2013 (M.A. No. 1169/2018, M.A. No.1715/2018 & M.A. No.20/2019)
WITH
Original Application No. 77/2016 (I.A. No. 74/2019 & M.A. No. 204/2019)

In the Matter of: -

All India Lokadhikar Sangathan — **Applicant(s)**

Vs.

Govt. of NCT of Delhi & Ors. — **Respondent(s)**

With

M/s Ashok Vihar Mitra Mandel — **Applicant(s)**

Vs.

Govt. of NCT of Delhi & Ors. — **Respondent(s)**

Index

(S. K. Gupta)
Scientist 'E'
Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar
Delhi-110032

Place: Delhi
Date: 16.07.2020.

Final Report in the Matter of M.A. No. 1715/2018 & M.A. No. 20/2019 In Execution Application No.11/2017, In O.A. No. 159/2013 With Review Application No. 01/2019 (I.A. No. 34/2019, I.A. No. 35/2019 & I.A. No. 49/2019, In Execution Application No.11/2017, In O.A. No. 159/2013 & O.A. No. 77/2016 With Review Application No. 07/2019 (I.A. No. 72/2019), Execution Application No.11/2017, In O.A. No. 159/2013 & O.A. No. 77/2016 With I.A. No. 74/2019 , In Original Application No. 77/2016; All India Lokadhikar Sangathan Versus Govt. of NCT of Delhi &Ors. With All India Lokadhikar Sangathan Versus Govt. of NCT of Delhi & Ors. With All India Lokadhikar Sangathan Versus Govt. of NCT of Delhi & Ors. With M/s. Ashok Vihar Mira Mandal Versus Delhi Pollution Control Committee & Ors.

This matter is related to illegally operating stainless steel pickling (SSP) industries in violation of Master Plan of Delhi in spite of orders of the Hon'ble Supreme Court in M.C Mehta Vs. Union of India & Ors. (2004) 6 SCC 588. and were required to be shifted out of Delhi, within three years from 23.09.2013. The major issues observed by Hon'ble NGT, in this matter, are as follows:

i) There is no amendment to the Master Plan.

ii) No study has been carried out, which can be the basis to justify amendment of the Master Plan.

iii) Mere setting up of ETPs/CETP is not enough to permit activities of prohibited industries in violation of the Master Plan.

iv) Huge amount of hazardous waste is being generated and dumped and is not being scientifically disposed.

Hon'ble NGT in its order dated 07/02/2019 directed as under:

> *"However, before considering the matter further, it is necessary to ascertain the impact of the industry on the air quality of Delhi, which is already polluted, on river Yamuna which is also subjected to severe pollution by several polluting activities, industrial as well as municipal, impact on the green belt and the inhabitants on account of huge hazardous waste already dumped and further potential for generation of such hazardous waste, if the pickling industry is to be allowed and the mechanism, if any, to deal with the poisonous liquids flowing in the area as depicted in the photographs caused damage to the environment, including the ground water. It is also necessary to ascertain the quantification of damage already caused and the cost of restoration of the environment, required to be*

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incurred.

The above question may also require conducting of carrying capacity of the area on the anvil of sustainable development in permitting such hazardous and polluting activity."

In the above matter, the Expert Committee, in its report of April 4, 2019, in compliance of order dated 7/2/2019, recommended to conduct a detailed study including assessment of carrying capacity considering all type of industries and other activities with potential of air, soil and water pollution generation in Wazirpur Industrial Area (WIA**)**, since Pickling is only one of the intermediate process industries linked with a number of other upstream and downstream industries in the region.

The CSIR-NEERI was assigned the task of conducting the study of the Wazirpur Industrial area, by the CPCB in November 6, 2019, in compliance of NGT Order, to conclude on the following points:

i) *Carrying Capacity of the Wazirpur Industrial Area;*

ii) *Assessment /quantification of the damage already caused to the environment and the cost of restoration;*

iii) *Mechanism by which pickling and other hazardous industries could be allowed in the Wazirpur Industrial Area without affecting the environment.*

The preliminary report of the study was submitted to Hon'ble NGT, by CPCB on 13/3/2020 with a request for granting time upto May 20, 2020, for submission of final report. After hearing the matter, in its order dated 16/3/2020 (**Annexure-1**), Hon'ble NGT observed and directed CPCB as under:

"Further time has been sought upto May 20, 2020 for submitting final report.

...CPCB may also ensure that final report of NEERI is furnished latest by 15.04.2020...."

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Due to Lockdown on account of Covid 19 pandemic, a prayer was made by CPCB to Hon'ble NGT on 29/4/2020 to consider the request for granting one & half month time, after lockdown period is over on May 3, 2020, for submission of final report.

Now, the Final Report of the CSIR NEERI has been received on 15/7/2020, which is submitted herewith as **Annexure-2**, for consideration of Hon'ble NGT.

The main conclusions and recommendations of CSIR-NEERI with regard to the following three issues are as follows:

I. *Carrying Capacity of the Wazirpur Industrial Area;*

II. *Assessment /quantification of the damage already caused to the environment and the cost of restoration;*

III. *Mechanism by which pickling and other hazardous industries could be allowed in the Wazirpur Industrial Area without affecting the environment.*

1. Carrying Capacity of the Wazirpur Industrial Area

The carrying capacity with respect to Air, Water (Drains and Ground Water), CETP, CETP Sludge & Soil in the Park, outside the CETP Premises was assessed by CSIR-NEERI as follows:

1.1. Air

Overall average (average of daily average concentrations at 3 locations) concentrations of PM_{10}, $PM_{2.5}$, NO_2 & SO_2 at Wazirpur Industrial Area (WIA) were found to be 234 µg/m^3, 147 µg/m^3, 72 µg/m^3 and 6 µg/m^3 respectively, whereas these values for Delhi (average of 17 locations) were found to be 228 µg/m^3, 156 µg/m^3, 58 µg/m^3 and 9 µg/m^3, respectively. Further analysis of two CAAQMS data of Ashok Vihar and Wazirpur sites indicates that PM_{10} & $PM_{2.5}$ levels are high (exceeding limits) during post-monsoon, winter and summer seasons and the trend is similar to that of the entire Delhi.

Therefore, it may be concluded that higher levels of PM_{10} and $PM_{2.5}$ are the outcome of various sources of air pollution in Delhi & NCR, and not limited to the activities taking place in the Wazirpur Industrial Area only.

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1.2. **Water:**

Drains: It was observed during the study that a PWD storm water drain is flowing into the WIA. This PWD storm water drain is carrying storm water/ wastewater/ sewage water from the up-stream of the WIA, and also from the WIA. The study team also observed that some of the individual industrial units are discharging the water/waste water into the storm water drains of the area. These storm water drains are ultimately mixing with the PWD drain entering the WIA and flowing out of the WIA without treatment. The average flow of the storm water drain as observed during the study was around 15 MLD.

pH of the drain water was found acidic in nature. The water quality characteristics of the drain water were almost similar to the waste water reaching the CETP through the conveyance system. This indicates that some of the individual units in the WIA are either not connected to the CETP conveyance system or they are discharging the untreated/partially treated industrial effluent into the storm water drains of the WIA. The untreated wastewater of storm water drain leads to the Yamuna river, thus causing water pollution.

The total pollution load (in terms of kg/hr or kg/day) of storm water drain was found to be much higher (upto 8 times with respect to different parameters) as compared to the wastewater stream passing through the CETP.

The discharge of industrial effluents in the storm water drains of the Wazirpur Industrial Area, is one of the most significant limiting factor w.r.t. carrying capacity of WIA. DPCC is required to identify such industries/discharges, to ensure that no industrial effluent is discharged illegally in the storm water drains. All the industrial effluent must be routed through CETP, for treatment and achievement of prescribed standards, before discharging into the environment.

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In view of the above, at present, the WIA can not be considered to have the carrying capacity to operate polluting industries, which generate acidic effluent containing hazardous heavy metals, till the time illegal discharges in the storm water drain ultimately leading to River Yamuna are stopped and all the effluent is routed to CETP, to achieve the prescribed norms before anything is discharged into the environment.

1.3. Ground Water:

With regard to ground water quality, it was found that the concentration levels of different parameters in WIA are less as compared to the levels observed in North West Delhi district. However, nitrate level was found to exceed the permissible limits, like other districts, indicating that it may be of geo-genic nature.

1.4. Existing CETP

The effluent flow to CETP was found in the range of 3.0 - 3.7 MLD, which is very less (about 14%) as compared to the design capacity of 24 MLD. pH of the waste water reaching the CETP was highly acidic in nature, which indicates that some of the industrial units did not neutralize the acid before its discharge into the CETP conveyance system. However, the pH of the treated water from the Wazirpur CETP is conforming to the discharge standards. Evaluation of the efficiency of CETP indicated that Wazirpur CETP is capable to achieve the effluent discharge standards for all the chemical parameters except for Fluoride, and FDS (fixed dissolved solids).

***The CETP requires improvement in performance with respect to the* discharge standards for FDS and fluoride. This becomes more significant in view of the fact that presently CETP is operated at just around 14% of its capacity. However, any addition of effluent load will further require proper assessment/ evaluation of CETP for its upgradation requirement (if any) to meet the standards for all the parameters.**

Utilization of CETP treated water was found to be very minimal/ negligible and after treatment, the treated water ultimately meets River Yamuna.

1.5. CETP Sludge

A huge amount of sludge is generated in the CETP (about 3 - 4 tons/day), which is at present is being stored in the CETP premises. This sludge contains high concentration of different metals like Cr, Cu, Fe, Mn, Ni, Pb, & Zn, which are removed from the wastewater in the treatment process. Presently, about 13000-15000 tons of sludge is stored within the premises of CETP, accumulated over the years, in the absence of any TSDF (Treatment, Storage and Disposal Facilities) in Delhi.

Apart from the above, Individual Industrial Units, generating acidic effluents, also generate hazardous sludge during preliminary treatment to neutralize the acidic effluent, before discharging to the conveyance system leading to the CETP. This hazardous sludge generated by individual industrial units is stored within their premises, in the absence of any TSDF in Delhi. The sludge (fresh as well as stored) is supposed to be disposed-off at a hazardous waste landfill site (TSDF), which is yet to be developed by DSIIDC.

The sludge can be utilized to manufacture bricks under the Rule 9 of Hazardous and Wastes (Management and Transboundary Movement) Rules, 2016. A trial is being made in this regard at M/s Bhiwadi Jal Pradushan Nivaran Association, Alwar, Rajasthan as per documents provided by CETP Society (**Annexure 6.1 of the Final Report**). DSIIDC and CETP Society should explore the possibility of manufacturing bricks/ tiles/ blocks etc. out of sludge generated/ stored at the Wazirpur CETP, by involving an institute with expertise in this field such as CSIR-CBRI (Central Building Research Institute, Roorkee) / CSIR- CRRI (Central Road Research Institute, New Delhi).

Since, at present, there is no TSDF in Delhi and the quantity of hazardous sludge is expected to go up considerably, if the industries which are closed at the moment, are allowed to operate without any proper arrangement for disposal of Sludge. Besides this, routing the illegally discharged effluent in the storm water drains of WIA, through CETP, will further add to the quality of hazardous waste.

In the absence of TSDF and any other option for disposal of hazardous sludge, Wazirpur Industrial Area can not be considered to have carrying Capacity w.r.t . Hazardous waste disposal. Under the circumstances, the CETP and the individual industry have to make adequate and safe provision for storage of sludge generated within their premises, till TSDF is developed.

On the same issue, possibility of transport/disposal of CETP sludge outside Delhi was explored. It was intimated by DPCC that M/s Green Gene Enviro Protection & Infrastructure Private Limited, Village Sighpur, Near Toll Naka, Tehsil Kapasan, Distt. Chittorgarh, Rajastahan-312207, has been granted authorization for collection and transportation of sludge from CETPs in Delhi, and for Pre-processing, Co-processing and disposal in Cement Plants of the said firm at Chittorgarh, Rajasthan vide HWM Authorization No. DPCC/HWM/2020/3096-3104 dated 04/02/2020 for a period of one year. This is based on the authorization granted to M/s Green Gene Enviro Protection & Infrastructure Private Limited by Rajasthan Pollution Control Board under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, with the condition that Authorization will cease if TSDF for hazardous waste in Delhi is made operational within one year.

However, examination of the authorization granted to M/s Green Gene Enviro Protection & Infrastructure Private Limited by Rajasthan Pollution Control Board under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, for operating a facility for collection, generation, pre-processing, storage, waste processing of Hazardous waste, vide No. F(HSW)/Chittorgarh (Kapasan)/2246 91)/2017- 2018/4290-430, dated 25/9/2018 indicated that the said agency is authorized to dispose off only 0.5 MT/annum of chemical sludge from wastewater treatment.

Therefore, with 13000-15000 MT sludge stored in Wazirpur Industrial Area (WIA) CETP, this agency may take 26000-30000 years to lift the sludge from CETP and hence, the authorization granted by DPCC to this agency as a temporary arrangement is not expected to serve any purpose of creating any carrying capacity with respect to the Hazardous Sludge Disposal, unless the agency is authorized to take away substantial quantity, so as to clear all the sludge in a year or so.

1.6. Soil (Park outside the CETP Premises)

Soil samples were collected from the Park outside the CETP premises at a depth of 1 ft and 2 ft. and were analysed for various physico-chemical parameters and metal content. Leaching potential of the soil samples was also assessed.

Metal content in soil samples collected from the Park outside the CETP premises in the present study was compared with the earlier study conducted by CPCB in 2019, wherein samples were collected from 9.5 ft. to 10.5 ft. depth. It was found that soil at 9.5-10.5 ft, appears to be a layer of sludge/ waste material mixed with soil. Evaluation of the data collected in both the studies indicates that the concentration of certain metals like Cr, Cu, Fe, Mn, Ni and Zn was relatively high at the depth of 10.5 ft and 9.5 ft , as compared to the contents of the metals observed at the 1-2 ft depth at the right-side corner of the Park.

Overall high level of metal content in the right side corner soil samples indicate the possibility of untreated water discharge or sludge dumping without taking measures to prevent contamination of soil. Non-leaching behaviour of metals observed at a depth upto 1-2 ft observed in the present study indicates that leaching might have already occurred beyond 2 ft. or stabilized. The quantum of damage occurred to the soil at lower depths requires further study/investigation by an expert agency, to suggest a proper restoration plan, if required. Otherwise, the said land/Park may be developed with green belt or for creating a facility for utilization of hazardous sludge generated in the Wazirpur Industrial area for brick manufacturing.

In view of the limitations explained above w.r.t. Water, Soil, CETP and hazardous waste disposal, allowing hazardous industries generating acidic effluents and chemical sludge such as Pickling and Electroplating may not be recommended, unless or until these limitations are removed to create adequate assimilative/ carrying capacity.

2. Assessment / Quantification of the Damage Already Caused to the Environment and the Cost of Restoration

During the study conducted by CSIR-NEERI, the damage caused to the Environment has been observed w.r.t. the following:

i. **Damage to Surface water, due to illegal discharge of industrial effluents in the storm water drain, which is leading to Yamuna River,**

ii. **Damage to surface water through the discharge of treated water from CETP without complying with the prescribed standards for FDS & Fluoride, leading to Yamuna River**

iii. **Damage to the soil in the park outside the CETP premises, due to illegal & un-scientific dumping of hazardous chemical waste without taking measures to prevent contamination of Soil (during 2008-2015).**

Accordingly, the assessment of the damage caused to the environment has been made, to recover the damage cost, for the restoration of the environment.

2.1. Assessment / Quantification of Damage caused to Surface Water/Storm water

The water quality characteristics of the drain water were found to be almost similar to that of the wastewater reaching the CETP through the conveyance system, which indicated that some of the individual units in the WIA are either not connected to the CETP conveyance system or they are discharging the untreated industrial effluent into the storm water drains of the WIA.

Though pH and the heavy metals are the main pollutants of concerns in the hazardous industries, generating acidic effluents such as pickling and electroplating industries, the damage assessment is considered in a holistic manner for the non-treatment of the effluent going into the surface water/storm water drains.

Total damage cost is considered as the cost saved/ benefits achieved by the concerned authority by not having proper wastewater/sewage treatment system in totality to the discharge standards for all the parameters. The key factors considered for environmental compensation/ damage cost are the capital cost for the treatment facility, O&M cost and anticipated environmental damage occurred over 5 years period as follows:

Environmental Damage Cost = Average capital cost of wastewater treatment facility + O & M Cost + Environmental damage occurred

Approximate capital cost for treatment of 15 MLD wastewater = Rs. 20.0 Cr. Operation & Maintenance cost (@ Rs. 30 Lakhs/month) = Rs. 3.6 Cr./year

Total O&M Cost for 5 Years = Rs. 18 Cr.

Environmnetal damage/ penality = Equivalent to O & M Cost

Total lum-sum Environmental Damage Cost for 5 years = Rs. 20.0 Cr. + Rs. 18.0 Cr. + Rs. 18.0 Cr. = **Rs. 56.0 Cr.**

The above cost does not include the cost of land for constructing the wastewater treatment facility.

Since SPCBs/PCCs are required to ensure that no industrial discharge/ illegal discharge is made into the storm water drains, <u>Rs. 56.0 Crores</u> towards Environmental Damage Cost as calculated above towards the damage caused to surface water through illegal discharge of industrial effluent/other wastewaters containing hazardous chemicals in the storm water drain, may be imposed.

DPCC may identify the sources of illegal discharges/ Illegal Industries involved in discharging the industrial effluent/other wastewaters containing hazardous chemicals to recover the total Environmental Damage Cost for restoration of the environment of the Wazirpur Industrial Area.

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Further, DPCC may be asked to ensure that discharge/ illegal discharge of industrial effluent/ other wastewaters containing hazardous chemicals into the Storm water drains is immediately stopped, ***failing which, additional Environment Damage Cost of Rs. 76.7 Lakhs/ month, as estimated below, may be imposed till the time discharge into the storm water drains, is stopped.***

Additional deterrent damage cost to prevent illegal discharge in future: Total of Annual O&M cost plus environmental damage cost and 10% on the capital cost of treatment facility; i.e. Rs. 3.6 + Rs. 3.6 Cr.+ Rs. 2.0 Cr. => Rs. 9.2 Cr./ annum (Rs. 76.7 Lakhs/ month).

2.2. Assessment/Quantification of Damage caused to Surface Water through discharge of Treated Water from CETP, without Complying with the Prescribed Standards for FDS and Fluoride

CSIR-NEERI carried out the overall performance evaluation of the CETP for the present operational practice and found that the CETP performed well with respect to removal of TSS (99%), BOD (92%), COD (87%) and metals (96-99.5%), except for Mn (85%) and Sr (25%). The system also helped in reduction of chemical parameters like chlorides, sulfates, nitrates, phosphates, ammonia and sulfide considerably (65-77% reduction). However, TDS & FDS levels increased as a result of required chemical dosing of lime and polyelectrolyte. pH raised to meet the discharge norm. ***All the physico-chemical parameters and metals were found to conform to the discharge norms, except for FDS and Fluoride, which were found to be beyond prescribed norms. Further, the CETP was found to operate only at 14% of its designed capacity of 24 MLD.***

It has been observed that concentrations of both the parameters, FDS and Fluoride were high in the treated water from CETP as compared to the inlet water to the CETP. This could be due to the following reasons:

a. The treatment regime in the CETP is Physico-chemical wherein the coagulants are added to remove the impurities. ***It appears that the coagulants are being added to the wastewater to remove the impurities; however, the precipitated impurities are not being removed efficiently.***

b. During the survey, it was also found that a large amount of sludge and silt has been accumulated in the treatment units of the CETP. It appears that this

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sludge and silt is increasing the FDS and Fluoride concentration in the treated water from the CETP. After the addition of coagulant and flocculants, the waste water is passed through the tube settler and then to Dual Media Filter and Activated Carbon Filter. ***It appears that these units are not working well at Wazirpur CETP and needed maintenance for optimal operation.***

Proper cleaning and change of some filters of the CETP would have helped in achieving the discharge norms for these parameters, to ensure that the receiving environment is not affected through the discharge of CETP treated water.

In view of the above, cost saved on maintenance and cleaning multiplied by an appropriate deterrent factor, i.e. <u>Rs. 1.5 Crores</u> (as calculated below) is recommended to be considered as environmental damage cost, to be imposed on CETP, for not complying with the prescribed norms.

Environmental Damage Cost to be imposed on CETP: Rs. 50 Lakhs (cost saved on maintenance) + Rs. 25 Lakhs as interest (@10%/year) x 2 as deterrent factor = Rs. 150 Lakhs (i.e. Rs. 1.5 Cr.).

Further, CETP Operator may be asked to clear the silt/sludge within 3 months, to improve the efficiency of CETP in order to comply with the prescribed parameters, to prevent further damage to the environment, failing which EC may be imposed by DPCC based on EC methodology developed by CPCB.

2.3. Assessment/Quantification of Damage to Soil in the Park outside CETP Premises

The study conducted by CSIR-NEERI at a depth of 1ft. – 2ft. and by CPCB at a depth of 9.5 ft.-10.5 ft. indicated overall high level of metal content in soil samples due to possible dumping of hazardous chemical sludge without taking measures to prevent contamination of soil. Non-leaching behaviour of metals observed at a depth upto 1-2 ft observed in the present study indicates that leaching might have already occurred beyond 2 ft. However, the quantum of damage occurred to the soil at lower depths requires further study/investigation to suggest a proper restoration plan.

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CPCB's "Guidelines on Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Wastes and Penalty", specifies an amount of ***Rs. 20 lacs - Rs. 3.5 Crores (depending on the small dump to large dump covering an area of more than 100 m²)*** *for Site Assessment/ Risk Assessment w.r.t. Dumping of hazardous wastes in Open grounds without secondary containment and an amount of Rs. 1 Crore – Rs. 25 Crores for remediation.*

Since the area of land directly affected in this matter is about 2000 m², it is recommended that an amount of Rs. 3.5 Crores may be imposed for Site Assessment/ Risk Assessment to be made by an expert agency and for preparing a remediation plan.

Based on the documents examined by CSIR-NEERI on this issues, it was observed that the land situated adjoining to the boundary wall and entrance of the CETP Wazirpur Plant (presently referred as CETP Park), was identified for developing it as the temporary hazardous waste storage facility, wherein some hazardous waste was already dumped, any time during 2008-2015. Therefore, dumping of CETP sludge in open area in front of CETP premises was known to all the concerned Authorities/Departments, however, no timely action and measures were taken to prevent the damage to the soil.

In view of the above, an Environmental Cost of Rs. 3.5 Crore is proposed for making site assessment/risk assessment of the contaminated site by an expert institute and for preparation of remediation plan. This may be recovered proportionately from the Agencies involved in Operation of CETP during 2008- 2015.

3. Mechanism for Allowing Pickling and Other Hazardous Industries in the Wazirpur Industrial Area without affecting the Environment

In view of the fact that the Individual Industries in the Wazirpur Industrial Area have installed Primary ETP, to neutralize the acids and remove metal contaminants, before conveying the effluent to CETP for further treatment; and CETP is operating at only 14% capacity and has the adequate hydraulic treatment capacity to take care of additional quantities of effluent, Pickling and other hazardous industries could be

allowed in the Wazirpur Industrial Area without affecting the environment, ***only if excluded from the negative list of Master Plan of Delhi-2021 (MPD-21) by Union Urban Ministry based on the applicable criteria,*** subject to the following mechanism/conditions, within the available assimilative/ carrying capacity of WIA:

1. ***Illegal discharge of Industrial Effluents into the storm waters is stopped*** and all the effluent is routed through CETP only. DPCC is required to ensure the stoppage of all the illegal discharges into the environment.

2. ***CETP is upgraded to enhance efficiency*** w.r.t. treatment and achievement of norms for different parameters, with additional pollution load, expected after starting operation of such industries.

3. ***Arrangement for disposal of Hazardous sludge already stored within the premises of CETP & Individual Industrial Units and also the additional higher quantity of hazardous sludge***, to be generated is made either in TSDF which is yet to be established by DSIIDC besides creating an adequate facility to store fresh Hazardous sludge at CETP or Establishment of Common Acid Recovery Plant, for recovery & reuse of acids in the process with the minimized generation of hazardous sludge.

4. Spent acid generated from acid bath can be treated separately by installing an appropriate acid recovery plant in CETP premises.

5. Typical pollution load from a pickling industry with 5 TPD capacity has been presented in the following table, which may be used by DPCC to estimate the number of pickling units, which can be allowed to operate with the assimilative capacity, if permitted by Hon'ble NGT.

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Table : Waste Generation Scenario from a Typical 5 TPD Pickling Industry

Sr. No.	Item	Value
1.	SS Production Capacity, tons/day	5
2.	Sulfuric Acid Consumption, litres (@10L/ton)	50
3.	Hydrochloric Acid Consumption, litres (@10L/ton)	50
4.	Water Consumption, litres (@2000 L/ton)	10,000
5.	Domestic Water Consumption, litres (@2000 L/unit)	2,000
6.	Total Wastewater Generation, (considering 100% in effluent), litres	12,100
7.	Spent Acid Generation from Acid Bath, litres (@4 L/ton)	20
8.	Spent Acid Sludge Generation from Acid Bath, kg (@2 kg/ton)	10
9.	Scale/impurities Generation from Washing, kg @15 kg/ton	75

The detailed Report of the CSIR NEERI is submitted herewith as **Annexure-2**, for consideration of Hon'ble NGT.

S.K. Gupta
Scientist 'E'
Central Pollution Control Board

July 16, 2020

ANNEXURE-I

Item Nos. 02 & 03 Court No. 1

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Execution Application No. 11/2017
IN
O.A. No. 159/2013
(M.A. No. 1169/2018, M.A. No.1715/2018 & M.A. No.20/2019)
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All India Lokadhikar Sangathan Applicant(s)

Versus

Govt. of NCT of Delhi & Ors. Respondent(s)

With

M/s Ashok Vihar Mitra Mandel Applicant(s)

Versus

Govt. of NCT of Delhi & Ors. Respondent(s)

Date of hearing: 16.03.2020
Date of uploading of order: 20.03.2020

CORAM: **HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON**
HON'BLE MR. JUSTICE SHEO KUMAR SINGH
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER

ORDER

1. This order is being passed in continuation of order dated 19.11.2019. The proceedings in the matter are off shoot of directions of the Hon'ble Supreme Court in *M.C Mehta Vs. Union of India & Ors. (2004) 6 SCC 588.* The subject matter is illegally operating stainless steel pickling industries in violation of Master

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Plan of Delhi in spite of orders of the Hon'ble Supreme Court and this Tribunal directing closing thereof.

2. The matter was last considered on 19.11.2019 in the light of earlier order of this Tribunal dated 16.10.2018, order of the Hon'ble Supreme Court dated 14.12.2018 in *C.A. No. 11726-11727 of 2018*, giving liberty to file a review and further order of this Tribunal dated 07.02.2019 in the light of the said order of the Hon'ble Supreme Court. The Tribunal considered the report of the Expert Committee comprising representatives of CPCB, NEERI and IIT Roorkee dated 05.04.2019 recommending as follows:

> "
> - ***The operator of the CETP facility is liable for environmental damages caused due to improper handling of hazardous waste and shall be directed to take immediate response measures and environmental site assessment and remediation (if required) as per the guidelines published by CPCB "Guidelines on Implementing Liabilities for Environmental Damages due to Handling &Disposal of Hazardous Waste and Penalty.***
> - *CETP society may be directed to engage a 3rd party consultant having relevant experience to carry out detailed environmental site assessment as per the aforesaid guidelines of CPCB within one month. They shall submit a report to DPCC on detailed site assessment within 4 months thereafter.*
> - *Penalty may be imposed on CETP society for improper handling or disposal of CETP sludge.*
> - ***Since there is no common TSDF in Delhi/ CETP society shall create additional sludge storage facility till the time such common facility is established.***
> - *CETP society shall provide shed on the sludge storage area near the tertiary treatment units.*
> - *CETP society shall ensure that sludge removed from filter press should not be stored in open and it shall be ensured that dewatered sludge is lifted immediately and shifted to sludge storage area."*

"9. The report further refers to the CPCB assessment of the performance of CETPs conducted in January – February, 2019 finding as follows:

> ***"Analysis of the performance data of CETPs reveals that none of the three CETPs is achieving the prescribed standards.***
>
> ***In Wazirpur CETP/ the parameters of BOD (70 mg/I>30 mg/I/ F (14 mg/I>2 mg/I/ NO_3-N (96 mg/I>10 mg/I/ O&G (18 mg/I>10 mg/I/ FDS (6388 mg/I>2100 mg/I/ Fe (7.82 mg/I >3 mg/I) and Mn (719 mg/I >2 mg/I) were found significantly higher in concentration than prescribed standards.***
>
> ***In Badli CETP, the parameters of BOD (78 mg/I>30 mg/I) F (19. 66 mg/I>2 mg/I/NO_3-N (26 mg/I>10 mg/I) SO_4(1209 mg/I>1000 mg/I)FDS (2396 mg/I>2100 mg/I) and Fe (4. 74 mg/I>3 mg/I) were found much beyond the prescribed standards.***
>
> ***In SMA CETP, the parameters of FDS (5360 mg/I>2100 mg/I), SO_4 (1639 mg/I>1000 mg/I/ Cl (1104 mg/I>1000 mg/I), CN- (0.66 mg/I>0.2 mg/I) were reported higher than prescribed standards.***
>
> ***It is evident from the above assessment carried out by CPCB that CETPs having membership of Steel Pickling units are not meeting the prescribed norms even in the absence of Effluents from Steel Picking Units. Once these CETPs start receiving effluents from Steel Pickling units/ the values of parameters specific to steel pickling units such as Fe/ NO_3-N SO_4 and Fare expected to further go up."***

"10. The Expert Committee visited site on 28.03.2019. Conclusions and recommendations of the Expert Committee are as follows:

> *"The Expert committee could neither see nor study the adequacy and performance of Primary Effluent Treatment facilities of the Pickling Industries/ since the pickling industries were not in operation as per directions of DPCC. For the same reasons/ the Expert Committee could not assess the impact of pickling industries on air and river Yamuna as well.*
>
> *Since, CETP is not receiving effluent from Steel pickling Units at the moment the assessment of the performance of CETPs for treatment of effluents from Steel Pickling Units could not be made by Expert Committee.*
>
> *The findings of earlier reports (CPCB and NEERI) indicate that CETP installed to treat the wastewater/ effluent generated in the Wazirpur Industrial Ares needs to be revisited to ensure proper treatment of the*

effluent generated not only from Steel Pickling Industries but also from mixed effluents received from other industries/ activities of the area as well.

It is recommended to conduct a detailed study including assessment of carrying capacity considering all types of industries and other activities with potential of sir, soil and water pollution generation in this industrial area, since Pickling is only one of the intermediate process industries linked with a number of other upstream and downstream industries in the region. This study will also involve evaluation of CETPs for suggesting better pre-treatment of pickling liquor, cleaner production improved air pollution control measures and upgradation of CETPs for tertiary treatment including nitrogen removal. This study may be undertaken under the supervision of the Expert Committee constituted as per Hon'ble NGT Order in this matter and is estimated to take 6 months' time for completion of the study and preparation of the report.

The Joint Expert Committee shall abide by the directions of Hon'ble NGT in this matter."

3. It was further observed:

"13. ***The order dated 18.07.2019 shows serious ground situation on account of unscientific storage of hazardous waste. According to the Chief Secretary, the hazardous waste stored is 60,000 tonnes. We are informed that the said hazardous waste is lying since 2014. No serious action has been taken by the Authorities in Delhi on the subject. Liability of CETP for such serious violation has not been determined in spite of directions of this Tribunal. Since all these facts have been brought to the notice of the Chief Secretary, we expect further complete action in the matter within two months and a report from the Chief Secretary.***

14. *We may also note the allegation that apart from units connected to CETP, huge pollution is being caused by the units not so connected to CETP. The DPCC has not carried out any serious assessment in respect thereof. It is necessary to ascertain the manner of disposal of hazardous waste by such units and impact on the recipient environment so as to plan further remedial action in accordance with the Water (Prevention and Control of Pollution Act, 1974, the Air (Prevention and Control of Pollution Act, 1981, the Environment (Protection) Act, 1986 and ruled framed including Hazardous (Waste Management and Handling) Rules,*

2016. Let the whole process be completed positively by 15.01.2020 including the tangible progress on setting up of TSDF and affidavit of compliance by 20.01.2020 by e-mail at judicial-ngt@gov.in.

15. *The CPCB has not completed the task assigned under order dated 18.07.2019 and has filed a report seeking more time. Let complete steps for the purpose be taken in the same manner and further status report filed by 20.01.2020 by e-mail* judicial-ngt@gov.in.

16. *The study to be carried out at the instance of CPCB by NEERI may be completed within three months as the same data base is already available.* ***Setting up of TSDF may also be completed latest by June, 2020 positively failing which the Managing Director, DSIIDC may not be entitled to draw salary from 01.07.2020, till compliance and entry about non performance may have to be made in service record."***

4. Accordingly, following reports / responses have been filed:

i. Affidavit of compliance for setting up of Treatment, Storage and Disposal Facility (TSDF) by Delhi State Industrial & Development Corporation Ltd. (DSIIDC) filed on 12.03.2020.

ii. Action taken report on behalf of the Delhi Pollution Control Committee (DPCC) in terms of the order dated 19.11.2019 filed on 12.03.2020.

iii. Progress report filed by CPCB on the subject of carrying capacity of the Wazirpur Industrial Area and also evaluation of CETP and request for extension of time line in the matter of *O.A. No. 159/2013* titled as *All India Lokadhikar Sangathan Vs. Govt. of NCT of Delhi & Ors.* filed on 13.03.2020.

5. We proceed to consider the matter further in the light of the above.

6. The stand of the DSIIDC is that work of development of TSDF has been awarded to M/s TNWML. Letter of Commencement of work has been issued to the said party on 17.12.2019. The work is to be

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completed by June 2020. The EAC of MoEF&CC has issued Terms of Reference (ToR) for grant of Environmental Clearance (EC) on 26-27/12/2019. Further action is to be taken only after grant of EC by MoEF&CC and Consent to Establish by DPCC and other statutory clearances.

7. Action taken report of DPCC is that in the light of directions issued by DPCC on 06.12.2019, 19 pickling units were closed which was followed by further directions for vigil on the said units. Surveillance team was constituted and it was found that 15 units had restarted their operations in the first quarter of 2019 which were again closed and compensation assessed for the violation. Recovery certificates have been issued for unrealized compensation. In December 2019 and January 2020, nine units more were found to be operating clandestinely which have been closed and FIR lodged. DPCC has asked the pickling units to remove plant and machinery. 29 units have removed plant and machinery and four are in the process.

Action has also been initiated to fix liability on CETP for failing to handle hazardous waste. DPCC has assessed compensation of Rs. 13.5 crores on 09.03.2020. Further action has been initiated to detect the units which are not connected to the CETP. 91 such units have been identified. 86 units have been connected and five are yet to be connected. Compensation has been assessed against 67 units out of 91 units and recovery certificates have been issued on 06.03.2020 for unrealized compensation. 23 units were engaged in discharge of effluents. Seven units were found violating the Hazardous Waste Rules for

(2)

which compensation has been assessed and recovery certificate has been issued on 06.03.2020. 60000 MT of hazardous waste is lying stored. Contract has been given for TSDF facility by the DSIIDC for which EC has yet to be issued.

8. Report of the CPCB deals with the carrying capacity of the Wazirpur Industrial Area and also evaluation of CETP in the said area. It is stated that the study was entrusted to NEERI which has furnished preliminary draft report on 12.03.2020, inter-alia, as follows:

> ***"I. Soil:***
>
> *Metal Content in the soils was assessed and was compared with Canadian standards 2002.* ***It was found that the concentration of trace metals was higher with respect to Cu, Pb, Ni &Cr in the park soil and Cr in garden outside CETP office soil.***
>
> ***II. Water and Waste Water (WIA and Wazirpur CETP):***
>
> *The data generated for assessing the carrying capacity on Air, Soil and water indicates* ***that exceedance of various environmental parameters.*** *However, further analysis is required w.r.t adequacy of pretreatment facilities of individual industries of the area and CETP as well, to take care of effluent from all the industries, if connected to CETP and subsequent impact on the carrying capacity, in order to decide the number and type of industries which could co-exist in the Wazirpur Industrial area.*
>
> ***III. Damage Assessment:***
>
> *The data generated by CSIR-NEERI was reviewed.* ***The data indicates the damage caused to the air, water and soil on account of exceedance of various environmental parameters.*** *However, further study and analysis is required for quantification in terms of contribution by different sources, environmental damage in monetary terms and Cost of restoration."*

9. Further time has been sought upto May 20, 2020 for submitting final report.

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10. In the light of the above reports, while the unsatisfactory state of affairs is self-evident and so is failure of the statutory authorities to take adequate remedial action, there is continuing harm to the environment and public health for which not only the violators of law but also the authorities have to be held accountable by way of prosecution, recovery of compensation and/or disciplinary action. We particularly find and record serious failure on the part of Managing Director of DSIIDC who may be liable to be dealt with individually for his failure. We hope that adequate demonstrable steps are now taken in the matter.

11. Having regard to the continuing damage to the environment, we direct MoEF&CC to adopt a shortened timeline for grant of EC by using a special mechanism for dealing with the emergency situation so as to ensure that grant of EC is not delayed beyond 15.04.2020 which is the date fixed for public hearing.

12. CPCB may also ensure that final report of NEERI is furnished latest by 15.04.2020. DPCC may ensure recovery by closing the defaulting units including the members of the association of CETP in view of emergency situation existing on the ground noticed above.

13. Delhi Government has not paid the amount of Rs. 35 crores liable to be paid in the light of order dated 16.10.2018 passed by this Tribunal read with order of the Hon'ble Supreme Court dated 14.12.2018 and further order of this Tribunal dated 18.07.2019. The same may now be deposited within one month which will be the responsibility of the Chief Secretary, Delhi. CPCB may take

steps in case of default. The amount recovered may be spent for restoration as per an approved action plan.

14. DPCC must ensure stringent action against clandestine operation of industries in violation of orders of this Tribunal and for recovery of compensation already assessed. Action may also be taken to ensure that CETP performance is as per standards. If the defaults continue further action may be taken in accordance with law. The amount recovered may be spent for restoration as per an approved action plan. Till establishment of TSDF and upgradation of CETP no new industry be permitted in the industrial areas.

15. Let a further action taken reports be filed before the next date by e-mail at judicial-ngt@gov.in.

A copy of this order be sent to the Chief Secretary, Delhi, MoEF&CC, CPCB, DSIIDC and DPCC by e-mail.

List for further consideration on 05.05.2020.

Adarsh Kumar Goel, CP

S.K. Singh, JM

Dr. Nagin Nanda, EM

March 20, 2020
Execution Application No. 11/2017
& other connected matter
DV

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ANNEXURE II

मी.एस.आई.आर.- राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसन्धान संस्थान
दिल्ली क्षेत्रीय केंद्र, ए – 93, 94, फेज -I
नारायणा औद्योगिक क्षेत्र, नई दिल्ली – 110 028, भारत
मुख्यालय: नेहरू मार्ग, नागपुर – 440020, महाराष्ट्र

CSIR-National Environmental Engineering Research Institute, Delhi Zonal Centre, A-93/94, Phase-I, Naraina Industrial Area, **New Delhi – 110 028, India**
Headquarter: Nehru Marg, Nagpur - 440020, Maharashtra

From:
Dr. S.K. Goyal
Chief Scientist & Head

NEERI-DZC/ WIA-CC/2020/ **July 14, 2020**

To,
The Member Secretary
Central Pollution Control Board
Parivesh Bhawan, East Arjun Nagar,
Delhi 110032
Email: mscb.cpcb@nic.in

Sub: "Assessment of Carrying Capacity of Wazirpur Industrial Area with Possibility of Existence of Pickling Industries in the Region in an Environmentally Sustainable Manner"- *Submission of Final Report reg.*

Ref: Study Awarded by CPCB to CSIR-NEERI in reference to the Hon'ble NGT matter of O.A. No. 159/2013; All India Lokadhikar Sangthan Vs. Govt. of NCT of Delhi & Ors.

Sir,

Please find attached copy of the Final Report titled "**Assessment of Carrying Capacity of Wazirpur Industrial Area with Possibility of Existence of Pickling Industries in the Region in an Environmentally Sustainable Manner**" awarded to CSIR-NEERI by CPCB in November 2019, in reference to the Hon'ble NGT matter of O.A. No. 159/2013; All India Lokadhikar Sangthan Vs. Govt. of NCT of Delhi & Ors.

The Report contains a total of 173 pages (including Coverpage and 12 Annexures). Kindly acknowledge receipt of the report.

Thanking you for the opportunity given to CSIR-NEERI to undertake this important study.

Your's sincerely,

Goyal 14.7.2020
(S.K. Goyal)

डा. एस.के.गोयल / Dr. S.K.Goyal
वैज्ञानिक एवं मुख्य / Scientist & Head
सीएसआईआर-नीरी दिल्ली अंचल केंद्र
CSIR-NEERI Zonal Center
ए-93/94, फेज-I, नारायणा औद्योगिक क्षेत्र
A-93/94, Phase-I, Naraina Industrial Area,
नई दिल्ली-110 028
New Delhi-110 028

Copy to:

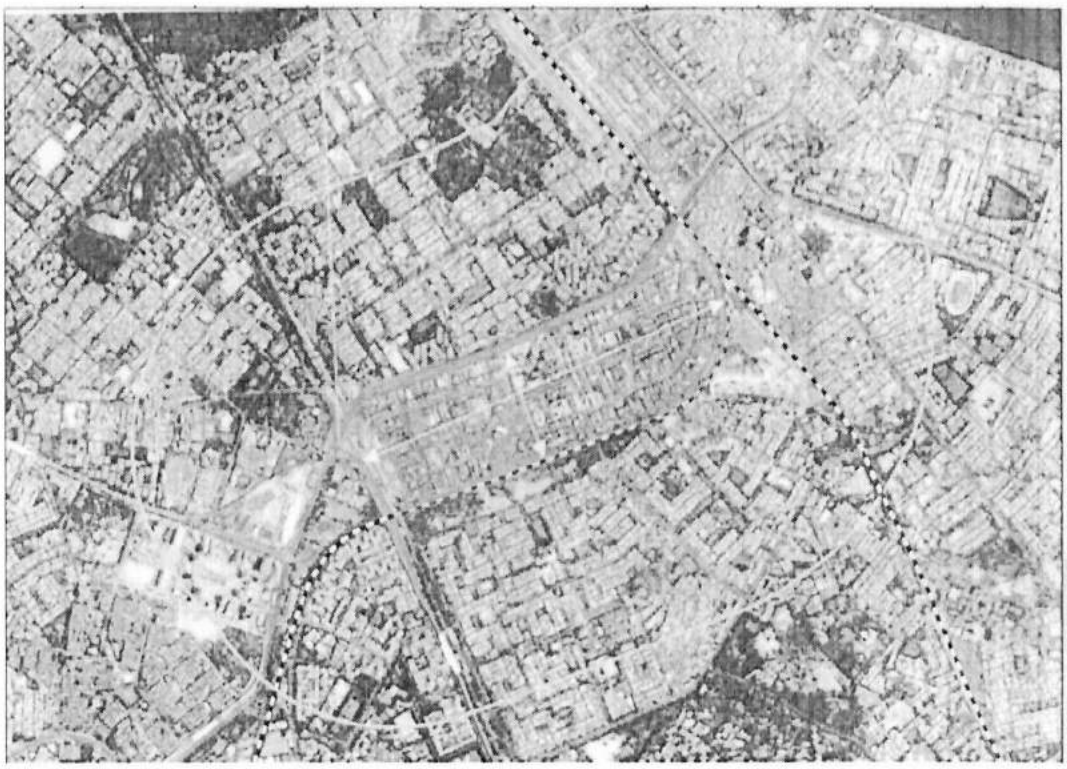
1. Dr. S.K. Gupta, AD & Div. Head, IPC-V, CPCB, Delhi (ipc5division.cpcb@gov.in)
2. Dr. Rakesh Kumar, Director, CSIR-NEERI, Nagpur (director@neeri.res.in)

Phone: +91 11-45609107; Telefax: +91 11-45609106; Email:sk_goyal@neeri.res.in;goyalneeri@gmail.com

Final Report

Assessment of Carrying Capacity of Wazirpur Industrial Area with Possibility of Existence of Pickling Industries in the Region in Environmentally Sustainable Manner

(In reference to Hon'ble NGT Order dated 07.02.2019 & 19.11.2019 wrt Case No. OA 159/2013)



For

Central Pollution Control Board, Delhi

CSIR-National Environmental Engineering Research Institute (NEERI), Delhi Zonal Centre, Naraina, New Delhi 110028

July, 2020

CSIR- NEERI Study Team
(Delhi Zonal Centre, New Delhi)

Project Guide	Dr. Rakesh Kumar	Director, CSIR-NEERI, Nagpur
Project Leaders	Dr. S.K. Goyal	Chief Scientist & Head, CSIR-NEERI, Delhi Zonal Centre
	Dr. Raman Sharma	Sr. Scientist
Team Members		
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	Ms. Priyanka Saxena	Sr. Scientist
	Dr. Sunil Gulia	Sr. Scientist
	Dr. Mamta Prakash	Sr. Technical Officer (3)
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	Mr. Shubham Kumar	Project Assistant II
	Mr. Saurabh Mendiratta	Project Assistant II
	Ms. Archana Kumari	Project Assistant II
	Ms. Prachi Goyal	Project Assistant II
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	Ms. Usha Tripathi	Project Assistant III
	Mr. Deepchand	Project Assistant III
	Ms. Neha Yadav	Project Assistant III
	Ms. Renu Daulta	Research Associate I

Acknowledgement

The data/reports/inputs/support provided by the various concerned officials of CPCB, DPCC, DSIIDC, CETP Society and Individual Industries in the Wazirpur Industrial Area, which has become the basis of this study, is thankfully acknowledged.

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Chapter 1

Introduction

1.1 Background

This has reference to the Hon'ble National Green Tribunal (NGT) Order dated 07/02/2019 related to Wazirpur Industrial Area, in the matter of M.A. No. 1715/2018 & M.A. No. 20/2019 in Execution Application No. 11/2017 in OA No. 159/2013; All India Lokadhikar Sangathan Vs Govt. of NCT of Delhi & Ors. The main content of the order is:

> *"However, before considering the matter further, it is necessary to ascertain the impact of the industry on the air quality of Delhi, which is already polluted, on river Yamuna which is also subjected to severe pollution by several polluting activities, industrial as well as municipal, impact on the green belt and the inhabitants on account of huge hazardous waste already dumped and further potential for generation of such hazardous waste, if the pickling industry is to be allowed and the mechanism, if any, to deal with the poisonous liquids flowing in the area as depicted in the photographs caused damage to the environment, including the ground water. It is also necessary to ascertain the quantification of damage already caused and the cost of restoration of the environment, required to be incurred.*
>
> *The above question may also require conducting of carrying capacity of the area on the anvil of sustainable development in permitting such hazardous and polluting activity."*

To enable this to be done, Hon'ble NGT constituted an Expert Committee comprising representatives from a senior scientist of CPCB, a senior scientist of NEERI and a senior scientist of IIT Roorkee. The nodal agency shall be CPCB.

In compliance to the above, the Expert Committee visited the site on March 28, 2019 and submitted its report on April 5, 2019 to Hon'ble NGT. The report submitted by the expert committee concluded that:

> *"It is recommended to conduct a detailed study including assessment of carrying capacity considering all types of industries and other activities with potential of air, soil and water pollution generation in this industrial area, since Pickling is only one of the intermediate process industries linked with a number of other upstream and downstream industries in the region. This study will also involve evaluation of CETPs for suggesting better pre-treatment of pickling liquor, cleaner production, improved air pollution control*

measures and upgradation of CETPs for tertiary treatment including nitrogen removal. This study may be undertaken under the supervision of the Expert Committee constituted as per Hon'ble NGT Order in this matter and is estimated to take 6 months' time for completion of the study and preparation of the report."

In view to the above, CPCB approached Director, CSIR-NEERI, Nagpur vide letter No. IPC-V (SSI)/2019/ R-1 dated June 21, 2019 (copy attached as **Annexure 1.1**) to conduct the desired study as recommended by the Expert Committee (NEERI Scientist being part of the Expert Committee) for better coordination and supervision. Understanding the concern and study requirement, the following study was proposed.

1.2 Study Undertaken by CSIR-NEERI

1.2.1 Brief Introduction about Pickling Industry

There are about 100 pickling industries in the Wazirpur industrial area, which serve as an *intermediate small-scale industry* for steel utensils manufacturing units. The basic purpose of this industry is to remove stains from stainless steel sheets using cold and hot process. Sulfuric acid/ nitric acid is used in the process, which leads to generation of acid fumes and highly acidic wastewater. The wastewater generated from the industries is connected to the CETP located in Ashok Vihar area through the conveyance system/ drain. Various processes/ activities in the pickling industries carried out in a confined area, are expected to have adverse impacts on the surrounding region. These need to be identified, assessed/quantified and appropriate strict control measures are to be adopted for their possible continuation in the same region.

1.2.2 Study Objectives

- To assess the carrying capacity of Wazirpur Industrial Area with the possibility of continuation of existing Pickling Industries in the region in an environmentally sustainable manner.
- To determine the extent of damage occurred due to pickling industries, with its valuation, and cost of restoration of the environment in the region.

1.2.3 Scope of Work

A. Study of Present Landuse/Landcover of Wazirpur Industrial Area and Status of Infrastructural Facilities

- Study of present landuse/landcover based on remote sensing data of Wazirpur industrial area (WIA)
- Mapping of different types of industries (including pickling industries) with

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process details located in the WIA – Questionnaire based survey/ interaction with industries association

- Mapping of other activities (commercial/residential) in the WIA
- Mapping of infrastructural facilities (roads, water supply-sanitation, power supply etc.) in the WIA
- Status of solid and liquid waste generation and disposal facilities
- Details of population residing within the WIA and adjacent area within 1 km.

B. Assessment of Present Environmental Quality Status of WIA (through Field Studies)

B.1 Status of Air Quality

- Representative sampling at 3-4 locations for relevant parameters (PM_{10}, $PM_{2.5}$, SO_2, NO_2, H_2S, NH_3, chemical characterization of PM_{10} & $PM_{2.5}$ for anions, cations and heavy metals) shall be done continuously for 3 days during daytime and night time at select locations. The sampling shall be done during critical seasons/month in Post monsoon (Oct-Nov)/Winter (Dec-Jan).

B.2 Status of Water/Wastewater Quality

- Water body (if any): Grab sample collection and analysis for various physico-chemical, bacteriological parameters and heavy metals
- Source of fresh water for industrial purpose and consumption details
- Status of ground water abstraction (if any) and quality
- Wastewater drains (not connected to CETP), if any: Grab sample collection and analysis for various physico-chemical, bacteriological parameters and heavy metals
- Evaluation of CETP Facility: Review/Evaluation of CETP system and analysis of inlet and outlet wastewater with respect to different relevant parameters

B.3 Status of Solid and Hazardous Wastes and other Aspects

- Status of Industrial and Municipal Solid Waste Generation and disposal practices
- Assessment of noise levels in the WIA at select locations
- Assessment of soil quality (if any) wherein untreated wastewater is directly used for land discharge
- Status of parks and gardens/green spaces in the WIA.

C. Study of Existing Pickling Industries in WIA

- Study of process adopted by pickling industries with material balance (input and output materials) for each unit
- Quantification of wastes generated (wastewater, solid waste, air emissions)
- Waste management practices adopted by individual unit for air, wastewater and solid waste
- Assessment/prediction of likely impacts by pickling industries on the surrounding environment
- Analysis of possible impact of pickling industries on upstream & downstream industries in WIA.

The above aspects shall be studied through questionnaire survey, interaction with industrial associations, CETP Society, DSIIDC, DPCC, CGWB, and other concerned stakeholders. A joint meeting of all the stakeholders (including the representative from All India Lokadhikar Sangthan) shall be required with CPCB for better cooperation, coordination and timely inputs.

D. Analysis of Carrying Capacity of the Wazirpur Industrial Area (WIA)

- Scenario 1: Status of WIA without Pickling Industries
- Scenario 2: Expected Status of WIA with Pickling Industries as such with existing practices
- Scenario 3: Expected Status of WIA with Pickling Industries after adoption of strict control measures
- Delineation of Environmental Management Plan for WIA under Different Scenarios to make the region environmentally sustainable.

E. Assessment of Damage Occurred, its Valuation and Cost of Restoration

Based on the environmental quality status and improvement needs in the region due to different activities and by the pickling industries, extent of damage occurred (with associated cost) and cost of restoration of the same shall be estimated.

Keeping in view the study objective, scope of work and availability of data for the study region, the study has been conducted and report is presented in the following Chapters as:

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Chapter 1: Introduction

Chapter 2: Details of Study Region with Landuse /Landcover Analysis

Chapter 3: Environmental Quality Status of WIA

Chapter 4: Status of Existing Pickling Industries in Wazirpur Industrial Area

Chapter 5: Summary of Study Findings

Chapter 5: Conclusion and Recommendations

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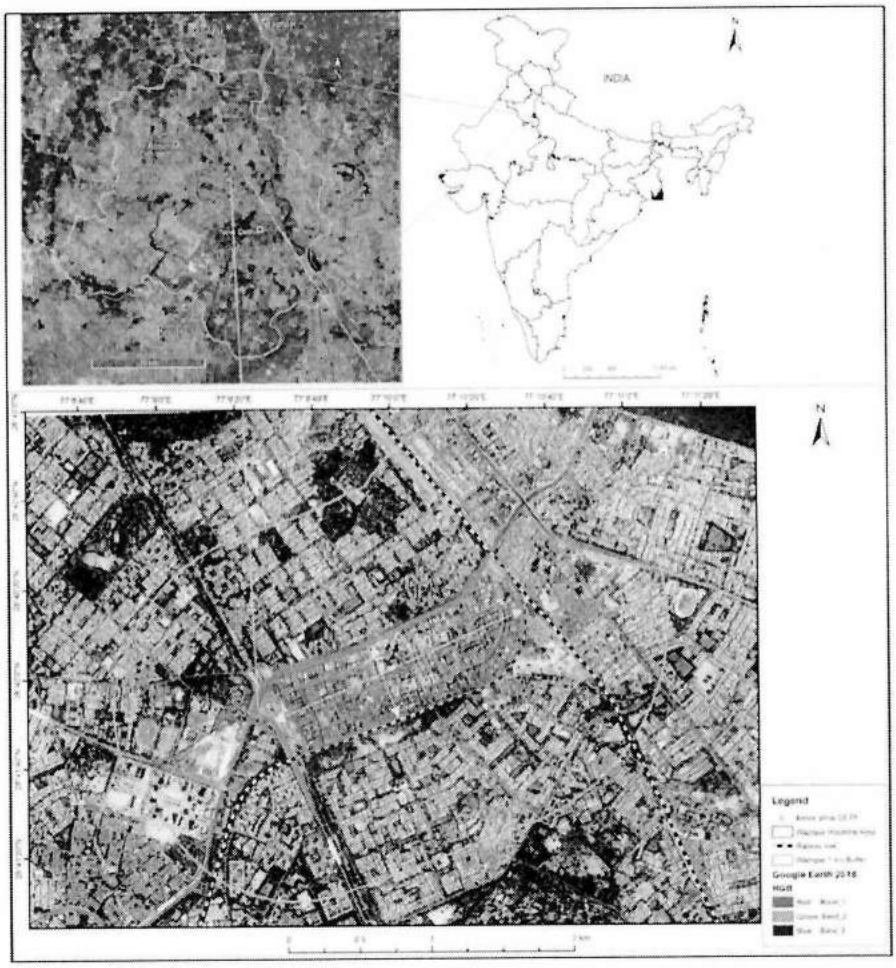
Chapter 2

Details of Study Region with Landuse/ Landcover Analysis

2.1 Study Region - Wazirpur Industrial Area

The Wazirpur Industrial Area (WIA) comes under the Wazirpur assembly constituency located in the North-West Delhi district. Wazirpur Industrial Area is located at the extreme end (towards the eastern side) of the North West district, sharing boundary with North and Central Delhi districts. Location of Wazirpur Industrial Area on the Google Earth Image 2018 along with 1 km buffer zone is shown in **Fig. 2.1.1**.



(Source: Google Earth as seen on 21/11/2019)

Fig. 2.1.1: Wazirpur Industrial Area: Google Earth Image – 2018 with 1 km Buffer Zone

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The Wazirpur Industrial Area (WIA) is a part of Ashok Vihar Ward No. 72-N. As per 2017 elections, total population of voters in the Ward was 57402. The industrial area map authorized by government agencies was not available, therefore reliable information has been obtained from secondary sources in the form of Google Map, Google Earth images and others. The boundary of the industrial area has been outlined based on secondary data. The spatial extent of the area is about $77^0$9'23.588" E to $77^0$10'32.92" E longitude and $28^0$41'41.213" N to $28^0$42'25.23" N latitude. The total area of the Wazirpur Industrial Area comes around 1074800 m^2 (with approx. length of 1900 m and width 540 m + some non-linear area).

The industrial area is bordered by railway lines in the south-east, and by Ring road and Maharaja Nahar Singh Marg on north-west side. The green star symbol in the map indicates the location of Common Effluent Treatment Plant (CETP), and it treates industrial effluent of the WIA. The CETP is managed by the CETP Society as per the Delhi Government CETP Act 2000.

2.2 Landuse/ Landcover (LULC) Analysis of WIA

2.2.1 Present LULC (February 2019)

Landuse Landcover (LULC) map of an area provides better understanding of land utilization information to help in the formation of temporal changing dynamics of landscape to make policies and planning required for area and users to understand the current land status.

Analyzing LULC using Remote Sensing (RS) satellite data and Geographical Information Systems (GIS) are essential for any environmental impact assessment and social applications. These powerful tools provide reliable, temporal and synoptic view of large area, not only for the present situation but also for earlier patterns. The Google Earth image has common detailed information of the earth at less than 1 m spatial resolution. It comprises of RGB (Red Green Blue) bands and using different band ratios, it becomes very difficult to distinguish these features e.g. rooftops, roads, barren land and buildings, as it has limited bands composition. Therefore, ground truthing becomes very important. The study team carried out ground truthing of some critical places in the study area.

The data used in the present study was taken from Sentinel-2 mission, which is a land monitoring assemblage of two satellites that provide high-resolution optical imagery at free and open data policy. The mission offers a global imagery of the Earth's land surface at every 10 days with one satellite and 5 days with two satellites by European Space Agency (ESA). It has 13 spectral bands and comes in various spatial resolutions from 10 to 60 m, which was found very much suitable for the present study.

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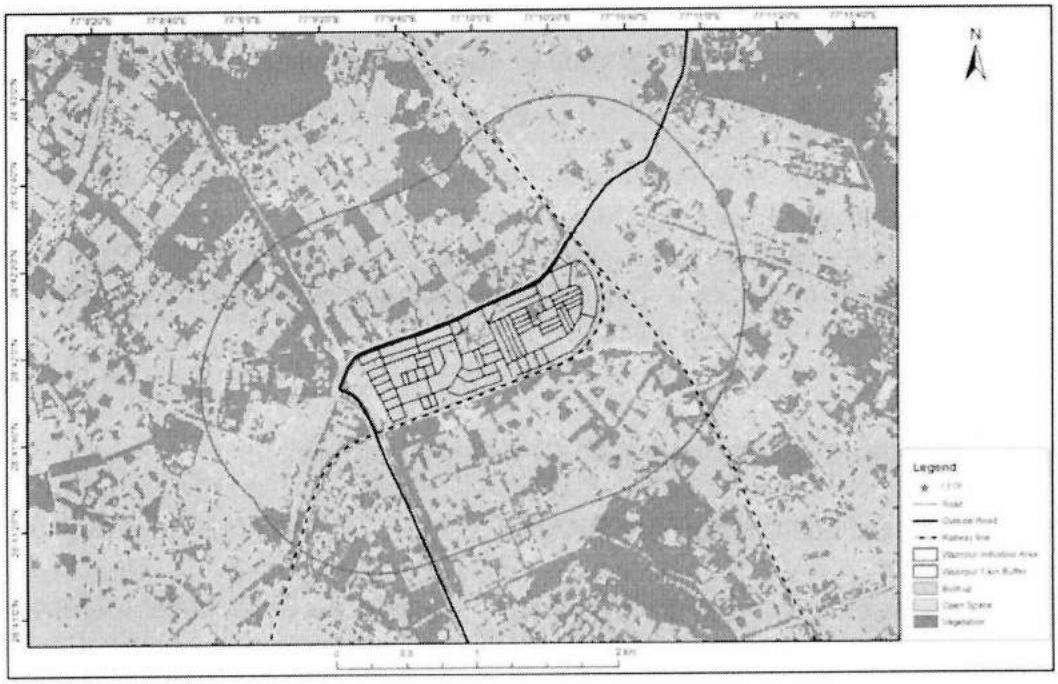
LULC of the WIA and adjacent area (1 km buffer zone) is shown in **Fig. 2.2.1.** It illustrates the features like Built-up area (buildings, road and other concrete things), Open space (open soil or slightly grassy land) and vegetative land-based on band ratio of red (Band 4) and near-infrared (Band 8) of the ESA remote sensing satellite imagery "Sentinel-2" (10 m Spatial resolution) of February 2019.



(Source: https://scihub.copernicus.eu/dhus/#/home)

Fig. 2.2.1: LULC of Wazirpur Industrial Area
(Based on Sentinel-2, February 2019 Imagery)

Based on the analysis of Sentinel-2 data, area under different LULC classes for WIA and its 1 km buffer zone (excluding WIA) has ben determined, as given in **Table 2.2.1**.

Table 2.2.1: LULC of WIA and Its 1 km Buffer Zone Area

Sr. No.	LULC Class	Area (km^2)	Area (%)
A.	**WIA**		
1.	Built-up area	0.8711	81.05
2.	Open Space area	0.1451	13.50
3.	Vegetation area	0.0586	5.45
4.	Total area	1.0748	100.00
B.	**1 km Buffer Zone (excluding WIA)**		
1.	Built-up area	3.9461	48.81
2.	Open Space area	1.482	18.33
3.	Vegetation area	2.6572	32.86
4.	Total area	8.0853	100.00

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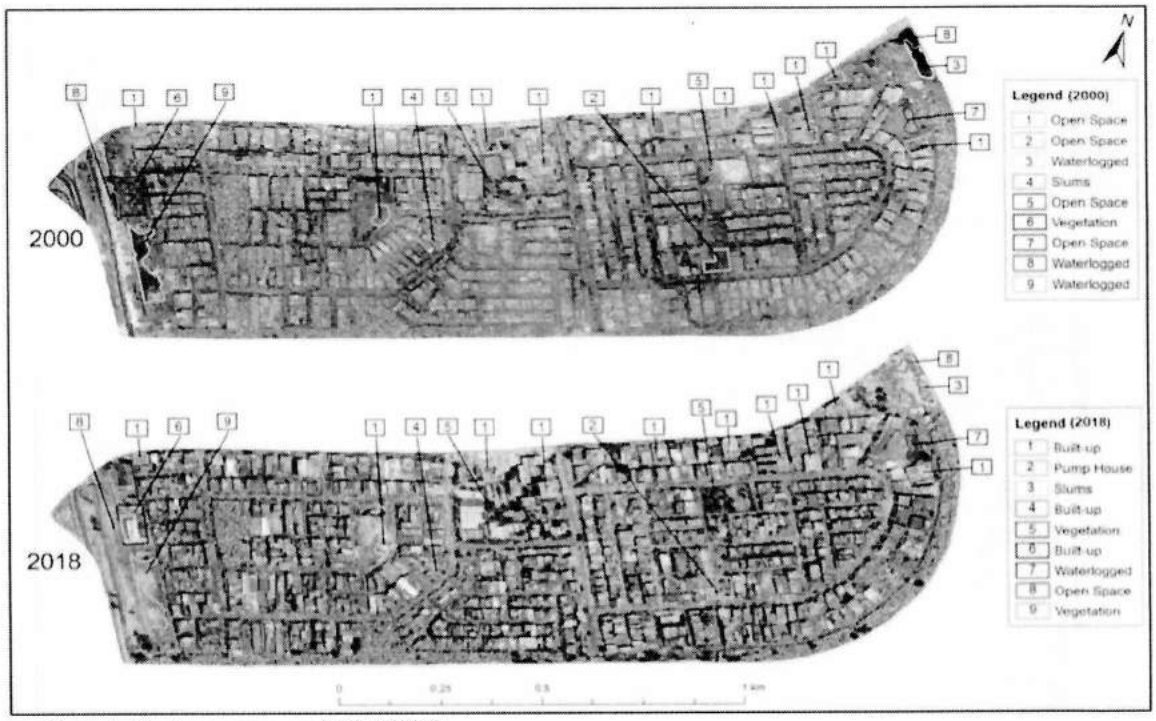
It is observed that about 81% of the total area in WIA is occupied by the Built-up class. Since it is an industrial area, most of the land is used by the industrial/commercial establishments, however some of its open space/ common public space is also occupied by slums. About 5.5% of its land is covered by vegetation and 13.5% by open space.

In the buffer zone (excluding area of WIA), Built-up area is about 48.8% and area under vegetation class is about 33%. The percentage of green area is good and is essential for O_2:CO_2 exchange ratios of ecosystem.

2.2.2 Change in LULC (2000 to 2018)

Google Earth image of WIA for the year 2000 and 2018 (Image searched during 21/11/2019 to 24/12/2019) are analysed to quantify the changes in LULC during this period. The major changes in LULC categories have been observed over the years, as shown in **Fig. 2.2.2**.



(Source: Google Earth as seen on 21/11/2019

Fig. 2.2.2: Google Earth Images of 2000 and 2018 showing Changes in LULC

Different areas/patches that have undergone changes from one category to another in 2018 have been identified and total area of change is determined. Number of patches and LULC area changed from one to another category is summarised in **Table 2.2.2.**

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Table 2.2.2: Change in LULC from 2000 to 2018 (based on Analysis of Google Earth Images)

Sr. No.	No. of Patches Changed	LULC in 2000	LULC in 2018	Total Area Changed (m^2)
1.	Ten	Open Space	Built-up	13162
2.	One	Open Space	Pump House	2325
3.	One	Waterlogged	Slums	2745
4.	One	Slums	Open Space	623
5.	Two	Open Space	Vegetation	13827
6.	One	Vegetation	Built-up	5157
7.	One	Open Space	Waterlogged	1308
8.	Two	Waterlogged	Open Space	2813
9.	One	Waterlogged	Vegetation	6102

It has been observed that in the WIA, slums are older than the Google Earth archive image. However, some of the change in the form of encroachment of slums seems to have taken place in north-west corner of the WIA in the Google Earth image of 2018 as compared to 2000. Buildings and vegetation area have been increased and waterlogged area disappeared from most of the places but in eastern portion of WIA, the waterlogged area appears in the time frame of 2000 & 2018 (**Fig. 2.2.3**).

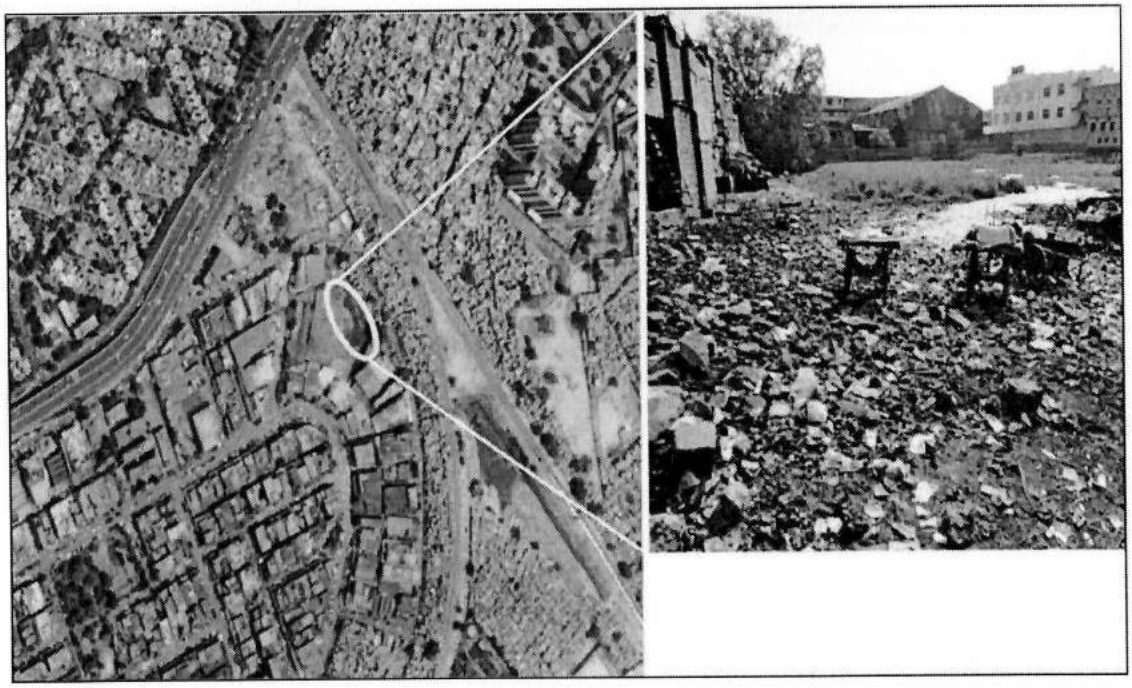

Fig. 2.2.3: Water Logged Area appears in the Timeframe 2000-18 in WIA

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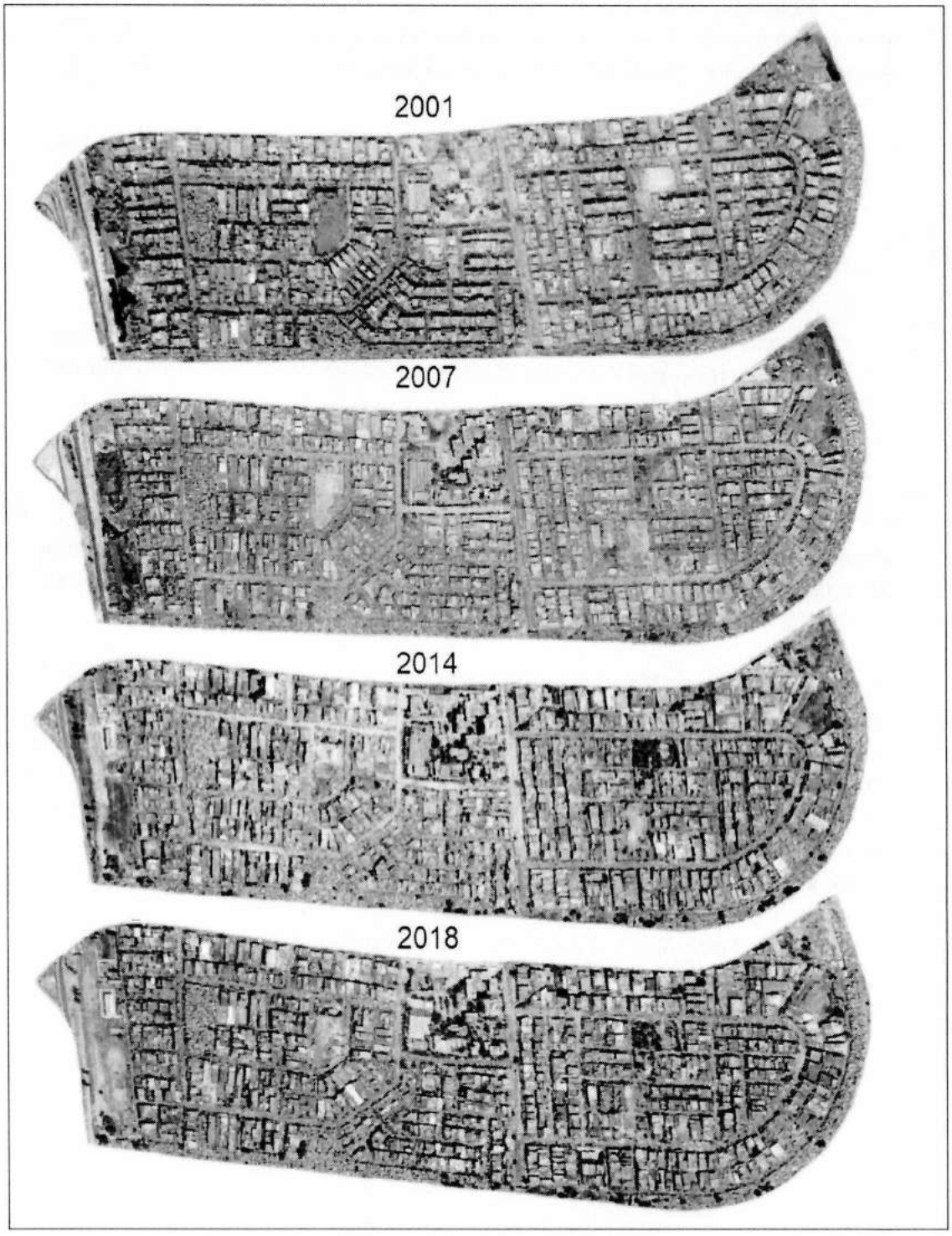
Further, visual changes in LULC during 2001, 2007, 2014 and 2018 are shown in **Fig. 2.2.4.**



(Source: Google Earth as seen on 21/11/2019)

Fig. 2.2.4: Google Earth Images of WIA in the Year 2001, 2007, 2014 and 2018

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2.3 Industrial Setup in WIA

Following information relating to all the industries (including pickling industries) in Wazirpur Industrial Area and other details were sought from DPCC, DSIIDC and CETP Society vide letter dated December 2, 2019 (copy attached as **Annexure 2.1**):

- Details of all the industries/establishments located in the Wazirpur Industrial Area with their location marked on a map
- Details of road network, water supply, sanitation, power supply
- Details of solid & liquid waste generation and disposal facilities
- Details of population residing within the industrial area
- Details of pickling industry, locations, capacity, process adopted and quantity of wastes (air, water & solid waste) generated and waste management practices followed
- Any other document relevant to the study.

In response to the above some information was received and further data available at DPCC website was downloaded. The data related to the Wazirpur Industrial Area is presented in this section, whereas data related to Pickling Industries is presented in Chapter 4 of this report.

2.3.1 Number and Mapping of Industries

The data regarding number and type of industries was collected from the Delhi Pollution Control Committee (DPCC). As per DPCC records, there are total 2294 industries, which are located in different blocks in WIA, identified as plot groups (A, A-Group, B, B-Group, C and Shed). Block-wise total number of industries are given in **Table 2.3.1**.

Table 2.3.1: Block-wise Total Number of Industries in WIA (as per DPCC as on 18-06-2020)

Sr. No.	Block/ Plot/ Groups	Total Number of Industries
1.	Block A	915
2.	Block A Group	229
3.	Block B	399
4.	Block B Group	153
5.	Block C	369
6.	Shed	98
7.	Miscellaneous	131
	Total	**2294**

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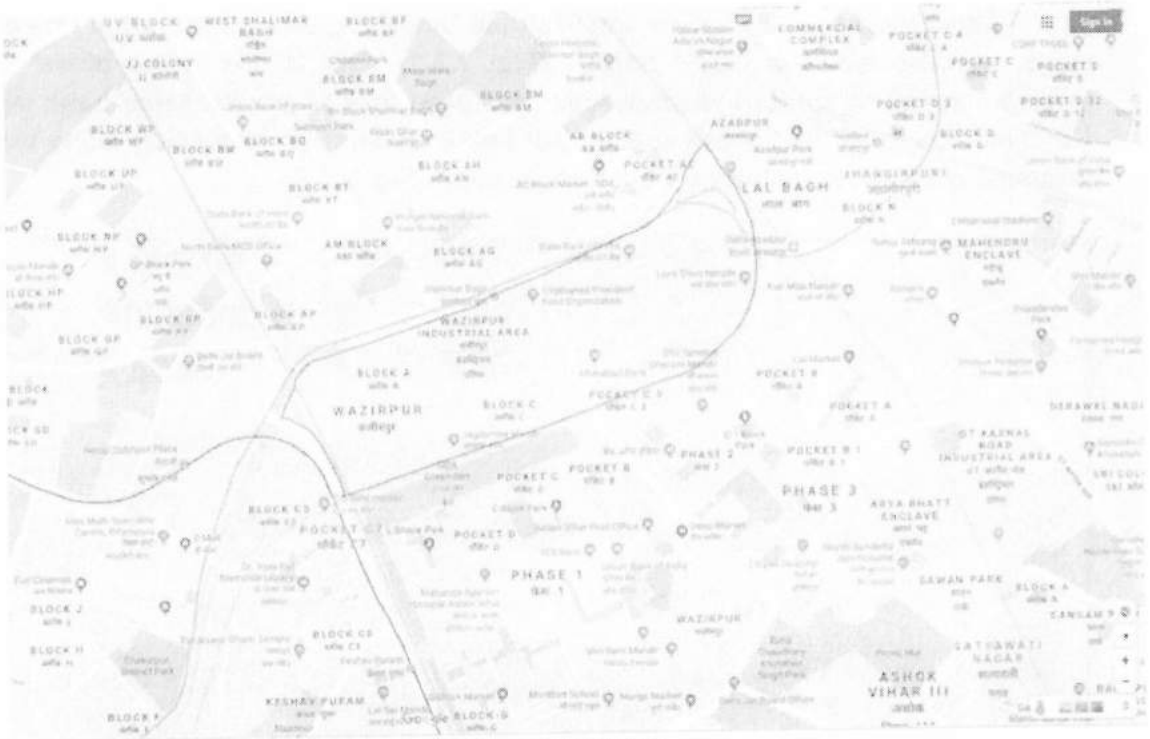
Major blocks (A, B, & C) in the Wazirpur Industrial Area are shown in one of the maps available with the CETP Society (**Fig. 2.3.1**). This is one of the oldest maps available for the Wazirpur Industrial Area, and used only to provide some basic inputs. For better clarity, a map showing Wazirpur Industrial Area (in blue color) along with its adjoining area was downloaded from Google Earth (**Fig. 2.3.2**).

Fig. 2.3.1: Map of WIA showing Different Blocks and Pattern of Plots (Source: CETP Society)



(Source: https://www.google.com/maps, as seen on 20/12/2019)

Fig. 2.3.2: Google Map showing WIA (in blue color) with Adjoining Area

2.3.2 Categorization / Types of Industries

As per DPCC, the industries in Wazirpur Industrial Area are classified under four categories as Red, Orange, Green and White. The criteria of categorization of industrial sectors is based on the Pollution Index (PI), which is a function of the emissions (air pollutants), effluents (water pollutants), hazardous wastes generated and consumption of resources. The classification is as per CPCB guidelines dated February 29, 2016.

The Pollution Index (PI) of any industrial sector is a number from 0 to 100 and the increasing value of PI denotes the increasing degree of pollution load from the industrial sector. The following criteria on 'Range of Pollution Index' for the purpose of categorization of industrial sectors is finalized:

- Red Category Industrial Sectors - Pollution Index score of 60 and above
- Orange Category Industrial Sectors - Pollution Index score of 41 to 59
- Green Category Industrial Sectors - Pollution Index score of 21 to 40
- White Category Industrial Sectors - Pollution Index score incl. & upto 20.

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Category-wise total number of industries in different blocks of Wazirpur Industrial Area are summarized in **Table 2.3.2**. As per DPCC records (as on 18.06.2020), there are total 2294 industries in Wazirpur Industrial Area, out of which only 7 industries fall under Red Category, 1030 under Orange Category, 1023 under Green Category and rest 234 under White Category. Details of Red Category industries including address and type of industrial activity is given in **Table 2.3.3.**

Table 2.3.2: Block and Category-wise Number of Industries in WIA

Sr. No.	Block/ Plots Group	Total Number of Industry as			
		Red Category	Orange Category	Green Category	White Category
1.	Block A	4	394	419	98
2.	Block A Group	1	93	122	13
3.	Block B	2	192	160	45
4.	Block B Group	0	70	69	14
5.	Block C	0	191	156	22
6	Shed	0	36	47	15
7.	Miscellaneous	0	54	50	27
	Total	**7**	**1030**	**1023**	**234**

Table 2.3.3: Details of Red Category Industries in WIA

Sr. No.	Industry Name	Industry Address	Industry Activity
1.	Kanodia Technoplast (P) Ltd	A-43	-
2.	Classique Disc	A-98/1A	Batteries (Lead Acid) and Accessories without Trade Effluent Discharge
3.	Bluart Industries	A-83/4	Plating - Copper Plating with less than 5 KLD , Plating - Nickel and Chrome Plating with less than 5 KLD, Casting of Ferrous/ Non Ferrous Metal (except Cupola Furnace Only), Process Involving Buffing
4.	Benlon India Ltd.	A-68	Yarn and Textile Processing involving Scouring, Bleaching, Dyeing, Printing or any effluent/emission generating Process (upto 100 Workers In all shifts, 1 acre of Land, 100 KLD water), with Boiler
5.	Prem Electroplaters	B-28/5	Plating - Nickel and Chrome Plating with less than 5 KLD, Process involving Buffing
6.	Allena Auto Industries Pvt. Ltd.	B-68	Phosphating
7.	Topline Home Appliances	A-132	Mfg. of Home Appliances with Anodizing/ Buffing

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As per CETP Society, there were total of 105 stainless steel pickling industries in different Blocks of WIA (**Table 2.3.4**), however DPCC has verified data and informed that total number of industries as 86. These industries are classified under ***Orange Category*** by DPCC.

Table 2.3.4: Block-wise Total number of Pickling industries in WIA.

Sr. No.	Block/ Plot Group	Number of Pickling Industries as per	
		CETP Society*	DPCC
1.	Block A	47	43
2.	Block A Group	10	7
3.	Block B	14	8
4.	Block B Group	10	9
5.	Block C	22	17
6.	Shed	2	2
Total		**105**	**86**

**Ref: Report submitted to Hon'ble NGT on April 5, 2019 in the case, OA. 159/2013.*

The White Category of industry pertains to those industrial sectors which are practically non-polluting such as Biscuit trays etc. from rolled PVC sheet (using automatic vacuum forming machines), Cotton and woollen hosiery making (Dry process only without any dying/ washing operation), Electric lamp (bulb) and CFL manufacturing by assembling only, Scientific and mathematical instrument manufacturing, Solar power generation through the photovoltaic cell, wind power and mini hydel power (less than 25 MW).

2.4 Slum Areas in WIA

Slums are an urban phenomenon which come into existence on account of industrialization in and around cities, thereby attracting migration of population from country side. Though slums are a rich source of unskilled and semi-skilled manpower, they tend to result in burden on the existing public amenities. Number of Slums have been developed in Wazirpur Industrial Area also. Alongside the railway track in the south-eastern portion of the WIA, about 30 m of railway land is occupied by slums. In the WIA, some of public open space, parking areas and land plots are also occupied by slums. These occupants are believed to be encroachments on land belonging to the Wazirpur Industrial Area. In this area, the majority of slums were found to made up of brick, plastered with cement and roofs of stone or concrete. The actual population residing in all the slum areas of WIA is not known, however unofficial figure says, it could be upto 2 lakhs.

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These slum areas marked in the red color on the Google Map (2018), are shown in **Fig. 2.4.1**. Photographs showing slum dwellers in these areas are given in **Plate 2.4.1**.

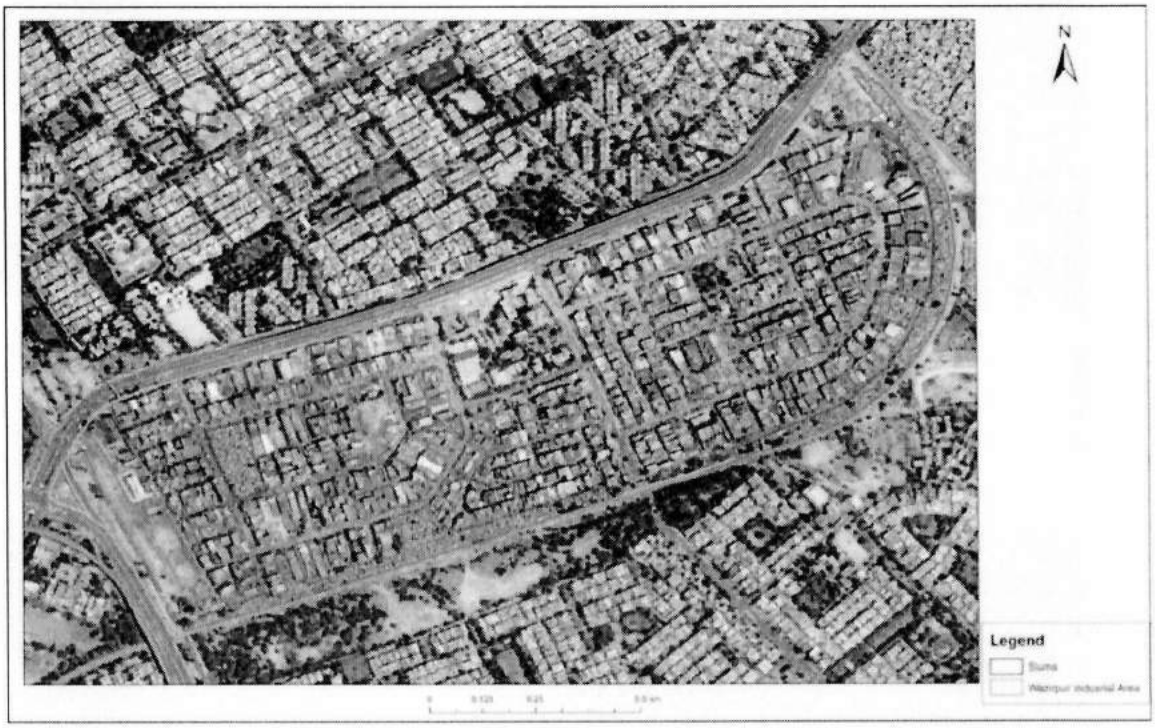

Fig. 2.4.1: Demarcation of Slum Areas in WIA (based on Google Earth Image 2018)

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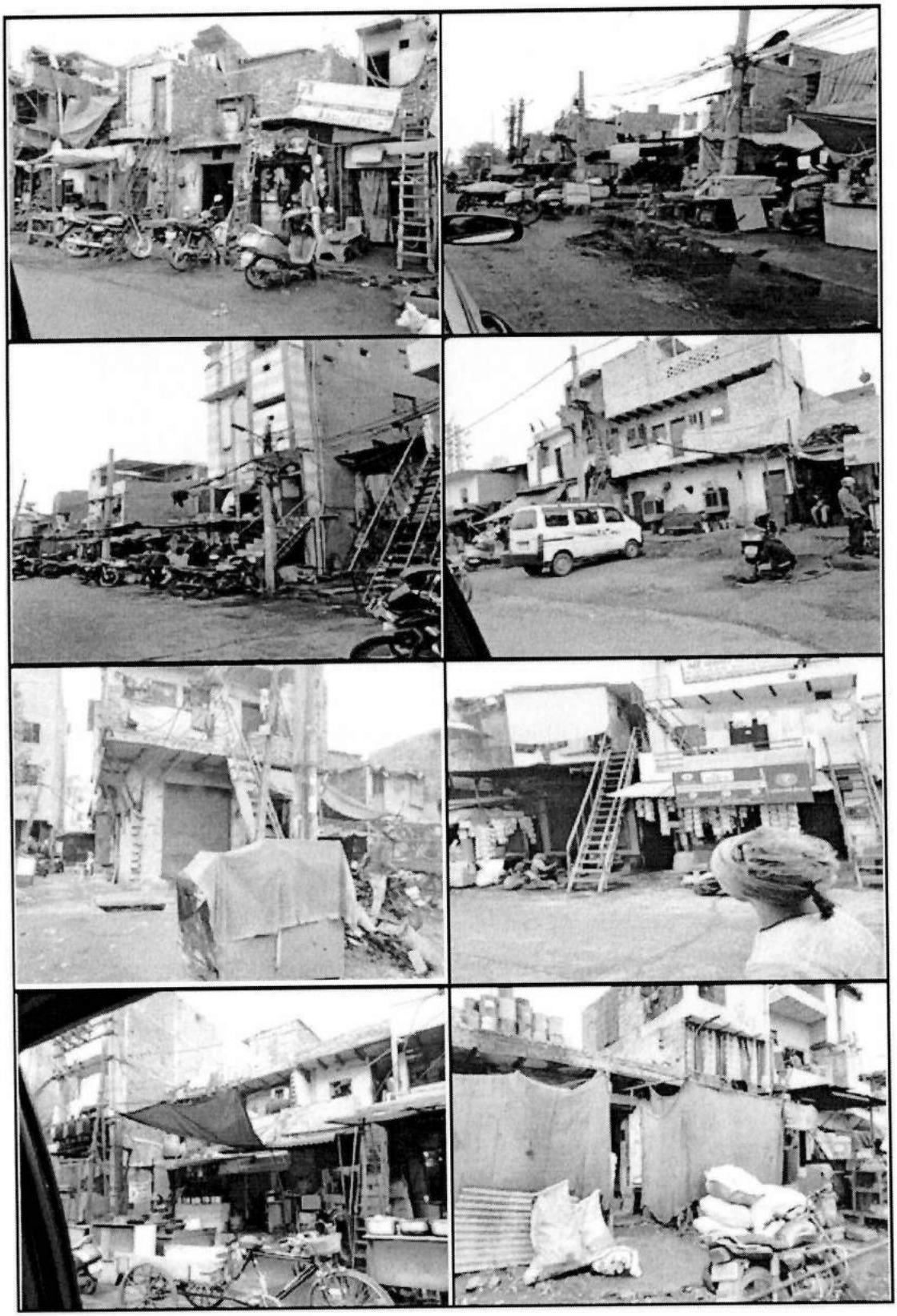

Plate 2.4.1: Photographs showing Slums Dwellings in Wazirpur Industrial Area

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2.5 Road Network

Based on the Google Earth Image 2018, the road network in Wazirpur Industrial Area has been outlined, as shown in **Fig. 2.5.1**. The roads are generally 20 to 80 feet wide, and the total length of road network is about 20 km within the WIA. Inspite of wide roads, traffic congestion is a common problem due to inadequate parking facilities and slums encroachment. The internal roads in WIA are maintained by DSIIDC.

Fig. 2.5.1: Road network in WIA (Google Earth Image 2018)

2.6 Solid and Liquid Waste Management

Solid waste generated in the WIA is collected by Municipal Corporation of Delhi on a daily basis.

For liquid waste treatment, a 24 MLD capacity CETP is installed just outside in the south-east corner of WIA in Ashok Vihar. As learnt from the CETP Society, there is well laid wastewater conveyance system in the WIA, which takes it first to a sump well, from where it is pumped to CETP. The treated wastewater conforming to discharge standards is finally let to another drain, which ultimately leads to the Yamuna River. There is another drain in the WIA, which is known as storm water drain, which mainly carries sewage along with some industrial wastewater as well. Details of CETP and other drains, their status and characteristics are discussed in Chapter 3.

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Chapter 3

Environmental Quality Status of WIA

This chapter presents environmental quality status in the Wazirpur Industrial Area (WIA) with respect to the following aspects:

- Air Quality Status in WIA and in Delhi
- Status of Wastewater Drains, their Characteristics and Treatment
- Soil Quality Status
- Status of Park/ Gardens in Wazirpur Industrial Area
- Generation, Characteristics and Leaching Potential of CETP Sludge (Fresh & Stored Sludge)
- Characteristics of Suspected Sludge Contaminated Soil at CETP Park
- Ground Water Quality Status in Study Area and Delhi during 2015-16

Field studies were conducted during December 2019. Details of methodology adopted, results and their interpretations are given the following sections.

3.1 Air Quality Status

3.1.1 Details of Sampling Locations

The study area, i.e. Wazirpur Industrial Area, located in New Delhi has its name mainly after the huge cluster of industries it possesses. The industrial area mainly has the stainless steel industry, making steel utensils, which produce tons of steel vessels for all over India and also for export. The area also consists of commercial and residential activities. Three monitoring locations; DSIIDC office, Admin Block and Wazirpur CETP were identified to assess the ambient air quality status of the study area. The sampling locations are shown in Google map of Wazirpur Industrial Area. The sampling locations are shown in **Fig. 3.1.1**. Besides, there are two Continuous Ambient Air Quality Monitoring Stations (CAAQMS) operating in Wazirpur and Ashok Vihar area. Wazirpur CAAQMS site is also located in the study area, near DSIIDC office, whereas Ashok Vihar station is slightly away (1.7 km from Wazirpur site). Details of sampling locations are given in **Table 3.1.1**.

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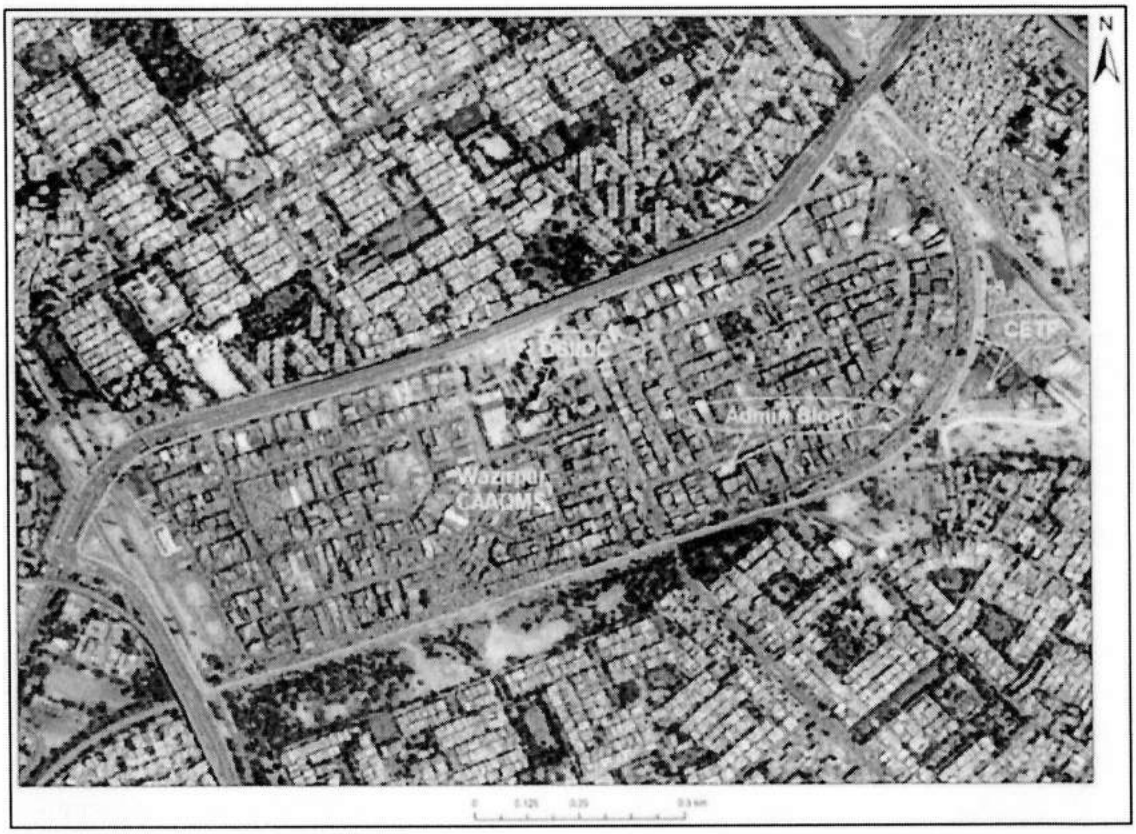

Fig. 3.1.1: Google Earth View of Monitoring Locations in the Study Area

Table 3.1.1: Details of Monitoring Locations in the Study Area

Sr. No.	Monitoring Location	Height of the Sampler (m)	Description
1.	DSIIDC Office	30	Highly vegetated area with greenery all over the campus, Highway ~50 m away from the monitoring location, Traffic movement is fairly low
2.	Admin Block	20	Large cluster of industries adjacent to the monitoring location, Radial roads outside the campus with high traffic movement mainly dominated by HDVs, Highway ~150 m away from the monitoring location
3.	CETP (WIA)	6	Vegetated area with trees planted all over the premises

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3.1.2 Air Quality Status of WIA during December 11-18, 2019

The air quality data has been assessed at the three selected monitoring locations at Wazirpur Industrial Area, namely DSIIDC Office, Admin Block and CETP. Major air quality parameters, viz. PM_{10}, $PM_{2.5}$, SO_2, NO_2 and NH_3 were measured following standard procedure and daily concentration levels are determined. The sampling was carried out during December 11-18, 2019. Occasional drizzling/rain was observed from December 12, 2019 onwards for few hours on some days during this period.

The data has been analyzed for both particulate (PM_{10} and $PM_{2.5}$) and gaseous pollutants (SO_2, NO_2, NH_3) during December 11-18, 2019. Further, the data has been compared with National Ambient Air Quality Standards (NAAQS) prescribed by CPCB to ascertain the violations with the standards, if any. Date-wise air quality status in terms of PM_{10}, $PM_{2.5}$, SO_2, NO_2 and NH_3 is presented in **Table 3.1.2**, whereas the statistical summary of air quality status is presented in **Table 3.1.3**.

Observations

- PM_{10} concentrations at DSIIDC, Admin Block and CETP were found in the range of 76-497 $\mu g/m^3$ (avg. 207 $\mu g/m^3$), 84-495 $\mu g/m^3$ (avg. 241 $\mu g/m^3$) and 109-508 $\mu g/m^3$ (avg. 254 $\mu g/m^3$), respectively. Daily average PM_{10} levels exceeded the NAAQS of 100 $\mu g/m^3$ at all the three locations except on 16 December 2019.
- $PM_{2.5}$ concentrations at DSIIDC, Admin Block and CETP were found in the range of 49-279 $\mu g/m^3$ (avg. 122 $\mu g/m^3$), 46-350 $\mu g/m^3$ (avg. 178 $\mu g/m^3$) and 59-343 $\mu g/m^3$ (avg. 141 $\mu g/m^3$), respectively. Daily average $PM_{2.5}$ levels exceeded the NAAQS of 60 $\mu g/m^3$ at all the three locations during the monitoring period, except on December 15 & 16 at DSIIDC, and at Admn. Block & CETP, only on December 16, 2019.
- SO_2 concentrations were upto 5 $\mu g/m^3$ at DSIIDC, upto 7 $\mu g/m^3$ at Admin Block and ranging between 4-16 $\mu g/m^3$ at CETP site. Daily average SO_2 levels were found well within the NAAQS of 80 $\mu g/m^3$, and maximum concentration on a particular day was observed to be only 16 $\mu g/m^3$ at the CETP, which is close to the slum area/JJ Colony.
- NO_2 concentrations at DSIIDC, Admin Block and CETP were found in the range of 58-127 $\mu g/m^3$ (avg. 83 $\mu g/m^3$), 52-124 $\mu g/m^3$ (avg. 68 $\mu g/m^3$) and 49-99 $\mu g/m^3$ (avg. 65 $\mu g/m^3$), respectively. NO_2 concentration levels, in general, were found to be high (more than 49 $\mu g/m^3$), with 5 days exceeding the NAAQS of 80 $\mu g/m^3$. Higher levels of NO_2 are mainly attributed to the vehicular traffic activity on the ring road, which is in the vicinity of WIA.
- NH_3 concentrations at DSIIDC, Admin Block and CETP were found in the range of 13-91 $\mu g/m^3$ (avg. 44 $\mu g/m^3$), 11-101 $\mu g/m^3$ (avg. 38 $\mu g/m^3$) and 10-77 $\mu g/m^3$ (avg. 38 $\mu g/m^3$), respectively. The NH_3 concentrations levels were found well within the daily average NAAQS of 400 $\mu g/m^3$ throughout the study period.

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Table 3.1.2: Daily Average Pollutants Concentrations at the Selected Monitoring Locations in the Study Area

Sr. No.	Date	Pollutant concentration (µg/m^3)				
		PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3
A.	**DSIIDC Office**					
1.	December 11, 2019	497	279	< 3	127	91
2.	December 12, 2019	201	125	5	76	55
3.	December 13, 2019	193	95	< 3	87	13
4.	December 14, 2019	185	116	3	74	27
5.	December 15, 2019	103	49	< 3	81	21
6.	December 16, 2019	76	58	< 3	79	45
7.	December 17, 2019	154	79	< 3	80	53
8.	December 18, 2019	249	177	< 3	58	45
B.	**Admin Block**					
1.	December 11, 2019	495	350	5	124	101
2.	December 12, 2019	381	295	7	65	50
3.	December 13, 2019	169	143	< 3	60	11
4.	December 14, 2019	216	167	5	65	27
5.	December 15, 2019	167	89	< 3	52	14
6.	December 16, 2019	84	46	< 3	63	31
7.	December 17, 2019	193	142	< 3	57	34
8.	December 18, 2019	223	190	4	58	35
C.	**CETP**					
1.	December 11, 2019	508	343	4	99	77
2.	December 12, 2019	231	130	7	80	48
3.	December 13, 2019	162	148	9	55	17
4.	December 14, 2019	365	141	14	49	21
5.	December 15, 2019	132	64	10	54	10
6.	December 16, 2019	109	59	16	64	38
7.	December 17, 2019	196	108	6	59	39
8.	December 18, 2019	329	134	7	63	52
	NAAQS (24-hrs)	100	60	80	80	400

Table 3.1.3: Statistical Summary of Air Quality Status in the Study Area

Sr. No.	Parameter	Pollutant concentration (µg/m^3)					
		DSIIDC		Admin Block		CETP	
		Min-Max	Avg ± SD	Min-Max	Avg ± SD	Min-Max	Avg ± SD
1.	PM_{10}	76-497	207±130	84-495	241±133	109-508	254±137
2.	$PM_{2.5}$	49-279	122±75	46-350	178±101	59-343	141±88
3.	SO_2	< 3-5	< 3±< 3	4-7	5±< 3	4-16	9±4
4.	NO_2	58-127	83±20	52-124	68±23	49-99	65±16
5.	NH_3	13-91	44±25	11-101	38±28	10-77	38±22

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3.1.3 Comparison of Air Quality in Wazirpur Industrial Area vis-a-vis AQ in Delhi during December 11-18, 2019

The statistical summary of air quality status (in terms of PM_{10}, $PM_{2.5}$, SO_2 & NO_2) at three sites monitored in the Wazirpur Industrial Area vis-à-vis at different locations in Delhi is presented in **Table 3.1.4**. Overall average (average of daily average concentrations at 3 locations) concentrations of PM_{10}, $PM_{2.5}$, NO_2 & SO_2 at Wazirpur Industrial Area were found to be 234 µg/m^3, 147 µg/m^3, 72 µg/m^3 and 6 µg/m^3 respectively, whereas these values for Delhi (average of 17 locations) were found to be 228 µg/m^3, 156 µg/m^3, 58 µg/m^3 and 9 µg/m^3, respectively. *Thus one can conclude that the air quality levels in the entire Delhi are more or less similar, however, there may be some variations due to the magnitude of activities at the local level.*

Table 3.1.4: Air Quality Status in WIA and in Delhi during December 11-18, 2019

Area Classification	Monitoring Site	Average Pollutant Concentration (µg/m^3)			
		PM_{10}	$PM_{2.5}$	NO_2	SO_2
Present Study (Wazirpur Industrial Area)	DSIIDC Office	207	122	83	3
	Admn Block	241	178	68	5
	CETP	254	141	65	9
	Average	**234**	**147**	**72**	**6**
CAAQMS Data*					
Industrial Area	Wazirpur	303	197	56	8
	Okhla	237	160	62	11
	Bawana	182	125	34	7
Commercial Area	Alipur	197	146	36	14
	DTU	229	168	59	5
Residental Area	Ashok Vihar	256	183	56	12
	Burari	280	212	34	-
	Dwarka	291	156	65	10
	RK Puram	209	125	55	12
Kerbside Locations	ITO	168	138	76	4
	CRRI	211	125	108	-
	Anand Vihar	263	164	192	8
Mixed Use Area	Rohini	254	192	50	4
	Vivek Vihar	249	169	15	8
Less Activity Areas	Najafgarh	169	125	19	**8**
	Aya Nagar	170	120	14	-
	Dr. Karnisena Shooting Range	208	149	51	12
Average of 17 CAAQMS Data		**228**	**156**	**58**	**9**
NAAQS (24 hrs Average)		**100**	**60**	**80**	**80**

* Source: https://app.cpcbccr.com/ccr/#/caaqm-dashboard-all/caaqm-landing/data

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3.1.4 Analysis of CAAQMS Data Collected at Wazirpur and Ashok Vihar Site during December 2018- November 2019

The air quality data has been analyzed for the two CAAQMS, namely Ashok vihar and Wazirpur site, to assess the pollution levels in different seasons. Wazirpur CAAQMS is located in the Wazirpur Industrial Area, whereas Ashok Vihar site is about 1.7 km from the Wazirpur site.

The air quality data has been analysed for the period from December 1, 2018 to November 30, 2019 to study the seasonal variations in pollutant concentrations throughout the year. The study period has been categorised into four seasons as; Winter (1st December 2018 - 31st March 2019), Summer (1st April 2019 – 30th June 2019), Monsoon (1st July 2019 - 30th September 2019) and Post-Monsoon (1st October 2019 - 30th November 2019) Season. The statistical analysis of seasons-wise air quality data in terms of daily minimum, maximum and average pollutant concentration along with standard deviation for PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO is presented in in **Table 3.1.5**.

Observations

- PM_{10} concentrations at Ashok Vihar site during winter, summer, monsoon and post-monsoon were 288 µg/m^3, 225 µg/m^3, 113 µg/m^3 and 301 µg/m^3, respectively, whereas at Wazirpur site, these values were 363 µg/m^3, 296 µg/m^3, 177 µg/m^3 and 345 µg/m^3, respectively. The concentrations were higher in post-monsoon and winter followed by summer and monsoon. Further, the concentrations were higher at Wazirpur site as compared to Ashok Vihar throughout the year. Also, both the sites exceeded the daily average NAAQS of 100 µg/m^3.
- $PM_{2.5}$ concentrations at Ashok Vihar site during winter, summer, monsoon and post-monsoon were 193 µg/m^3, 83 µg/m^3, 38 µg/m^3 and 189 µg/m^3, respectively, whereas at Wazirpur site, these values were 213 µg/m^3, 93 µg/m^3, 51 µg/m^3 and 197 µg/m^3, respectively. The concentrations were higher in post-monsoon and winter followed by summer and monsoon. Further, the concentrations were higher at Wazirpur site as compared to Ashok Vihar site throughout the year. Also, both the sites exceeded the daily average NAAQS of 60 µg/m^3 in all the seasons except monsoon.
- SO_2 concentrations at Ashok Vihar site during winter, summer, monsoon and post-monsoon were 22 µg/m^3, 26 µg/m^3, 13 µg/m^3 and 19 µg/m^3, respectively, whereas at Wazirpur site, these values were 21 µg/m^3, 22 µg/m^3, 10 µg/m^3 and 15 µg/m^3, respectively. The concentrations were higher in winter and summer seasons. Further, the concentrations were higher at Ashok Vihar as compared to Wazirpur throughout the year, however, none of the CAAQMS sites exceeded the NAAQS of 80 µg/m^3.
- NO_2 concentrations at Ashok Vihar site during winter, summer, monsoon and post-monsoon were 57 µg/m^3, 50 µg/m^3, 26 µg/m^3 and 62 µg/m^3, respectively. These values for Wazirpur site were 71 µg/m^3, 79 µg/m^3, 43 µg/m^3 and 46 µg/m^3, respectively. The concentrations were higher during post-monsoon season at

Ashok Vihar while during winter and summer seasons at Wazirpur. The average concentrations were higher at Wazirpur as compared to Ashok Vihar site in all seasons, except post-monsoon. Also, none of the sites exceeded the NAAQS of 80 µg/m^3.

- CO concentrations at Ashok Vihar site during winter, summer, monsoon and post-monsoon were 1.90 mg/m^3, 1.37 mg/m^3, 0.96 mg/m^3 and 1.68 mg/m^3, respectively, whereas at Wazirpur site, these values were 1.79 mg/m^3, 1.30 mg/m^3, 1.16 mg/m^3 and 1.87 mg/m^3, respectively. The concentrations were higher in winter and post-monsoon seasons at both the sites followed by summer and monsoon. Further, the concentrations were more or less similar at both the sites.

Table 3.1.5: Seasonal Variation at 2 CAAQMS Sites in the Study Area from December 1, 2018- November 30, 2019

Parameter & Season	Pollutant Concentration							
	Ashok Vihar				Wazirpur			
	Min	Max	Avg	SD	Min	Max	Avg	SD
PM_{10} (µg/m^3) - NAAQS: 100 µg/m^3								
Winter	58	666	**288**	125	116	726	**363**	155
Summer	58	494	**225**	89	110	516	**296**	95
Monsoon	16	509	**113**	84	60	521	**177**	75
Post-Monsoon	49	678	**301**	156	122	668	**345**	147
$PM_{2.5}$ (µg/m^3) - NAAQS: 60 µg/m^3								
Winter	38	576	**193**	115	42	630	**213**	123
Summer	20	175	**83**	33	28	195	**93**	39
Monsoon	12	91	**38**	17	15	106	**51**	19
Post-Monsoon	29	605	**189**	133	41	586	**197**	133
SO_2 (µg/m^3) - NAAQS: 80 µg/m^3								
Winter	11	36	**22**	6	10	40	**21**	6
Summer	12	47	**26**	7	12	37	**22**	6
Monsoon	7	19	**13**	3	7	16	**10**	2
Post-Monsoon	11	31	**19**	4	7	27	**15**	4
NO_2 (µg/m^3) –NAAQS: 80 µg/m^3								
Winter	8	98	**57**	18	15	139	**71**	24
Summer	19	81	**50**	16	42	125	**79**	20
Monsoon	13	46	**26**	7	22	70	**43**	10
Post-Monsoon	23	104	**62**	18	23	77	**46**	13
CO (mg/m^3) –NAAQS: 2 mg/m^3								
Winter	0.78	5.63	**1.90**	0.97	0.79	4.07	**1.79**	0.75
Summer	0.71	2.32	**1.37**	0.36	0.55	2.29	**1.30**	0.37
Monsoon	0.39	1.92	**0.96**	0.29	0.46	2.51	**1.16**	0.38
Post-Monsoon	0.74	2.94	**1.68**	0.56	0.82	3.75	**1.87**	0.71

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Analysis of primary air quality data monitored during December 11-18, 2019 indicates that PM_{10} and $PM_{2.5}$ are the two most critical parameters exceeding the permissible limit. NO_2 levels, though in general, were within the permissible limits, also need attention.

However, these three parameters are of concern in the entire Delhi during post monsoon and winter months (October-March), as evident from the analysis of 17 continuous ambient air quality monitoring stations (CAAQMS) data monitored by CPCB /DPCC for the same period.

Further analysis of two CAAQMS data of Ashok Vihar and Wazirpur sites indicates that PM_{10} & $PM_{2.5}$ levels are high (exceeding limits) during post-monsoon, winter and summer seasons and the trend is similar for the entire Delhi.

3.2 Wastewater Drains in WIA, their Characteristics and Treatment

3.2.1 Sample Collection and Analysis

To assess the carrying capacity of water/wastewater drains in the Wazirpur Industrial Area (WIA) in general and with respect to the pickling industries in particular, CSIR-NEERI team conducted survey of the area. The study team observed the following important points:

- There is a conveyance system in the WIA that connects the wastewater from the individual industrial units in the WIA and takes it to raw effluent well. From this raw effluent well, the industrial wastewater is pumped to the Wazirpur Common Effluent Treatment Plant (CETP) for treatment.
- The Wazirpur CETP treats this industrial effluent collected from the WIA and after treatment discharges the treated water into a storm water drain.
- A PWD storm water drain is flowing into the WIA. This PWD storm water drain is carrying storm water/wastewater/sewage water from the up-stream of the WIA, and also from the WIA.
- The study team also observed that some of the individual industrial units are discharging the water/waste water into the storm water drains of the area. These storm water drains are ultimately mixing with the PWD drain entering the WIA.
- PWD drain and the storm water drains after mixing with each other flow out of the WIA without treatment.

Based on the survey of the WIA, six important locations were identified as indicated in **Fig. 3.2.1**, and detailed in **Table 3.2.1**.

Fig. 3.2.1: Six Important Locations in the WIA and Wazirpur CETP

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Table 3.2.1: Details of Six Important Points in WIA alongwith Sampling Locations

Location	Coordinates	Significance	Sample Collection
1	28°42'5.82"N 77°10'33.83"E	Wastewater Inlet point to the CETP	Yes
2	28°42'5.80"N 77°10'34.01"E	Outlet point of the CETP	Yes
3	28°42'17.30"N 77°10'19.18"E	PWD storm water drain entry point in the WIA	No
4	28°42'12.92"N 77°10'27.49"E	Storm water drain from the WIA mixing with the PWD drain	No
5	28°42'13.59"N 77°10'31.05"E	Combined/mixed storm water drain sampling point	Yes
6	28°42'14.22"N 77°10'33.83"E	Untreated combined/mixed storm water drain flowing out from the WIA	No

All these locations are depicted through photographs in **Plate 3.2.1**.

Survey of the area revealed that the drain going out of the WIA and the Wazirpur CETP play an important role in the assessment of the carrying capacity of the Wazirpur Industrial Area and also to ascertain the impact of the pickling industries on the water quality. Hence, water samples were collected from the inlet of the Wazirpur CETP (Location 1), the outlet of the Wazirpur CETP (Location 2) and the drain going out of the WIA (Location 5).

To understand the diurnal variation in wastewater flow and quality characteristics, samples were collected on an hourly-basis from these three locations during morning hours (6-8 am), noon hours (11 am - 1 pm) and evening hours (4-6 pm) on December 12, 2019. Samples could not be collected further due to sudden rain, which continued till late night. The photographs showing sample collection from the inlet and outlet of CETP at different timings are given in **Plate 3.2.2.** Similarly, samples were collected from the combined/mixed drain flowing through the WIA/Slum area, as depicted in **Plate 3.2.3**.

Hourly samples of each duration were mixed well, and composite samples were prepared. All the samples were analysed for various physico-chemical parameters and heavy metals content following the respective standard procedures. The characteristics of treated water are compared with the MoEF&CC discharge norms for surface water/ land irrigation. The results are presented in the following section.

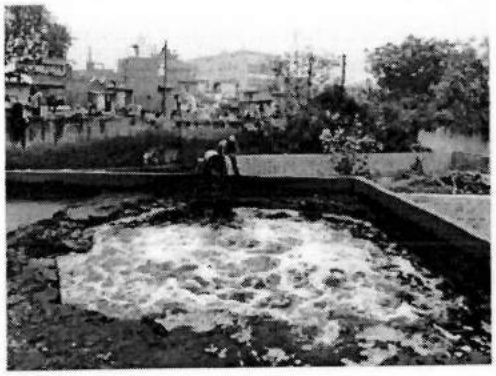
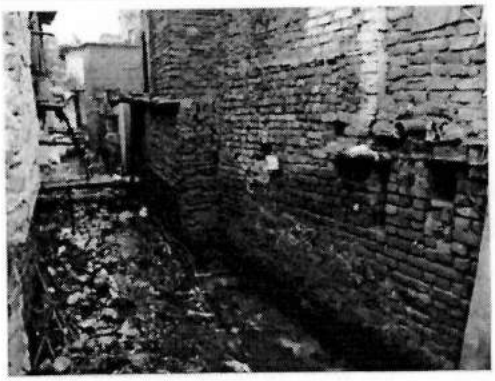
	
Location 1: CETP Inlet Point	Location 2: CETP Outlet Point
	
Location 3: PWD drain entering the WIA	Location 4: PWD drain mixing with the other storm water drains from the WIA
	
Location 5: Combined drain flowing through the slum in the vicinity of the WIA	Location 6: Combined mixed Storm water drain flowing out of the WIA/Slum area

Plate 3.2.1: Photographs showing Wastewater Inlet/Outlet at CETP and Untreated Drains in Wazirpur Industrial Area

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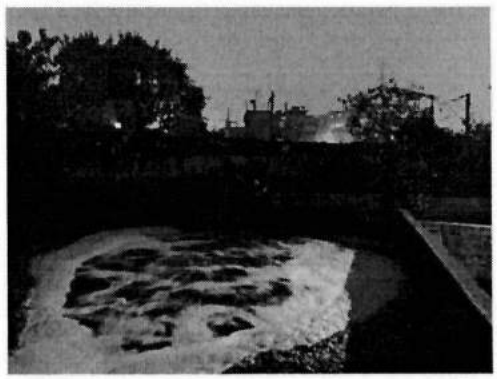

a) Inlet Sample Collection around 6 am

b) Outlet Sample Collection around 6 am

c) Inlet Sample Collection around 11 am

d) Outlet Sample Collection around 11 am

e) Inlet Sample Collection around 4 pm

f) Outlet Sample Collection around 4 pm

Plate 3.2.2: Photographs showing Sample Collection at Inlet and Outlet of CETP during Different Timings

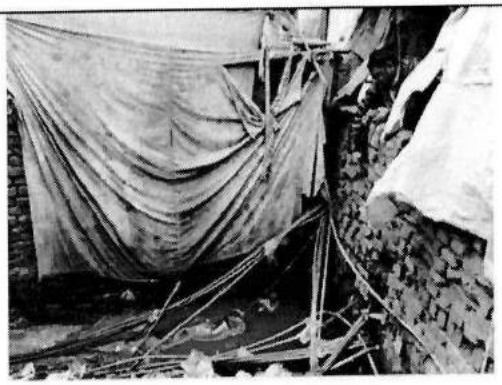	
e) Sample collection from the drain flowing out of the WIA	f) Samples collection from the drain flowing out of the WIA

Plate 3.2.3: Photographs showing Sample Collection from the Combined/Mixed Drain Flowing through the WIA/ Slum Area

3.2.2 Results: Wastewater Characteristics

The characteristics of wastewater at the inlet and outlet of CETP during different time hours along with discharge standards are given in **Table 3.2.2.** The characteristics of combined/mixed storm water drain/wastewater flowing through the slum area of WIA are given in **Table 3.2.3.** The observations on the analysis of wastewater are described briefly here.

a. Inlet and Outlet of the CETP and its Performance

To treat the wastewater generated from the Wazirpur Industrial Area, a Common Effluent Treatment Plant (CETP) of 24 MLD capacity has been installed in 2006. The CETP is operated and maintained by the CETP Society, with the contribution from its member industries, and other establishments in the WIA. Therefore, its successful operation to the discharge norms is important for the WIA to ensure wastewater treatment and safe disposal.

- The inlet/outlet flow was found in the range of 3.0 - 3.7 MLD, which is very less (about 14%) as compared to the design capacity of 24 MLD.
- pH of the waste water reaching the CETP was acidic in nature. This indicates that in the WIA industrial manufacturing/processing of material taking place that involves acid. This also indicates that some of the industrial units do not neutralize the acid before its discharge into the CETP conveyance system. However, the pH of the treated water from the Wazirpur CETP is conforming to the discharge standards.
- High concentration of Fixed Dissolved Solids (FDS) was observed in inlet and outlet samples. The WIA CETP is not capable to achieve the effluent discharge

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standards for FDS/TDS. Hence, it is recommended to have appropriate technological interventions for achieving the effluent discharge standards.

- All the chemical parameters except Fluoride, and demand parameters were found to be well within the discharge standards.
- High interference was encountered during the analysis of chemical parameters.
- Concentration of metals viz. chromium, copper, iron, manganese, nickel and lead were found in inlet samples, whereas the values for these metals were well within the standard limits in outlet samples.
- The CETP requires improvement in performance with respect to discharge standards for FDS and Fluoride.

b. Water Quality Characteristics Untreated Drain Passing through the WIA

- An untreated wastewater drain (known as storm water drain) was found to flow through the slum area in WIA, which carries the industrial wastewater and sewage. The flow rate of this drain was observed to be in the range of 11.4-17.6 MLD.
- pH of the drain water is acidic in nature. This indicates that some of the individual units in the WIA are either not connected to the CETP conveyance system or they are discharging the untreated industrial effluent into the storm water drains of the WIA.
- High concentration of TSS, FDS, Chloride, Sulphate, Nitrate, BOD, COD, TKN, Fe, Pb, Cu and Ni was observed in the drain water.

c. Comparison of the CETP Influent and Untreated Drain Water Characteristics

As observed during the survey that some of the individual industrial units are discharging their water/waste water into the storm water drain of the WIA, hence, it becomes important to compare the water quality of the Wazirpur CETP influent with the untreated drain wastewater flowing out of the WIA.

pH of the influent to the CETP as well as of the drain wastewater is acidic in the nature. The water quality characteristics of the drain water are almost similar to the waste water reaching the CETP through the conveyance system.

In view of the fact that characteristics of the influent to CETP and drain waste are more or less similar, DPCC is required to ensure that no industrial wastewater is discharged in the storm water drain.

Table 3.2.2: Characteristics of Wastewater at the Inlet and Outlet of CETP at Different Timings and Applicable Discharge Norms

Sr. No.	Parameters	CETP Inlet			CETP Outlet			*Discharge Standard
		6 AM - 8 AM	11 AM - 1 PM	4 PM - 6 PM	6 AM - 8 AM	11 AM -1 PM	4 PM - 6 PM	
A.	**Physical Parameters**							
1.	pH	2.4	3.2	4.7	7.4	7.6	7.8	6.0 – 9.0
2.	Temperature (°C)	16.9	17.0	16.0	17.1	17.0	17.1	-
3.	Colour	Reddish Brown	Reddish Brown	Reddish Brown	Clear	Clear	Clear	-
4.	Conductivity (µS/cm)	6060	6280	5440	5730	5670	5790	-
5.	TSS (mg/L)	2229	1816	1701	27	19	29	100
6.	FDS ignited at 550°C	3525	3520	2845	3758	3680	3804	2100
B.	**Chemical Parameters (mg/L)**							
7.	Chloride	850	800	840	280	260	248	1000
8.	Sulphate	1104	1300	1664	468	441	395	1000
9.	Phosphate	3.1	2.8	3.4	0.7	0.6	0.7	5/NS
10.	Nitrate	45.6	26.5	15.2	10.1	10	10.2	10/NS
11.	Total RC	NT	NT	NT	0.07	0.33	0.49	1
12.	Fluoride	10.6	8.1	4.9	11.9	8.3	9.9	2
13.	Ammonia	15.1	12.8	13.4	3.9	5.1	1.7	50/NS
14.	Sulphide	1.97	0.1	1.34	ND	ND	ND	2
15.	Phenol	0.007	0.004	0.007	ND	ND	ND	1
16.	Oil & Grease	0.05	0.05	0.02	0.02	0.04	0.02	10
17.	Sodium Absorption Ratio (SAR)	39	22	29	20	20	20	<3
C.	**Demand Parameters (mg/L)**							
18.	BOD	202	303	280	12	25	23	30/100
19.	COD	992	928	956	100	132	152	250
20.	TKN	50	39	39	39	37	37	50/NS
D.	**Heavy Metals Concentration (mg/L)**							
21.	Aluminium (Al)	0.007	0.005	0.008	0.001	0.001	BDL	-
22.	Cadmium (Cd)	0.001	0.008	0.012	BDL	BDL	BDL	0.005
23.	Cobalt (Co)	0.456	0.278	0.514	0.017	0.009	0.007	-
24.	Chromium (Cr)	47.2	12.8	94.9	BDL	BDL	BDL	-
25.	Copper (Cu)	13.2	5.4	26	0.043	0.116	0.072	3
26.	Iron (Fe)	561	173	1093	0.483	0.68	0.403	3
27.	Manganese (Mn)	55.6	33.1	58.6	12.1	6.5	6.4	-

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Sr. No.	Parameters	CETP Inlet			CETP Outlet			*Discharge Standard
		6 AM - 8 AM	11 AM - 1 PM	4 PM - 6 PM	6 AM - 8 AM	11 AM -1 PM	4 PM - 6 PM	
28.	Nickel (Ni)	7.68	6.96	9.49	0.39	0.24	0.21	3
29.	Lead (Pb)	11.17	4.42	23.18	0.013	0.076	0.034	0.1
30.	Strontium (Sr)	3.63	3.66	3.57	2.78	2.81	2.53	-
31.	Zinc (Zn)	0.60	0.386	0.843	0.007	0.011	BDL	5
E.	**Flow Rate (MLD)**							
32.	Flow	-	-	-	3.3	3	3.7	-

*MoEFCC Environment Protection Rule, 1986 (2016) Discharge Norms into inland surface water/ on land for irrigation); NT – Not Tested; ND – Not Detected; NS – Not Specified

Table 3.2.3: Water Quality characteristics of the Combined/Mixed Storm Water Drain Passing through the Wazirpur Industrial Area/Slum Area at different Timings

Sr. No.	Parameters	Water Quality during			*Discharge Standard
		6 AM - 8 AM	11 AM - 1 PM	4 PM - 6 PM	
A.	**Physical Parameters**				
1.	pH	2.5	2.6	2.4	6.0 – 9.0
2.	Temperature (°C)	16.9	17.2	17.3	-
3.	Colour	Grey	Grey	Grey	-
4.	Conductivity (µS/cm)	2739	2948	2695	-
5.	TSS (mg/L)	3186	3670	3036	100
6.	FDS ignited at 550°C	1336	1572	1050	2100
B.	**Chemical Parameters (mg/L)**				
7.	Chloride	200	400	200	1000
8.	Sulphate	1289	2158	2216	1000
9.	Phosphate	2.3	2.9	3.8	5/NS
10.	Nitrate	45	37	26	10/NS
11.	Total RC	NT	NT	NT	1
12.	Fluoride	11.2	2.0	4.8	2
13.	Ammonia	NT	NT	NT	50/NS
14.	Sulphide	1.97	1.78	1.52	2
15.	Phenol	0.005	0.007	0.007	1
16.	Oil & Grease	0.032	0.028	0.036	10
17.	Sodium Absorption Ratio (SAR)	9	11	11	<3
C.	**Demand Parameters (mg/L)**				
18.	BOD	412	300	364	30/100
19.	COD	976	928	960	250
20.	TKN	78	67	22	50/NS

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Sr. No.	Parameters	Water Quality during			*Discharge Standard
		6 AM - 8 AM	11 AM - 1 PM	4 PM - 6 PM	
D.	**Heavy Metals Concentration (mg/L)**				
21.	Aluminium (Al)	0.006	0.006	0.006	-
22.	Cadmium (Cd)	BDL	BDL	BDL	0.05
23.	Cobalt (Co)	0.17	0.19	0.068	-
24.	Chromium (Cr)	17.4	19.6	9.1	-
25.	Copper (Cu)	3.8	5.2	1.8	3
26.	Iron (Fe)	168	185	96	3
27.	Manganese (Mn)	20.1	24.4	10.1	-
28.	Nickel (Ni)	2. 6	3.2	1.1	3
29.	Lead (Pb)	3.3	4.5	1.6	0.1
30.	Strontium (Sr)	1.8	1.4	2.2	-
31.	Zinc (Zn)	0.27	0.77	0.37	5
E.	**Flow Rate (MLD)**				
32.	Flow	16.1	17.6	11.4	-

*MoEFCC Environment Protection Rule, 1986 (2016) Discharge Norms into inland surface water/ on land for irrigation); NT – Not Tested; ND – Not Detected; NS – Not Specified

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3.3 Soil Quality Status

3.3.1 Soil Sampling and Analysis

Two locations were selected for soil sample collection in the study area. The representative soil samples were collected from depth (0-30 cm) from the Park (located in 'B' Block) and from the garden outside the CETP premises boundary wherein trees have been recently planted by CETP Society. The sampling locations are shown in **Fig. 3.3.1,** and photographs showing soil sample collection is given in **Plate 3.3.1.**

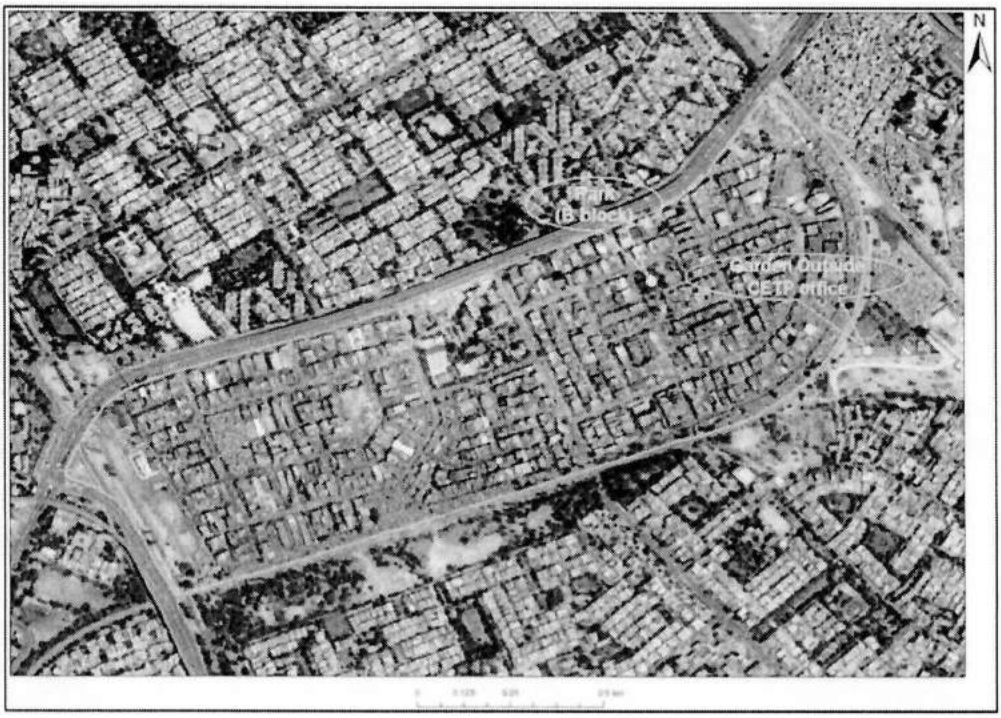

Fig. 3.3.1: Map showing Soil Sampling Locations in the Study Area

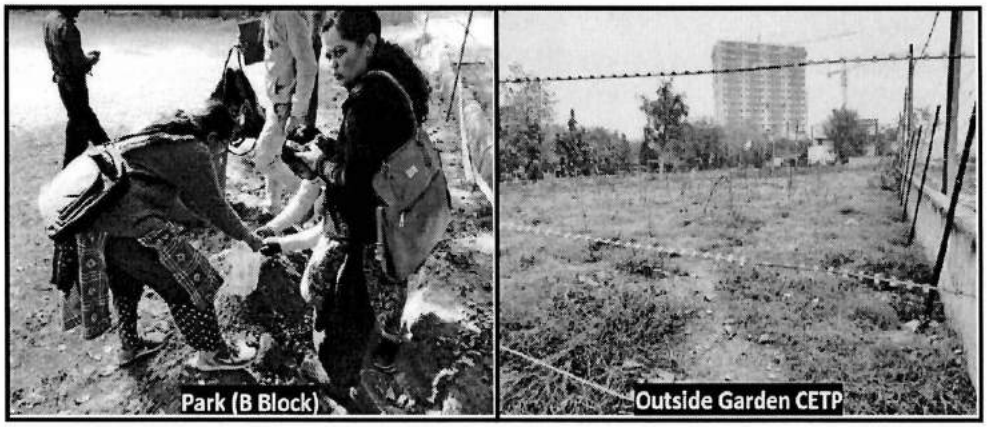

Plate 3.3.1: Photographs showing Soil Sample Collection from Park (B Block) and Park outside the CETP Premises

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The samples were collected on December 4, 2019. The collected soil samples were analysed for various physico-chemical parameters and metal content. Standard methods have been followed for the analysis of the soil samples.

The International Pipette Method (Black, 1964) was used for determination of particle size analysis. The textural diagram was generated using SEE Soil Class 2.0 version based on United States Department of Agriculture (USDA) classification of soils. Physical parameters such as bulk density, porosity and water holding capacity were determined by following KR Box Method (Keen and Raczkowski, 1921).

The chemical characteristics of soil were determined by preparing soil extract in distilled water in ratio 1:2 (as per Jackson procedure, 1967). Organic carbon was determined by Walkley & Black Method (1972). Heavy metals in the soil were determined by extracting soil with conc. H_2SO_4 and conc. HNO_3 followed by analysis on ICP or AAS (APHA, 1995).

3.3.2 Soil Quality Characteristics

Air-dried and sieved samples were used for determination of physico-chemical properties of soil and metal content. The characteristics of soil samples are given in **Tables 3.3.1 and 3.3.2.** Key observations are given here.

Observations

- The color of Park (B block) soil was dark greyish brown, and greyish brown of that from garden outside CETP premises.
- Particle size distribution of the soils in terms of percentage of sand, silt and clay showed that the percentage of sand and silt was higher than clay. The clay content in Park soil was 8.2%, whereas it was 12% in the garden soil (outside CETP premises). The textural class was sandyloam and loam respectively.
- Parameters like bulk density (1.25 g/cc & 1.32 g/cc), porosity (54% & 56%) and water holding capacity (44% & 43%) were comparable for the soil samples from the Park and garden outside CETP premises, respectively.
- The soils were neutral in pH. The soluble salts are expressed in terms of electrical conductivity (EC). The EC of the soil extract was 1.53 mS/cm and 2.35 mS/cm for the Park and garden outside CETP premises soil, respectively.
- The organic carbon content was very low, 0.9% in Park soil and 1.07% in the Garden soil.
- Metal Content in the soils was assessed and was compared with Indian Standards (Awasthi 2000).
- Concentration of all the metals was found to be considerably high in the soil sample collected from the Park in B block, as compared to the soil of garden outside CETP premises, and it also exceeded marginally with respect to Copper (Cu) and Nickel (Ni).

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- Though there is no Indian Standard for Chromium (Cr), Iron (Fe) and Manganese (Mn), yet level of these metals are found to be considerably high in the Park soil, indicating possibility of wastewater discharge from certain industries or some industrial solid waste disposal in the Park. *However, detailed investigation shall be required to ascertain the facts and extent at both the places. Detailed soil investigation for Garden/Park outside the CETP premises is addressed in* ***Section 3.6****.*

Table 3.3.1: Physico-Chemical Characteristics of Soil Samples collected from Park (B block) and Garden/ Park Outside CETP Premises

Sr. No.	Parameters	Park (B Block)	Garden Outside CETP Premises
1.	pH	7.94	7.83
2.	EC(mS/Cm)	1.53	2.35
3.	Colour	Dark Greyish Brown	Greyish Brown
4.	Sand (%)	61.2	49.2
5.	Silt (%)	30.6	38.8
6.	Clay (%)	8.2	12.0
7.	Textural Class	Sandy Loam	Loam
8.	Bulk Density (g/cc)	1.25	1.32
9.	Porosity (%)	54	56
10.	WHC (%)	44	43
11.	Organic Carbon (%)	0.90	1.07

Table 3.3.2: Metal Content (mg/kg) in Soil Samples collected from B Block Park and CETP Garden/Park in WIA

Sr. No.	Parameters	Park (B block)	Garden Outside CETP Premises	Indian Standards (*Awasthi 2000)
1.	Cadmium (Cd)	BDL	BDL	3-6
2.	Cobalt (Co)	8	2	-
3.	Chromium (Cr)	1120	168	-
4.	Copper (Cu)	178	BDL	135-170
5.	Iron (Fe)	31730	20311	-
6.	Manganese (Mn)	1788	401	-
7.	Nickel (Ni)	150	31	75-150
8.	Lead (Pb)	213	27	250-500
9.	Zinc (Zn)	136	92	300-600

BDL (<0.002) Below Detection Limit

Awashthi SK (Ed.) (2000). Prevention of Food Adulteration Act No. 37 of 1954. Central and State Rules as Amended for 1999, Ashoka Law House, New Delhi.

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3.4 Status of Park/ Gardens in Wazirpur Industrial Area

The assessment of floral diversity was done by observation and listing of trees within the Wazirpur industrial area. The trees in the industrial area are planted in the Green Belt (A Block), CETP, Community Centre and Park in B block of the industrial area as shown in **Fig. 3.4.1.**

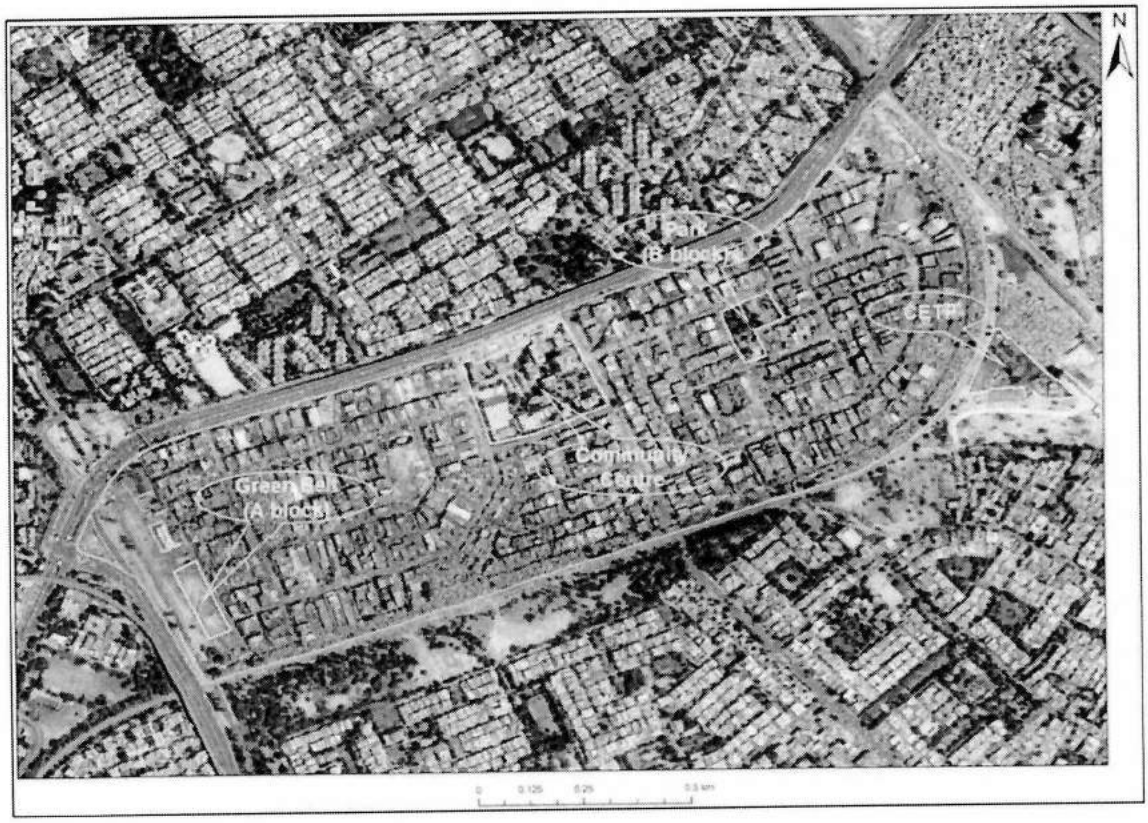

Fig. 3.4.1: Areas of Plantation/Vegetation/Greenery in WIA

Photographs showing plantation/vegetation/greenery in the Wazirpur Industrial Area are shown in **Plates 3.4.1 and 3.4.2.** List of tree species observed by the NEERI Study team is given in **Table 3.4.1.**

The road side plantation is found to be sparse. Among the road side plantation within the industrial area few trees of peepal (*Ficus religiosa*), Karanj (*Millettia pinnata*), goolar (*Ficus racemosa*) and Ashoka (*Saraca asoca*) have been planted. Overall vegetation in Wazirpur industrial area is sparse.

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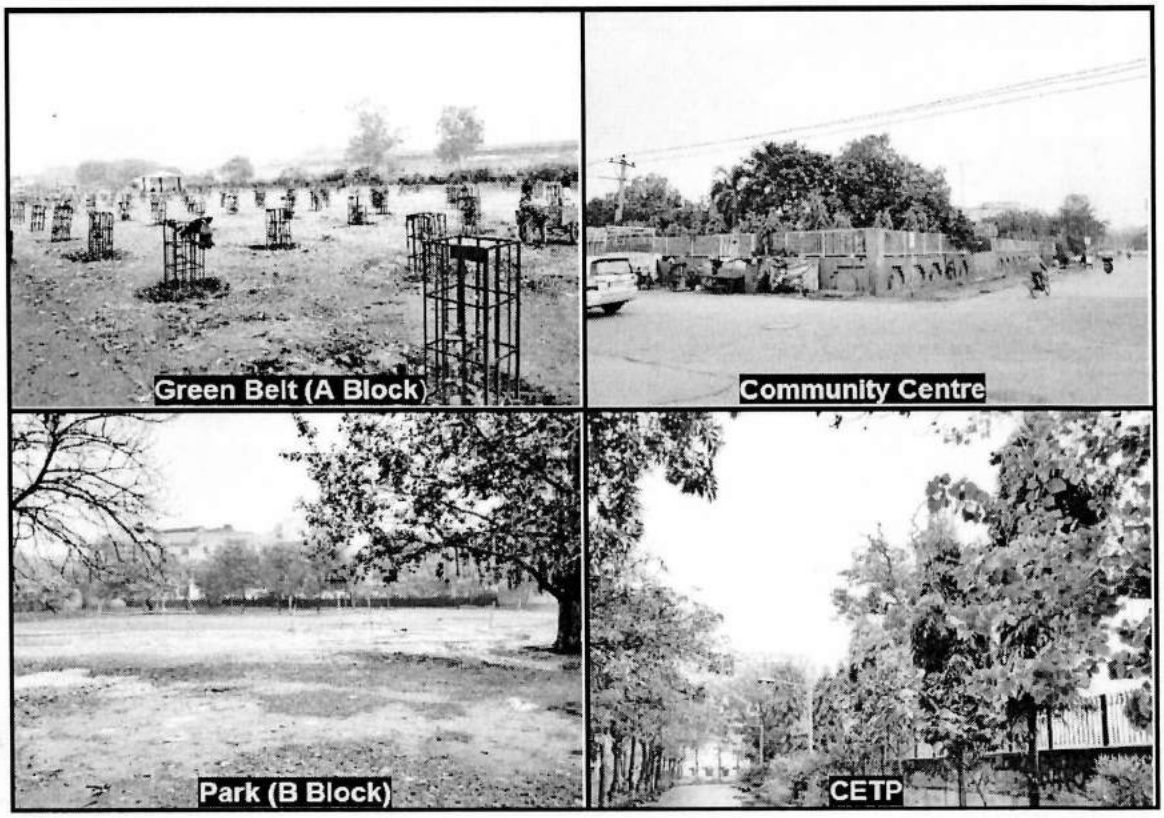

Plate 3.4.1: Plantation at different Locations in WIA

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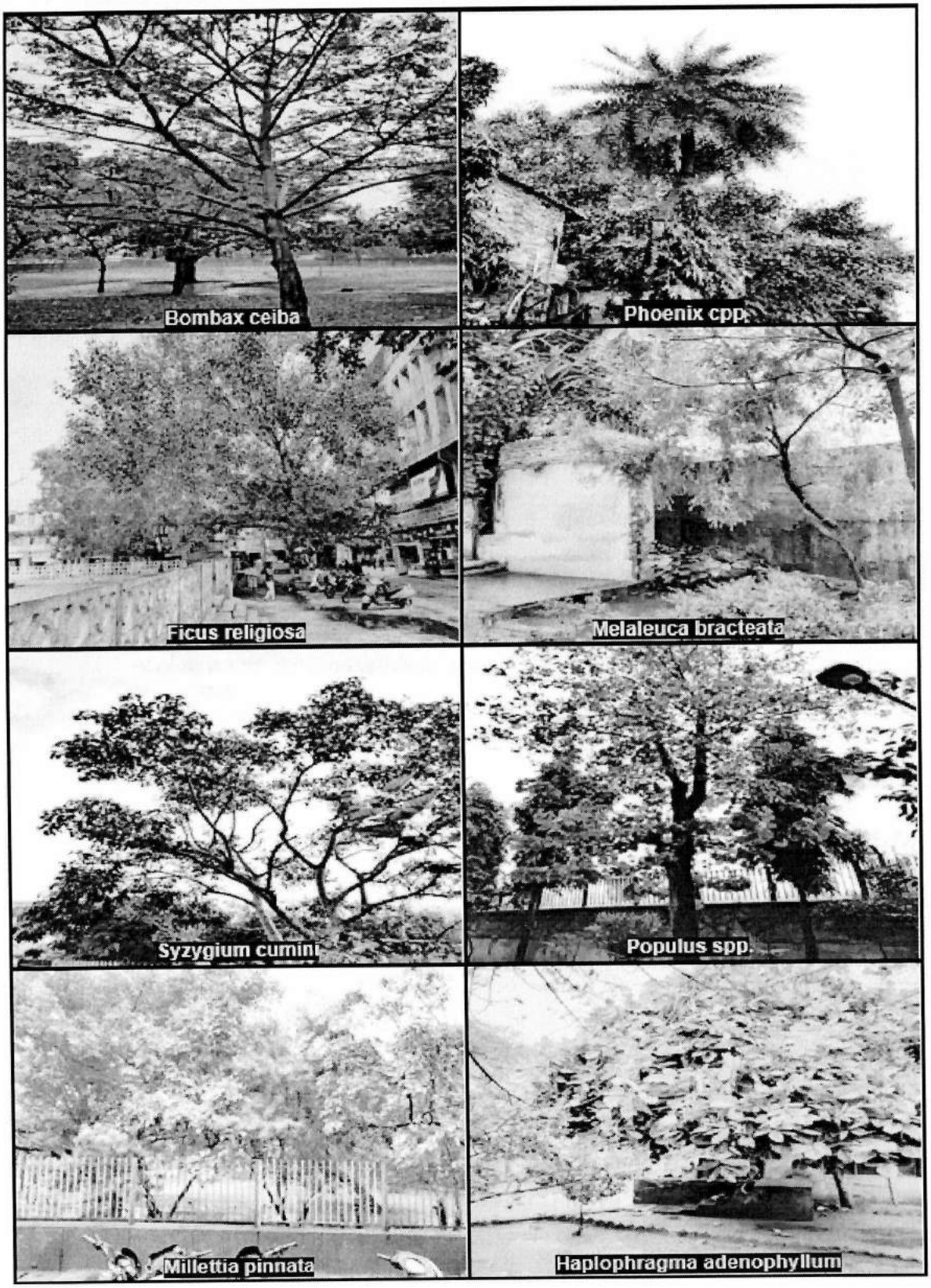

Plate 3.4.2: Tree Species found within the Study Area

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Table 3.4.1: Type of Tree Species Observed in the Wazirpur Industrial Area

Sr. No.	Name of the tree	Scientific Name	Family
1.	Pipal	*Ficus religiosa*	Moraceae
2.	Karanj	*Millettia pinnata*	Fabaceae
3.	Goolar	*Ficus racemosa*	Moraceae
4.	Bargadh	*Ficus Bengalensis*	Moraceae
5.	Ashok	*Saraca asoca*	Fabaceae
6.	Neem	*Azadirachta indica*	Meliaceae
7.	Semal	*Bombax ceiba*	Malvaceae
8.	Amal tas	*Cassia fistula*	Fabaceae
9.	Kaner	*Cascabela thevetia*	Apocynaceae
10.	Jungali Kikar	Prosopis juliflora	Fabaceae
11.	Sahatoot	*Morus alba*	Moraceae
12.	Shisham	*Dalbergia sissoo*	Fabaceae
13.	Aam(Mango)	*Mangifera indica*	Anacardiaceae
14.	Kathal	*Artocarpus heterophyllus*	Moraceae
15.	Arjun	*Terminalia arjuna*	Combretaceae
16.	Saptparn	*Alstonia scholaris*	Apocynaceae
17.	Mardophali	*Haplophragma adenophyllum*	Bignoniaceae
18.	Ficus	*Ficus panda*	Moraceae
19.	Lemon Tree	*Citrus limon*	Rutaceae
20.	Gavava Tree	*Psidium guajava*	Myrtaceae
21.	Banana Tree	*Musa paradisiaca*	Musaceae
22.	Shagoon	*Tectona grandis*	Verbenaceae
23.	Jamun	*Syzygium cumini*	Myrtaceae
24.	Khajoor	*Phoenix spp.*	Arecaceae
25.	Imli	*Tamarindus indica*	Fabaceae
26.	Anar	*Punica granatum*	Lythraceae
27.	Kachnar	*Bauhinia variegata*	Fabaceae
28.	Areca Palm	*Dypsis lutescens*	Arecaceae
29.	Golden Bottle Brush	*Melaleuca bracteata*	Myrtaceae
30.	Safeda (Eucalyptus)	*Eucalyptus spp.*	Myrtaceae
31.	Poplar tree	*Populus spp.*	salicaceae

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3.5 Generation, Characteristics and Leaching Potential of CETP Sludge (Fresh & Stored Sludge)

3.5.1 Sludge Generation and Storage

Wastewater from different industries and various other establishments is treated at the CETP, wherein huge amount of sludge is generated. Presently, about 3-4 tons of sludge is generated on daily basis, which also contains lots of toxic metals. The sludge comes under the hazardous waste category. The sludge is being stored in the premises of CETP since 2006, as proper TSDF (Treatment, Storage and Disposal Facility) is not available in Delhi. Approximately, 13000-15000 tons sludge is reported to be accumulated over the years, occupying large space in the CETP premises. Sludge is stored at many places, two of which are shown in **Plate 3.5.1.**

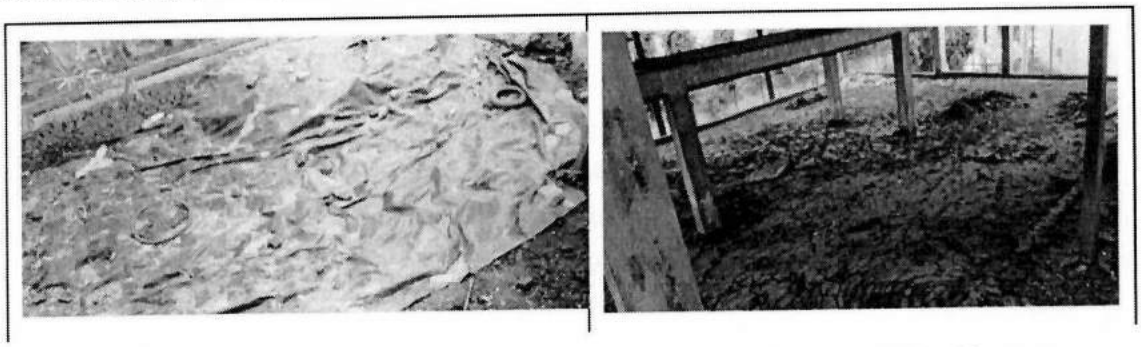

Plate 3.5.1: Storage of Sludge within CETP Premises over the Years

3.5.2 Sludge Sample Collection and Analysis

Freshly generated sludge from the CETP filter press and old sludge stored at the CETP premises were collected. Further, soil samples suspected to be contaminated with CETP sludge were collected from the garden outside the CETP premises. The samples were collected from different depths to observe the change in the sludge characteristics with time. Details of sample collection are given in **Table 3.5.1.** The photographs showing sludge sample collection at the CETP are given in **Plate 3.5.2.**

Table 3.5.1: Details of Sludge Samples Collected from the CETP

Sr. No.	Location of Sample Collection	Duration of Sludge Generation	Depth of Samples Collection
1.	Fresh Sludge at the bottom of filter press	December 2019	Surface
2.	Sludge Stored in CETP Premises		
(i)	1-2 Years Old	2018	1 ft & 2 ft
(ii)	3-6 Years Old	2014 - 2017	Surface, 1 ft & 2 ft
(iii)	8-14 Years Old	2006 - 2012	Surface, 1 ft & 2 ft

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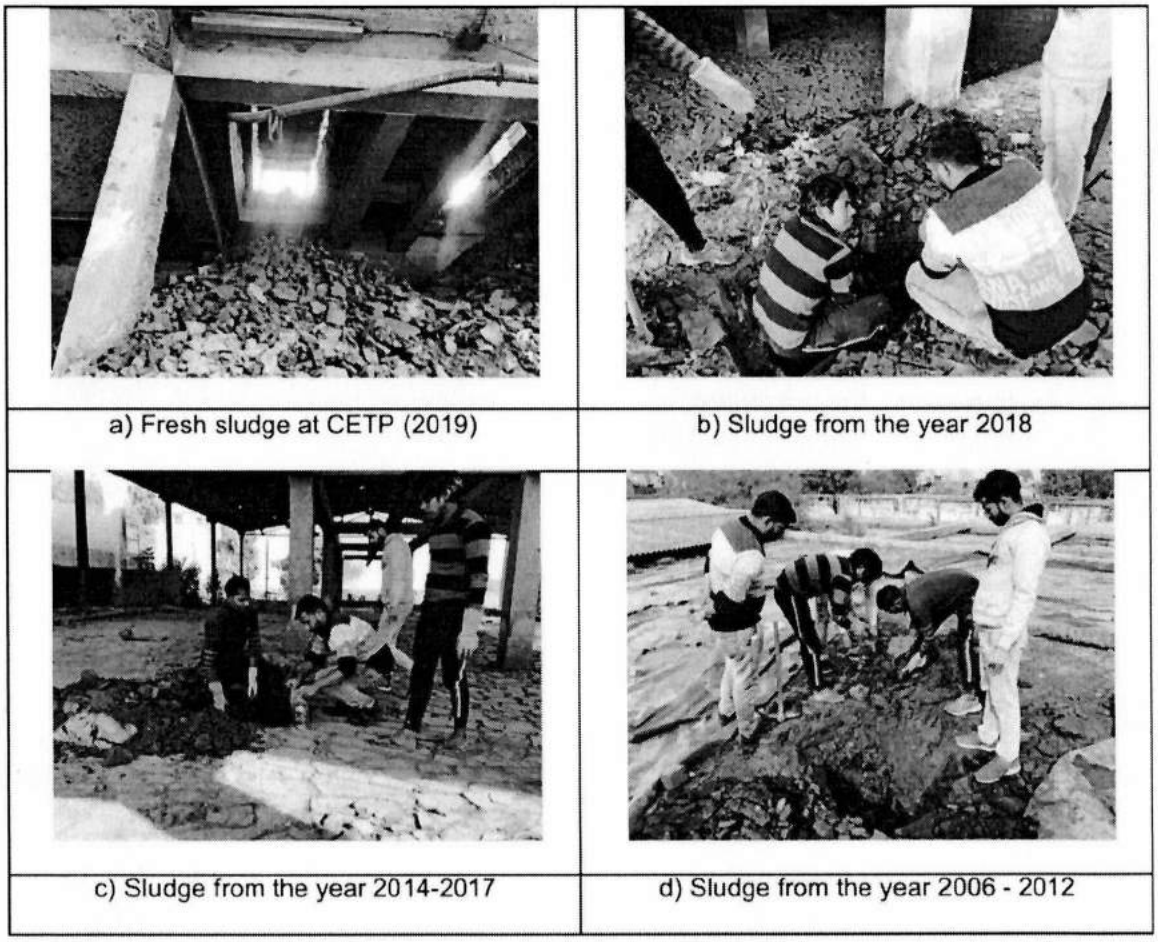

a) Fresh sludge at CETP (2019)

b) Sludge from the year 2018

c) Sludge from the year 2014-2017

d) Sludge from the year 2006 - 2012

Plate 3.5.2: Photographs showing Fresh & Old Sludge Sample Collection at the CETP

3.5.3 Characteristics of Fresh & Old Sludge at CETP and Leaching

In all 9 sludge samples and 4 soil (suspected to be sludge mixed) samples were collected. All the sludge samples (1 fresh and 8 old) were analyzed for various physico-chemical parameters and metal content. The physico-chemical characteristics of all the sludge samples are given in **Table 3.5.2**, whereas the metal contents are given in **Table 3.5.3.**

Leaching potential of all the sludge samples using TCLP and Waste Extraction Test (WET) procedure was determined. The analytical details are given in **Annexure 3.1**, and the results are given in **Table 3.5.4.** The key observations on characteristics and leaching potential are summarized here.

Observations

- The sludge samples are slightly acidic to neutral in nature. pH of fresh and old sludge samples varied between 6.1 & 7.6.

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- Organic carbon is highest in the recently formed sludge (6.4%), whereas in the stored sludge it varied in the range of 0.90- 2.04%.
- Sand content is found to be more in fresh sludge (58%), as compared to stored sludge (41 - 47%), on the other hand silt & clay content was less in fresh sludge (38 % & 4%), as compared to stored sludge (45-53% & 6-10%) respectively.
- Bulk density of fresh as well as stored sludge samples were comparable, whereas porosity of fresh sludge was more (81%) as compared to stored sludge (62-79%). All the sludge samples exhibited good water holding capacity.
- In general, the concentration of certain metals like (Bi, Cr, Cu, Fe, Mn, Ni & Pb) is found to be very high in fresh as well as stored sludge samples.
- The concentration of almost all the metals was found to be more in fresh sludge as compared to the 8-14 years sludge. This may be due to change in effluent/ sludge characteristics during that period.
- There is no specific trend in metal concentrations in the samples collected from surface, at 1 ft and 2 ft depth. However, in 1-2 years old sludge, all the metals (except Sr) have shown increasing trend at 2 ft depth as against 1 ft depth sludge. Similar trend is observed in 3-6 years old sludge for all the metals (except Sr & Zn), whereas at the surface some metals (Co & Mn) have shown highest values than at 1 ft and 2 ft.
- Due to high metal content, the use of this sludge comes under the hazardous waste category, and cannot be used as such for any purpose. Details technological studies shall be required to explore possibility of usage of this sludge, may be in different proportion, for stability of metals.
- Further, toxicity/leaching potential of for all the sludge samples was studied using TCLP and Waste Extraction Test (WET) procedure, wherein 12 metals like, B, Cd, Co, Cr, Cu, Fe, Li, Mn, Ni, Pb, Sr and Zn were determined.
- As per Schedule II (rule 3(1)(17)(ii), list of waste constituents with concentration limits are defined. Metals like As, Ba, Cd, Cr(iii), Pb, Mn, Hg, Se, and Ag are to be determined using TCLP test, whereas WET procedure is applicable for Antimony (Sb), Beryllium (Be), Chromium VI (Cr6), Cobalt (Co), Copper (Cu), Molybdenum (Mo), Nickel (Ni), Thallium (Th), Vanadium (V), and Zinc (Zn).
- Among all the metals, only Mn was found to leach out beyond the threshold limit in TCLP test. Mn concentration was found to be more in fresh sludge (110 mg/L) as compared to the stored sludge samples (4-50 mg/L). The threshold limit for Mn is 10 mg/L.
- Lead (Pb) determined using TCLP was found much below the threshold value of 5 mg/L
- Leaching of the metals is more when the samples are subjected to Waste Extraction Test, which is evident by the concentration levels observed by two different procedures.

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- Out of the above, metals analyzed using WET procedure were Co, Cr, Cu, Ni and Zn. Concentrations of Cr, Cu and Ni were found exceeding the respective threshold values (5 mg/L, 25 mg/L, & 20 mg/L respectively). All 9 sludge samples exceeded for Cr & 8 samples for Cu and 5 samples for Ni.

Table 3.5.2: Physico-chemical Characteristics of Fresh and Stored Sludge at CETP

Sr. No.	Parameter	Fresh Sludge	Stored Sludge with Age							
			1-2 Yrs Old		3-6 Yrs Old			8-14 Yrs Old		
			1 ft	2 ft	Surface	1 ft	2 ft	Surface	1 ft	2 ft
1.	pH	7.6	6.8	6.8	7.3	7.0	7.5	7.2	6.1	7.9
2.	EC mS/Cm	4.8	2.7	2.8	2.5	3.2	4.6	11.5	7.4	6.1
3.	OC, (%)	6.40	1.36	1.74	1.26	1.84	2.04	0.90	1.45	1.07
4.	Sand, (%)	58	47	41	42	41	44	46	44	46
5.	Silt, (%)	38	47	51	52	53	50	45	46	48
6.	Clay, (%)	4	6	8	6	6	6	10	10	6
7.	Textural class	Sandy Loam	Sandy Loam	Silty Loam	Silty Loam	Silty Loam	Silty Loam	Loam	Loam	Sandy Loam
8.	Bulk Density (g/cm^3)	0.77	0.73	0.73	0.68	0.66	0.73	0.77	0.81	0.78
9.	Porosity, (%)	81	62	70	68	68	79	76	76	78
10.	WHC, (%)	130	129	127	126	131	124	114	106	125

Table 3.5.3: Metal Content (mg/kg) in Fresh and Stored Sludge at CETP

Sr. No.	Metal	Fresh Sludge (mg/kg)	Metal Content (mg/kg) in Stored Sludge with Age							
			1-2 Yrs Old		3-6 Yrs Old			8-14 Yrs Old		
			1 ft	2 ft	Surface	1 ft	2 ft	Surface	1 ft	2 ft
1.	B	187	198	233	198	195	201	132	181	154
2.	**Bi**	**3304**	**2623**	**2838**	**2773**	**2263**	**2940**	**1316**	**2550**	**2138**
3.	Cd	1	1	2	1	1	1	BDL	BDL	BDL
4.	Co	84	69	76	83	55	80	36	52	57
5.	**Cr**	**17625**	**17693**	**18862**	**17280**	**16178**	**17602**	**10184**	**15538**	**12011**
6.	Cu	3235	2582	2599	2738	2031	2917	1260	2520	2116
7.	**Fe**	**134071**	**131406**	**138526**	**128091**	**122998**	**129509**	**87777**	**119872**	**102136**
8.	**Mn**	**11025**	**6618**	**6965**	**8736**	**5673**	**8110**	**4574**	**5448**	**9202**
9.	**Ni**	**1941**	**1608**	**1721**	**1793**	**1481**	**1934**	**930**	**1396**	**1186**
10.	**Pb**	**2482**	**2161**	**2902**	**1960**	**2334**	**2490**	**1182**	**2194**	**1941**
11.	Sr	82	105	97	80	99	87	81	69	50
12.	Zn	98	112	497	81	404	160	33	579	172

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Table 3.5.4: Leaching Potential of Various Metals in Fresh and Stored Sludge (determined using TCLP and WET Procedure)

Sr. No.	Metal	Thresh -old Limit	Fresh Sludge	Metal Concentration in Leachate Samples (mg/L)							
				1-2 Yrs Old Sludge		3-6 Yrs Old Sludge			8-14 Yrs Old Sludge		
				1 ft	2 ft	Surface	1 ft	2 ft	Surface	1 ft	2 ft
A.	**TCLP Test**										
1.	Cd	1	0	0	BDL	0	BDL	0	BDL	0	0
2.	Cr (III)	5	0.03	0.02	0.01	0.02	0.1	0.02	0.02	0.03	0.99
3.	Mn	10	110	38	17	4	13	48	10	50	10
4.	Pb	5	0.41	1.19	0.72	1.01	1.46	0.66	0.55	1.89	0.12
B.	**WET Procedure**										
1.	Co	80	0.67	1.55	1.22	1.48	1.08	0.55	0.76	1.24	0.15
2.	Cr (VI)	5	17	30	20	14	10	24	14	35	10
3.	Cu	25	48	62	43	53	45	41	37	75	8
4.	Ni	20	32	25	19	21	18	29	13	28	2
5.	Zn	250	0.24	0.59	0.43	0.26	0.34	0.46	0.25	1.23	0.16

Values in red color indicate exceedence to the threshold value.

All values are in mg/L.

3.5.4 Status of Metal Content in CETP Sludge - Comparison with Earlier Studies

Metal content in fresh and stored sludge samples at WIA CETP has been assessed earlier by NEERI (2018) and CPCB (2019). Status of metal content in earlier studies and present study is compared, as summarized in **Table 3.5.5**.

Table 3.5.5: Comparison of Heavy Metals Concentration in Fresh and Stored Sludge at Wazirpur CETP

Sr. No.	Metal	Stored Sludge (NEERI Report 2018 - Table 4, Pg. 8)	CPCB Inspection Report (2019)		Present NEERI Study (2020)	
			Fresh Sludge	Stored Sludge	Fresh Sludge	Stored Sludge (2006-2018) (Range & Average of 8 Samples)
1.	As	-	30	12	-	-
2.	Cd	0	BDL	BDL	1.0	1-2 (1)
3.	Co	299	94	124	84	36-83 (64)
4.	Cr	79643	29740	17180	17625	10184-18862 (15669)
5.	Cu	8485	3926	4000	3235	1260-2917 (2345)
6.	Fe	190941	278975	152515	134071	87777-139526 (120039)
7.	Mn	31321	7899	22679	11025	4574-9202 (6916)
8.	Ni	4236	2006	196	1941	930-1934 (1506)
9.	Pb	130	39.6	11.6	2482	1182-2902 (2146)
10.	Se	-	BDL	BDL	-	-
11.	V	-	118	112	-	-
12.	Zn	859	260	286	98	33-579 (255)

All values are in mg/kg of sludge.

Observations

- In fresh sludge samples, concentration of certain metals like Co, Cr, Cu, Fe, Ni and Zn were found more in the study conducted by CPCB in 2019, whereas other metals like Cd, Mn and Pb were found higher in the present study. Considerable variation in the concentrations of Cr, Fe, Mn, Pb and Zn was observed, which may be attributed to the quality of industrial influent received at the CETP on different occasions.
- Metal concentration in the stored sludge samples indicates that certain metals like Co, Cr, Cu, Fe, Mn and Zn was found to be highest in 2018 (NEERI Study), followed by CPCB in 2019 and lowest in the present NEERI study. Ni was found to be highest in 2018 (NEERI) and lowest in 2019 (CPCB), whereas Pb concentration was found to be very high in the present study.
- Analysis of data indicates that metal content largely depends on the type of industrial influent received at the CETP, which may vary substantially, and so metal content in fresh as well as stored sludge.

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- It is pertinent to note that the sludge contains considerably high levels of Fe, Cr and Mn. Therefore, economical recovery of these metals may be attempted through technological interventions.
- The sludge being hazardous in nature should be stored in secured landfill site (TSDF). However, it would be desirable to store the sludge separately for metal recovery, if possible at a later stage.

3.6 Characteristics of Suspected Sludge Contaminated Soil at CETP Park

3.6.1 Present Study

Soil samples were collected from the adjacent Garden/Park outside the CETP premises, as it is suspected that the soil is contaminated with CETP sludge. Samples were collected from the leftside and rightside corner of the Park. Two samples were collected from each site, at a depth of 1 ft and 2 ft and were analysed for various physico-chemical parameters and metal content. Further leaching potential of the soil samples collected from rightside corner (having substantial metal content) was assessed using TCLP and WET procedure. Standard procedures as described earlier were followed.

The physico-chemical parameters along with metal content in all the 4 samples are given in **Table 3.6.1 and 3.6.2** respectively. Indian Standards and Canadian Guidelines for metals are also indicated. Further, concentration of different leachable metals in two samples are given in **Table 3.6.3**. The key observations are summarized briefly here.

Observations

- The soil samples collected from the leftside and rightside corner of the Park (ouside CETP premises) showed marked difference almost with respect to all the physico-chemical parameters and metal content.
- pH of leftside soil samples was alkaline (7.8), whereas it was acidic (5.0 - 6.5) for the rightside samples.
- Organic carbon in the leftside soil samples was less (1.07-1.55%), as compared to rightside soil samples (1.55 - 1.95%).
- Sand, silt and clay content in all the four samples were more or less similar, with loamy texture of soil.
- Bulk density of leftside soil samples was relatively more (1.24 - 1.32 g/cm^3) than rightside soil samples (0.91 - 0.98 g/cm^3), whereas porosity of leftside soil was much less (54 - 56%) as compared to rightside soil samples (78 - 79%).
- Marked difference was observed in the water holding capacity. Leftside soil samples were found to have much lower WHC (43 - 44%) as compared to rightside corner soil samples (95 - 101%).

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- The concentration of all the metals (except Sr) was found to be much higher in right-side corner soil samples as compared to the left side corner soil samples.
- The concentration of all certain metals like (Bi, Cr, Cu, Fe, Mn, Ni & Pb) is found to be very high in right-side corner soil samples.
- Looking at the higher content of metals in the right-side corner soil samples, toxicity/leaching potential of soil samples was studied using TCLP and Waste Extraction Test (WET) procedure, wherein metals like, Cd, Co, Cr (III &VI), Cu, Mn, Ni, Pb and Zn were determined.
- As per Schedule II (rule 3(1)(17)(ii), list of waste constituents with concentration limits are defined. Metals like Cd, Cr(iii), Mn and Pb are determined using TCLP test, whereas WET procedure is applicable for Chromium VI (Cr6), Cobalt (Co), Copper (Cu), Nickel (Ni) and Zinc (Zn).
- All the metals were found within the respective threshold limit values.

Table 3.6.1: Physico-chemical Characteristics of Soil Samples Collected from Park Outside the CETP Premises

Sr. No.	Parameter	Parametric Value at			
		Left side Corner		Right-side Corner	
		1 ft	2 ft	1 ft	2 ft
A.	**Physical Parameters**				
1.	pH	7.8	7.8	6.5	5.0
2.	EC mS/Cm	1.4	2.4	6.7	5.0
3.	OC, (%)	1.07	1.55	1.55	1.94
4.	Sand, (%)	49	49	47	49
5.	Silt, (%)	39	39	41	39
6.	Clay, (%)	12	12	12	12
7.	Textural class	Loam	Loam	Loam	Loam
8.	Bulk Density, (g/cm^3)	1.32	1.24	0.98	0.91
9.	Porosity, (%)	56	54	79	78
10.	WHC, (%)	43	44	95	101

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Table 3.6.2: Metals Content (mg/kg) in Soil Samples Collected from Park Outside the CETP Premises

Sr. No.	Parameter	Metal Content (mg/kg) at				Indian Standard (*Awasthi 2000)
		Left side Corner		Right-side Corner		
		1 ft	2 ft	1 ft	2 ft	
1.	Boron (B)	43	24	203	230	-
2.	Bismuth (Bi)	BDL	BDL	17844	2483	-
3.	Cadmium (Cd)	BDL	BDL	2	3	3-6
4.	Cobalt (Co)	2	3	30	34	-
5.	Chromium (Cr)	168	330	16631	18884	-
6.	Copper (Cu)	BDL	31	2297	2484	135-170
7.	Iron (Fe)	20311	23582	128693	141764	-
8.	Manganese (Mn)	401	541	5281	4658	-
9.	Nickel (Ni)	31	42	786	615	75-150
10.	Lead (Pb)	27	53	2566	2799	250-500
11.	Strontium (Sr)	60	82	61	46	-
12.	Zinc (Zn)	92	77	156	139	300-600

Awasthi SK (Ed.) (2000). Prevention of Food Adulteration Act No. 37 of 1954. Central and State Rules as Amended for 1999, Ashoka Law House, New Delhi.

Table 3.6.3: Concentration of Various Leachable Metals in the Sludge Mixed Soil Collected from the Right-side Corner of CETP Park

Sr. No.	Metal	Threshold Limit (mg/L)	Metal Concentration (mg/L)	
			1 ft	2 ft
A.	**TCLP Test**			
1.	Cd	1	0	BDL
2.	Cr (III)	5	0.03	0.33
3.	Mn	10	BDL	1.9
4.	Pb	5	0.41	0.73
B.	**WET Procedure**			
1.	Co	80	0.28	0.53
2.	Cr (VI)	5	2	3
3.	Cu	25	11	20
4.	Ni	20	3	3
5.	Zn	250	0.26	0.31

Note: TCLP test and WET procedure were not performed on soil samples collected from left side corner of park.

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3.6.2 Comparison with Earlier Study (CPCB, 2019)

Metal content in soil samples collected from the Park outside the CETP premises in the present study was compared with the earlier study conducted by CPCB in 2019. The samples in CPCB study were collected from much depth of 10.5 ft and 9.5 ft. The soil in the Park is suspected to be contaminated with the CETP sludge. The sample collection details are given in **Table 3.6.4**, whereas in the present study, the samples were collected from the depth upto 2 ft. Comparative status of metal content in different soil samples (suspected with sludge contamination) is presented in **Table 3.6.5.**

Table 3.6.4: Details of Soil Samples Collected from the CETP Park and Nearby Area (CPCB Inspection Report, 2019)

Sr. No.	Location of Sample Collection	Sample Collection Depth and Description
A.	**Park Outside CETP**	
(i)	**Site A-** Sample 1	Top Soil/ Surface
(ii)	**Site A-** Sample 2	10.5 ft, Appears to be a layer of sludge/ waste material mixed with soil
(iii)	**Site B** (65 ft away from Site A) – Sample 3	9 ft, Appears to be a layer of sludge/ waste material mixed with soil
B.	**Site C -** Outside CETP Sludge Storage Area near boundary wall – Sample 4	Top Soil / Surface

Table 3.6.5: Comparison of Heavy Metals Concentration in Soil Samples in Park Areas of WIA

Sr. No.	Metal	Soil Quality Indian Stanadrd (+Awasthi 2000)	CPCB Inspection Report (2019)				Present NEERI Study (2020)	
			Site A-S1 (Top)	Site A-S2 (10.5 ft)	Site B-S3 (9 ft)	Site C-S4 (Top)	CETP Park	
							Site 1* (LSC)	Site 2* (RSC)
1.	As		14	62	36	26	-	-
2.	Cd	3-6	0.03	BDL	BDL	BDL	BDL	3
3.	Co		-	-	-	-	3	32
4.	Cr		2380	26920	19120	24700	249	17758
5.	Cu	135-170	326	2786	2702	2964	31	2391
6.	Fe		52375	270015	199215	227295	21947	135229
7.	Mn		1419	6419	8878	4978	471	4970
8.	Ni	75-150	138	800	950	994	37	701
9.	Pb	250-500	54	188	38	36	40	2683
10.	Se		BDL	BDL	BDL	BDL	-	-
11.	V		52	142	100	100	-	-
12.	Zn	300-600	98	208	206	114	85	148

All values are in mg/kg. *average of two samples collected from 1 ft and 2 ft depth.
LSC – Leftside corner; RSC – Rightside corner.

+Awasthi SK (Ed.) (2000). Prevention of Food Adulteration Act No. 37 of 1954. Central and State Rules as Amended for 1999, Ashoka Law House, New Delhi.

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Observations & Conclusion

- Perusal of the table indicates that the concentration of certain metals like Cr, Cu, Fe, Mn, Ni and Zn was relatively higher at the depth of 10.5 ft (Site A) and 9.5 ft (Site B), as compared to the metals content observed at the 1-2 ft depth at the rightside corner of the Park. However, reverse trend was observed for Pb content.
- It was observed that metal content profile across all the surface and deep samples was not uniform. Presence of high concentration of metals indicates mixing with industrial waste/ sludge/ untreated water.

Overall high level of metal content in the rightside corner soil samples indicate possibility of untreated water discharge or some sludge disposal. Non-leaching behaviour of metals at a depth upto 1-2 ft observed in the present study indicates that leaching might have already occurred beyond 2 ft. Earlier studies conducted by CPCB also indicates this fact. The quantum of damage occurred to the soil at lower depths may require further investigation as per the guidelines published by CPCB "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty".

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3.7 Ground Water Quality Status in the Study Area and Delhi

3.7.1 Analysis of Ground Water Data during 2015-16

Ground water forms the major source of water supply for drinking purposes in most parts of India. Groundwater plays a significant role in the ecological functions of various ecosystems. However, as a consequence of population growth, urbanization, industrialization, irrigation, mining and waste disposal practices, a large number of anthropogenic contaminants have emerged as threat to ground water resources. At the same time, geogenic contamination by arsenic, fluoride and others in many parts of the world also poses an important threat to ground water quality with grave implications to human health.

Ground water quality monitoring is an important activity of the Central Ground Water Board (CGWB) to generate background data on ground water quality as well as to identify the ground water quality hotspots through a network of about 15000 observation wells in the country. The samples are collected and analysed every year during the month of May.

CGWB also collects groundwater samples from different districts in Delhi. The total number of observation wells in Delhi is 99. The chemical parameters like TDS/ electrical conductivity, Chloride, Fluoride, Iron, Arsenic and Nitrate etc. are main constituents defining the quality of ground water in unconfined aquifers. Therefore, presence of these parameters in ground water beyond the permissible limits in the absence of alternate source has been considered by CGWB as ground water quality hotspot. The six main parameters considered with BIS permissible limit are:

- Electrical conductivity (>3000 µS/cm)
- Chloride (>1000 mg/L)
- Fluoride (> 1.5 mg/L)
- Iron (> 1.0 mg/L)
- Arsenic (> 0.01 mg/L)
- Nitrate (> 45 mg/L)

The ground water samples are collected mostly from dug wells and hand pumps. Based on the study conducted by CGWB during 2015-16, parameter-wise status of ground water quality hotspots in different districts of Delhi along with number of samples exceeding the permissible limit and range of values is presented in **Table 3.7.1**. Wazirpur Industrial Area comes under the **North West** district of Delhi.

Perusal of table indicates that electrical conductivity, chloride and nitrate levels are very high in North West, South West and West districts of Delhi. Nitrate is also high in South Delhi district. Only one sample each was found to exceed permissible limit for iron (> 1.0 mg/L) in Central Delhi, New Delhi and North Delhi. Arsenic level was also found to exceed permissible limit only in East and North East Delhi district.

Thus as per CGWB Report (2018), North West district of Delhi, where Wazirpur Industrial Area is located, is a ground water hotspot with respect to electrical conductivity, chlorides and nitrates.

Table 3.7.1: Parameter-wise Ground Water Quality Status in Different Districts of Delhi

Sr. No.	Parameters	BIS-DWQ Standards – Permissible Limit	Districts Exceeding BIS Limits in Delhi during 2015-16	No. of Samples Exceeding Permissible Limit	Parametric Value/ Range Exceeding Permissible Limit
1.	Electrical Conductivity, µS/cm	3000	Central	1	3989
			East	1	3400
			New Delhi	1	5107
			North West	**9**	**3063-8900**
			South West	9	3940-14470
			West	6	3438-24240
2.	Chlorides, mg/L	1000	**North West**	**5**	**1134-2511**
			South West	9	1154-3023
			West	4	1100-7409
3.	Fluoride, mg/L	1.5	North	1	1.85
			North West	**9**	**1.76-4.07**
			South	1	1.97
			South West	1	2.06
			West	2	2.04-2.18
4.	Nitrate, mg/L	45	Central	1	655
			East	1	68.2
			New Delhi	3	62.4-499
			North	2	52.7-125
			North West	**7**	**56.3-363**
			South	9	47.2-710
			South West	15	45.6-649
			West	7	48.7-350
5.	Iron, mg/L	1.0	Central	1	2.829
			New Delhi	1	1.526
			North	1	1.12
6.	Arsenic, mg/L	0.01	East	1	0.02
			North East	1	0.01

All values are in mg/L except electrical conductivity, which is in µS/cm.

Source: Extracted from CGWB Report on "Ground Water Quality in Shallow Aquifers in India (for Selected Parameters)", Central Ground Water Board, Ministry of Water Resources RD & GR, Govt. of India, Faridabad 2018.

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3.7.2 Comparison of GW in North West District and Near Wazirpur CETP

As per CGWB Report (2018), North West Delhi is identified as one of the ground water hotspot with respect electrical conductivity, chlorides and nitrates. The North West District forms a narrow trip/pi in the map of Delhi, wherein the present study area, Wazirpur Industrial area is located at the extreme end of the district, and it shares boundary with North and Central Delhi districts. District map of Delhi with Wazirpur Industrial Area marked is shown in the Figure.

CPCB (2019) assessed ground water quality near the Wazirpur CETP Area, wherein three samples were collected from borewells located within CETP premises and DJB pump house located in front of CETP and at the back of CETP. The depth of bore wells is reported to be around 120 feet. Ground water quality at the locations near CETP area wrt 6 parameters defined by CGWB is compared against the ground water quality of North West District, as presented in **Table 3.7.2**.

Perusal of table indicates that the levels near CETP area are much less as compared to the levels observed in North West Delhi district. However, nitrate level was found to exceed the permissible limits at all the three locations and iron at the pump house at the backside of CETP.

Table 3.7.2: Comparison of GWQ Parameters Exceeding the Permissible Limit in North West Delhi and Levels near CETP Area

Sr. No.	Parameters	BIS-DWQ Standards (BIS:10500-2012) Permissible Limit	Range of Values Exceeding Limits in North West District	CPCB Inspection Report 2019		
				CETP Premises	DJB Pump house in front of CETP	DJB Pump house at back of CETP
1.	Electrical Conductivity, µS/cm	3000	3063-8900	1595*	857*	1957*
2.	Chlorides, mg/L	1000	1134-2511	132	90	166
3.	Fluoride, mg/L	1.5	1.76-4.07	-	-	-
4.	Nitrate, mg/L	45	56.3-363	205	49	128
5.	Iron, mg/L	1.0	Nil	0.63	0.10	1.40
6.	Arsenic, mg/L	0.01	Nil	BDL	BDL	BDL

*Calculated from TDS Value (TDS = 0.67 x EC).

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Chapter 4

Status of Pickling Industries in Wazirpur Industrial Area

The chapter deals with the details of pickling industries in Wazirpur industrial area with respect to general manufacturing process adopted by Pickling Industries, environmental concerns and management. The information/data provided by the 37 pickling industries in the industrial area has been analysed to assess adequacy of pollution control systems for air and water pollution control.

4.1 Details of Pickling Industries in Wazirpur Industrial Area

As per the data provided by Wazirpur Industrial Area CETP Society, there are 105 pickling industries in the Wazirpur Industrial Area (WIA). These industries are located in different blocks of the WIA. List of pickling industries in WIA was also sought from DSIIDC and DPCC. Block-wise list of pickling industries as per CETP Society (with plot number/address), DSIIDC and DPCC, as well as status of their treated wastewater connectivity to CETP is given in **Table 4.1.1**.

As per CETP Society, 57 pickling industries are in Block A, 24 in Block B and 24 in Block C. Out of 105 pickling industries, as many as 86 industries are matching (name and location i.e. plot number) with DPCC records.

The data provided by various agencies were sent to DPCC (by CPCB) for authentication and the final data w.r.t. details of the industries have been included here.

4.2 Manufacturing Process Adopted by Pickling Industries, Environmental Concerns and Management

Information with respect to all the pickling industries in Wazirpur Industrial Area was sought through CETP Society (copy of letter dated February 11, 2020 attached as **Annexure 4.1**). Information in the form of pollution control system adequacy report for 37 pickling industries was provided by the industries, as listed in **Table 4.2.1**. It was informed that many of the industries have permanently closed down this activity or shifted out of Wazirpur Industrial Area due to uncertainty prevailing regarding permission for operation.

The data available for 37 industries have been analysed with respect to manufacturing process, environmental concerns, type of pollution control systems

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installed for control of air pollution and water pollution, adequacy of pollution control systems installed, characteristics of untreated and treated waste water stream etc. It is observed that the practices followed by different pickling industries are more or less same, and variation is only with respect to quantity of material processed/handled. The analysis of data is presented in the following sections.

4.2.1 Manufacturing Process adopted by Pickling Industries

The pickling industries in Wazirpur Industrial Area are mostly small scale units engaged mainly in the pickling and cold re-rolling of flat stainless steel sheets of different gauges (12 gauge to 16 gauge and 18 gauge to 22 gauge to 26 gauge) to manufacture the product in the form of Stainless Steel (SS) sheets, which is finally supplied for the manufacture of SS based utensils in local market. The units in general have installed capacity to handle about 1-5 tons of SS sheets per day.

These units mainly carry out job work of pickling, cold re-rolling, and annealing whereby they procure the rolls of stainless steel from the clients and return the same after processing to the desired quality of the product in terms of surface conditions. These units operate for about 8-12 hours per day and employ about 10-15 persons including labourers, depending upon the capacity of the unit.

Industry-wise details of 37 pickling industries with respect to their capacity, gauge of sheet processed, operational schedule and manpower deployed are given in **Table 4.2.2**.

The manufacturing operations involved for the manufacture of SS consists of annealing, cold rolling and pickling. The unit carries out all of these operations in its premises. Normally several cycles of these operations (pickling, cold rolling and annealing) are carried out with the minimum of three for cold rolling and annealing, whereas pickling is carried out only twice to convert the stainless steel sheets to thinner gauge. In this process number of cycles depends upon the desired thickness and the size of the final product. Some units are doing all the three processes, whereas some units are outsourcing annealing process to other units. Schematic diagram of pickling industry with treatment of air and wastewater polluting streams is depicted in **Fig. 4.2.1**.

During the process of annealing, which is carried out in the furnace, the surface of sheets becomes grey in colour, due to oxidation of the surface layer. These sheets are then acid pickled by keeping them in acid bath to remove oxides, dirt grease etc. from their surface and obtain the shining surface of sheets, which is suitable for making utensils and other products.

The acid bath contains a mixture of Sulphuric acid (H_2SO_4) and Nitric Acid (HNO_3). The temperature is normally maintained at ambient conditions. The steel sheets are then removed and washed/ rinsed with water before cold rolling.

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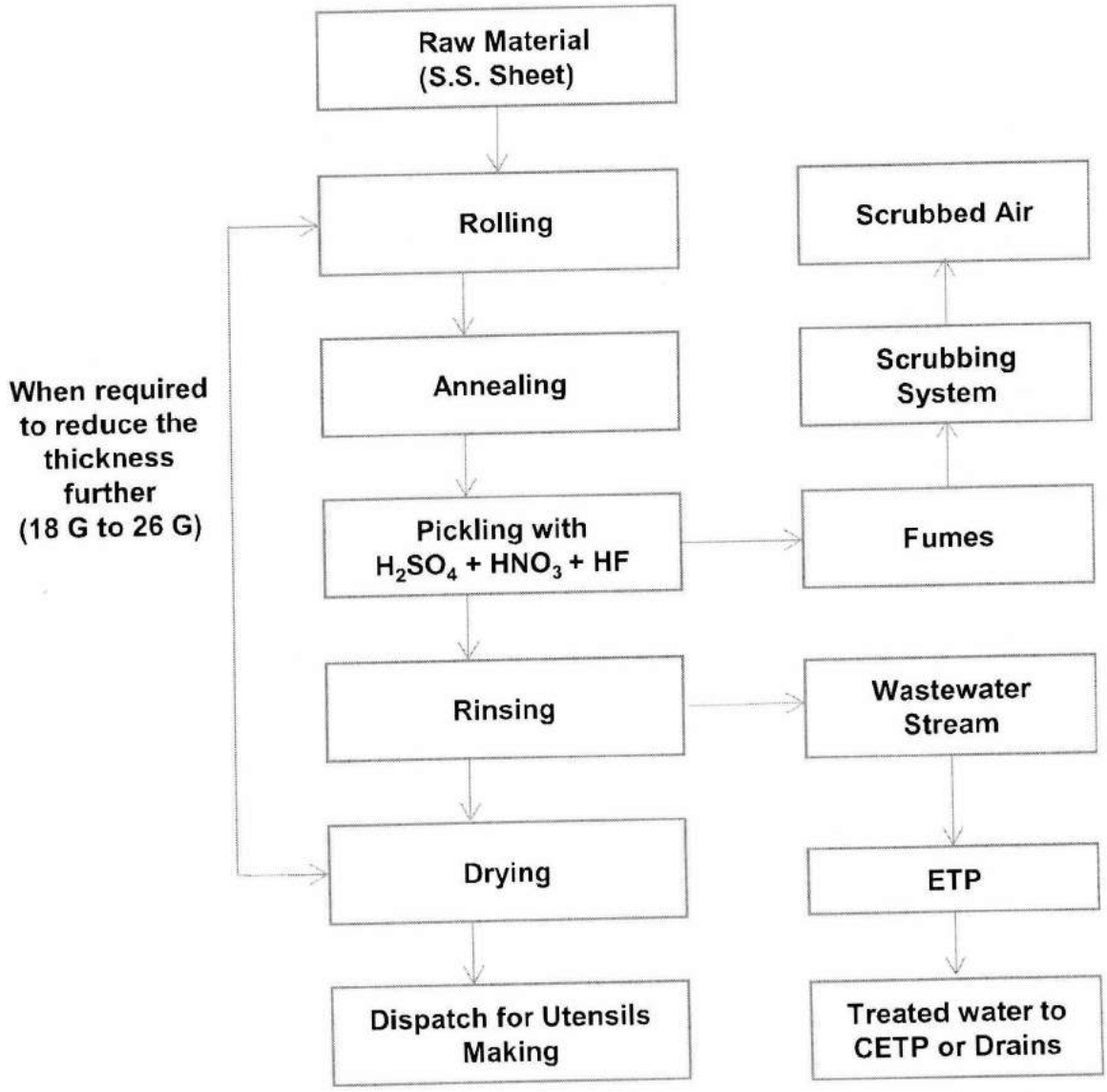

Fig. 4.2.1: Process Flow Diagram of a Typical Pickling Industry in Wazirpur Industrial Area with Air and Water Pollution Control Facility

Industry-wise details of daily consumption of Sulphuric acid (H_2SO_4), Nitric Acid (HNO_3), and Wastewater is given in **Table 4.2.3.** The quantity of acids used by different industries varies on daily basis depending upon the material processed. On an average about 10 litres of sulphuric acid and 10 litres of nitric acid is used per ton of raw material proceesed. Earlier, 5-7 litres of hydrofluoric acid was used in processing of 1.0 ton of material, however now hydrofluoric acid is not used by the industries. About 1000 litres waste water is generated from processing of 1 ton of raw materials (SS sheets).

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4.2.2 Environmental Concerns in Pickling Industry

The processes involved in a Pickling Industry generate following three types of wastes:

- Air emissions (mainly acid fumes) from pickling process
- Wastewater from spent acid bath, spent wash water bath, floor washing and scrubber containing acids, oil & grease and metal contents
- Hazardous solid waste/sludge from effluent treatment plant containing high metals content.

These aspects are to be taken care by the industry in such a manner that these wastes do not adversely affect the receiving environment; i.e. air quality of Wazirpur Industrial Area & its surrounding region, water body/stream where industry treated wastewater is discharged (the wastewater stream should be connected to CETP) and hazardous solid waste (ETP sludge) is properly stored and disposed as per Hazardous Waste Management Rule, 2016.

The following sections present the practices adopted by pickling industries to tackle with the problem of air emissions, wastewater and solid waste generation in an effective manner.

4.2.3 Air Pollution Control System Installed and Its Adequacy Status

The only source of air pollution from the pickling industry is pickling activity/ process, wherein some amount of acid fumes are formed. These fumes are highly acidic in nature consisting of mostly nitric acid and some amount of sulphuric acid. In order to prevent the accumulation of acid fumes in the work area, the exhaust fumes generated from the pickling operation are extracted by means of fan and hood system connected to the scrubber. The acid vapours released over the acid bath and its surrounding area get cleaned in this manner. A negative draft is maintained in the area by means of ID fan, so that no vapour can escape from the sides of the work area. The scrubber consists of spray column, where circulating liquid i.e. alkaline water is sprayed from the top of the scrubber through a set of nozzles. The clean air is then emitted through a stack (dia 25-40 cm) at a height of 10-15 m above the ground level.

The circulating water becomes acidic after absorption of acid, which is collected in a sump and is recycled back to the scrubber by means of a pump. The pH of scrubbing liquid is maintained in the range of 8-8.5 by addition of caustic soda. The liquid gas ratio maintained within the body of scrubber is nearly 1:1000, which is adequate for efficient removal of acid vapours. Some amount of scrubber water is taken out regularly and discharged as wastewater from the unit, and is treated along with the other wastewater generated from the pickling bath itself.

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In the pickling industry, release of acid fumes is the main source of air pollution, for which almost all the pickling industries have adopted wet scrubber based Air Pollution Control System (APCS). Diagram showing typical wet scrubbing based air pollution control system is shown in **Fig. 4.2.2**.

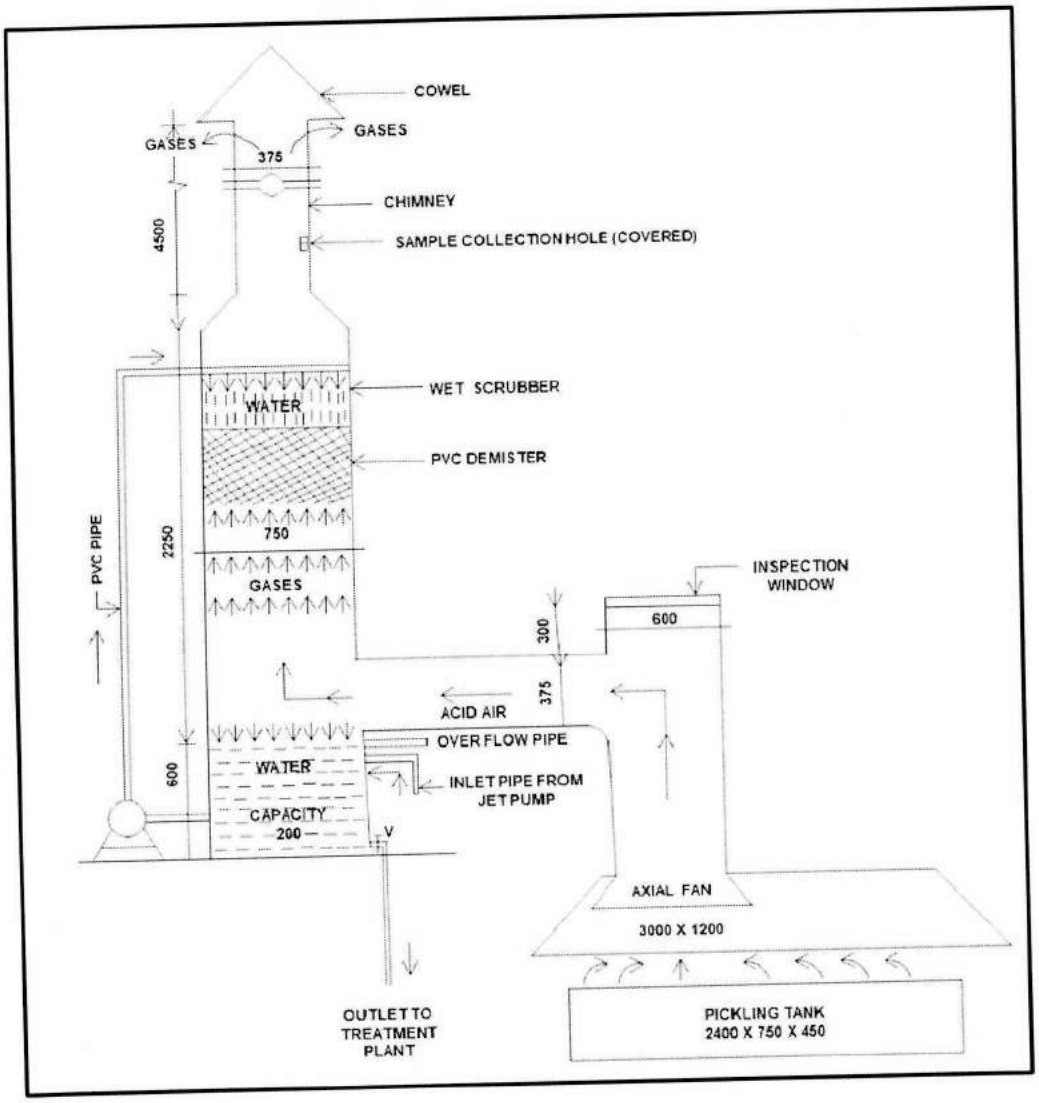

Fig. 4.2.2: Wet Scrubber based Typical Air Pollution Control System Installed in Pickling Industry in Wazirpur Industrial Area

The air pollution control system consists of the following units:

1. Hood
2. Scrubber Body
3. Scrubber Liquid Collection Sump
4. Scrubber Liquid Pump
5. ID Fan and Stack

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Specifications of typical air pollution control system used in pickllng industry are given in **Table 4.2.4**.

Adequacy of Installed Air Pollution Control System

In order to evaluate the performance of air pollution control system, the exhaust gas released through the stack was monitored by the respective agency. Details of the agency who carried out the stack monitoring and prepared adequacy report are given in **Annexure 4.2**. The results of stack monitoring along with details of each pickling industry are summarized in **Tables 4.2.5 (a,b,c,d,e,f,g,h).**

The analysis of results indicated that the scrubber system was working quite satisfactorily, with the efficient removal acid vapors/fumes, thereby establishing the adequacy of the air pollution control system. The ID fan normally operates at the rate of about 4500 m^3/hr through the system. This will provide enough suction on the top of the bath so as to prevent any acid vapor to go out into the atmosphere.

In the present study, CSIR-NEERI could not assess the adequacy of the air pollution control system, as the industries were found closed down.

4.2.4 Wastewater Generation Sources, Characteristics, Treatment System and Its Adequacy Status

A. Wastewater Generation Sources, Quantity and Characteristics

Sources of wastewater generation in pickling industry are:

- Rinsing of acid pickled sheets with water
- Spillage of acid during transfer of pickled sheets from bath
- Floor washings
- Scrubber water

The major source of water pollution in the pickling unit is rinsing water, which is used for washing of acid pickled sheets. The washing is done in two stages with the last one involving running water where fresh water is added continuously. The drainage of this water forms major source of water pollution in the plant. In addition while transferring the sheets from one bath to the other, some amount of spillage of acid occurs. The floor is regularly washed with fresh water which also becomes acidic in nature and forms source of effluent. Also wastewater from scrubber of air pollution control system is discharged periodically. Entire quantity of wastewater generated in the pickling industry is sent for the treatment to ETP before its final disposal in the conveyance system of CETP or in drain.

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The total wastewater quantity from the process system has been estimated on the basis of the washing and rinsing system and the frequency of floor washings carried out. The estimated quantity of water requirement for a typical 2 ton/day (TPD) unit is about 6000 L/d for domestic purposes, and 1000 L/d for running of scrubber for air pollution control in the unit. Out of these, the total wastewater generation is estimated to be about 5600 L/d from the processes, 400 L/d from the scrubber, and 400 L/d as domestic effluent. Depending upon the unit capacity and operational practices, the wastewater generation may vary.

The wastewater discharged from the individual washing steps and that from floor washing are similar in nature and are characterized by the acid and leftovers of metals present in them. Thus the water discharged from the rinsing tank after pickling and from floor washings is acidic in nature and expected to contain iron, nickel and chromium as major pollutants. Physico-chemical characteristics (pH, Total suspended solids and Oil & grease) of combined untreated wastewater/ effluent stream at equalization tank are given in **Table 4.2.6.**

The untreated wastewater is found highly acidic in nature with pH values ranging from 1.5 to 3.9, except for one industry showing 8 pH. Total suspended solids ranged from 54 to 350 mg/L. Oil & grease values ranged from 1.8-15.2 mg/L. DPCC norm for these values are as: pH - 5.5-9.0, TSS – 250 mg/L and 10 mg/L. Therefore, the wastewater needs to be suitably treated to ensure compliance to discharge norms.

Further, metal contents in terms of iron (Fe), total chromium (Cr), hexavalent chromium, copper (Cu) and nickel (Ni) are given in **Table 4.2.7**. Fe content varied from 3 mg/L to 237 mg/L with exceptionally high value upto 1575mg/L, whereas the DPCC norm is only 3 mg/L. Similarly concentration of other metals was found considerably high, thus necessitating proper treatment of wastewater generated to the prescribed norms.

It is pertinent to note that out of 37 pickling industries, only 11 industries have submitted characteristics of untreated effluent.

B. Wastewater/Effluent Treatment Plant Installed

Pickling industries have installed Primary Effluent Treatment Plant (PETP) to take care of treatment of wastewater generated to the DPCC discharge norms. ETP has been designed and installed on the basis of physico-chemical treatment. The operation of the effluent treatment is based on batch mode of operation. Schematic diagram of a typical effluent treatment plant installed within the pickling industry is depicted in **Fig. 4.2.3.**

The treatment process consists of collection of all the effluent by gravity in a collection/equalization tank. The effluent in equalization tank is agitated so as to keep the contents in suspended condition. The effluent from the Equalization tank is pumped to the Reaction cum settling tank by a pump. In the reaction-cum- settling tank chemicals

like lime, alum, and polyelectrolyte are added for the coagulation and flocculation of suspended solids. The reaction-cum-settling-tank has been provided with turbine type agitator system for the mixing of coagulants and other chemicals to the effluent.

A dose of about 125 mg/L of coagulating agent at a pH of 8.5-9.0 is used. For the purpose of flocculation, polyelectrolyte is dosed at 1-2 mg/L, the required dose of chemicals in the reaction cum settling tank is regulated manually. The reaction time allowed is about 25 min during which the agitator is kept running.

The mixed contents thereafter are allowed to be kept in quiescent conditions for about 1.5-2 hours for the separation of flocculated solids. The settled sludge is removed from the bottom of conical chamber through a sluice valve onto sludge drying beds. The clear liquid is taken out through the outlet line with the valve fitted on the sidewall at a height of about 600 mm from the bottom of the conical section.

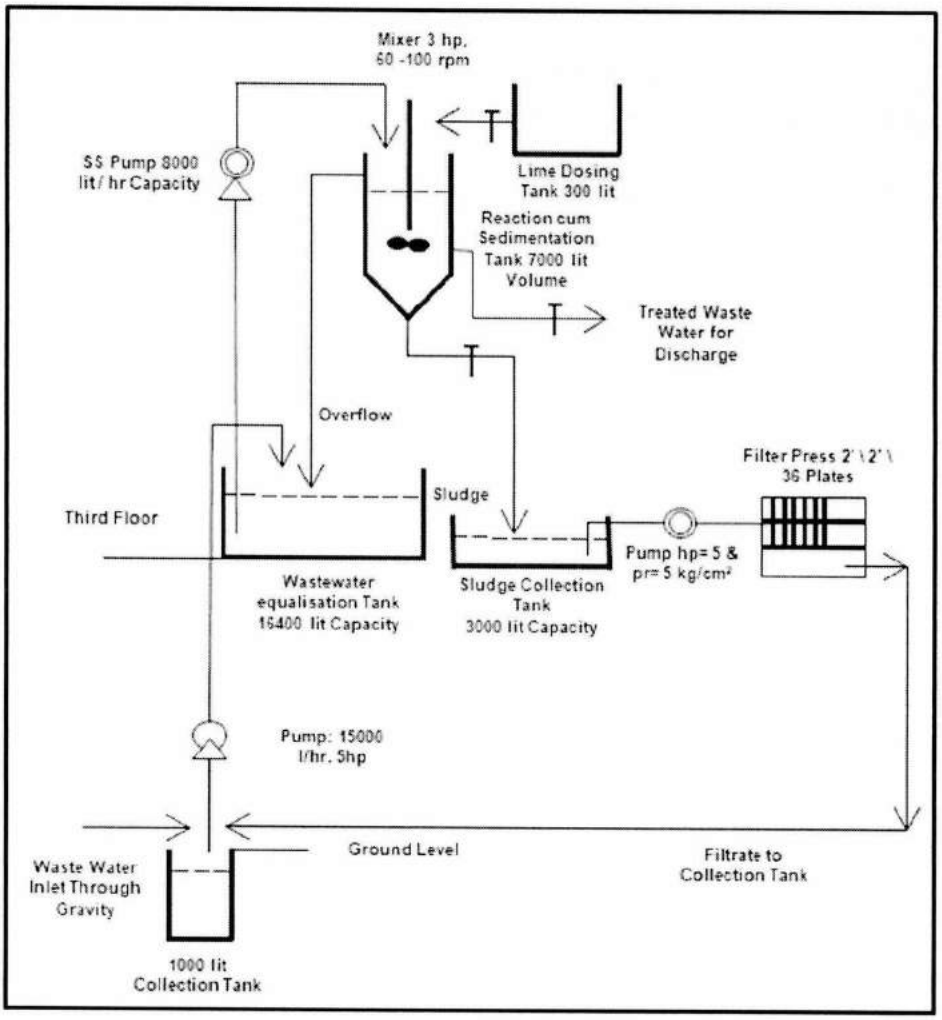

Fig. 4.2.3: Typical Water Pollution Control System Installed in Pickling Industry in Wazirpur Industrial Area

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The settled sludge is pumped to filter press for dewatering of sludge. The filtrate from filter press is collected through a drainage system into equalization tank. Dried sludge is collected and stored in a manner suitable for hazardous waste within the premises of unit.

The treated effluent from the reaction-cum-settling tank is disposed off in common conveyance leading to CETP. The treated wastewater from the industry were found to satisfy discharge standards stipulated by DPCC.

The treatment plant has been designed in such a manner that total time of treatment including that of filling, addition of chemicals, reaction and settling of a single batch is about 3 hours. Each batch of liquid can handle about 4000 litres of wastewater for treatment. This will necessitate the operation of 1 batch of wastewater per shift of 8 hours. Occasionally one additional batch may have to be operated for handling excess loading making it to 2 batches per shift. In case the unit works for 12 hours a day then the wastewater treatment operation may have to be continued for some more duration. It may be required to treat any residual wastewater on the next day starting in the morning simultaneously with the starting of operations.

The ETP for the combined stream consists of the following units:

1. Collection/Equalization Tank
2. Reaction sum Settling Tank
3. Clarifier (Sedimentation Tank)
4. Filter Press
5. Chemical Dosing Tanks
6. Effluent transfer pump
7. Sludge pump
8. Agitator

Details of a typical ETP are given in **Table 4.2.8.**

Details of the agency who carried out the performance evaluation of ETP and prepared adequacy report are given in **Annexure 4.3**.

Characteristics of ETP treated water for different pickling industries are summarised in **Table 4.2.9** for physico-chemical parameters and in **Table 4.2.10** for heavy metals.

Perusal of tables indicates that the treated wastewater at different industries has met the DPCC norms of discharge, and the ETP installed in the pickling industries was found to be adequate.

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4.3 Conclusion

Data of 37 Stainless Steel Pickling industries has been analysed, which reveals that for production of one ton SS material about 18 litres of H_2SO_4 (Sulfuric Acid) and 13 litres of HNO_3 (Nitric Acid) is used and about 2000 litres water is consumed in different processes. The amount of various inputs required in a particular unit may vary depending on material processed and process adopted on day to day basis.

Further, study of Pickling Industry processes indicates that three types of wastes are generated:

- Air emissions (mainly acid fumes) from pickling process
- Wastewater from spent acid bath, spent wash water bath, floor washing and scrubber containing acids, oil & grease and metal contents
- Hazardous solid waste/sludge from effluent treatment plant containing high metals content.

For control of air pollution/acid fumes generated during pickling process, all the units have installed scrubber based air pollution control system. Alkaline water is used as scrubbing medium to neutralize the acid fumes and the scrubbed water is recirculated multiple times. Further, adequacy of air pollution control system has been assessed by reputed institutions and found that acid mist concentration in the exit gas was much below the DPCC permissible limit of 50 mg/Nm^3.

Regarding treatment of wastewater generated in the industry, all the units have installed Primary Effluent Treatment Plant consisting of Collection/Equalization Tank, Reaction sum Settling Tank, Clarifier (Sedimentation Tank), Filter Press, Chemical Dosing Tanks, Effluent transfer pump, Sludge pump, Agitator etc. and treated water meeting the norms of DPCC is discharged to the conveyance system/drain. Further, adequacy of effluent treatment system is evaluated by reputed institutions and found that all the industries have met DPCC discharge norms.

Regarding hazardous sludge generated from the filter press, it is stored in containers within the industry.

The assessment of overall functioning of each unit could not be done at this stage, as all the units were found closed down.

Table 4.1.1: List of Pickling Industries in Wazirpur Industrial Area (as per CETP Society and DPCC)

Sr. No.	Name of Pickling Industry	As per CETP Society	As per DPCC
A.	**Block A**		
1.	Sagar Steel Industries	A-14	M
2.	Jai Paras Steel	A-16	M
3.	Satvir Jain	A-16	NM
4.	Shree Krishna Rolling Industries	A-16	M
5.	Sagar Steel Industries	A-18	M
6.	P B Steel	A-24	M
7.	Pradeep Industries	A-31	M
8.	Goel Steel Industries	A-35	M
9.	Shree Laxmi Industries	A-39	M
10.	Ganpati Steel	A-47	M
11.	Kasturi Steel Industries	A-65	M
12.	Jagdamba Steel/G S Enterprises	A-74/2	M
13.	A V Metal Works	A-75/2	M
14.	Mittal Re Rolling Industries	A-76/2	M
15	Manish Industries	A-83	M
16	Deepak Industries	A-83/5	M
17	Metal Fabricators	A-85/3	M
18	Brij Mohan Ram Mohan	A-86/2	M
19	Shri Ram Rolling Works	A-93/14	M
20	Parsvnath Steels/ Adish Jain	A-95	M
21	Aggarwal Industries	A-95/5	M
22	Harish Traders	A-96/1	M
23	Rahul Udyog	A-96/1A	M
24	Saraswati Traders	A-96/2	M
25	Arti Industries	A-97/1	M
26	Jayna Strips	A-97/1A	M
27	Durga Industries	A-97/3	M
28	Shri Ram Industries (New)	A-97/3	M
29	Ganpati Rolling Mills	A-98/6	M
30	Durga Industries	A-99/4	M
31	Shree Krishna Industries	A-101/1	M
32	Arihant Industries	A-101/1A	M
33	S. R. Industries	A-101/11	NM
34	Vishwakarma Metal	A-101/12	M
35	A K Industries	A-102/1A	M
36	National Industries India	A-102/2	M
37	Shiva Steel	A-102/6	M
38	Naresh Steel Fabrication	A-104/2	M
39	Arpan Metal Co.	A-104/5	NM
40	J N Steel & Co.	A-111/1	M

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41	Shree Shyam Steel	A-113/1	M
42	Veera Industries	A-117	NM
43	Shri Bankey Bihari Rolling	A-118	M
44	Mitul Industries	A-124	M
45	Jay Kay Enterprises	A-127	M
46	Kalyan Steel	A-130	M
47	Jagdish Kumar	A-133	M
B.	**Block A Group**		
48	Durga Enterprises	A-5 GR	M
49	R. K. Steel	A-12 GR	M
50	S V Industries	A-59 GR	M
51	Kartik Bansal	A-71 GR	NA
52	Sumeet	A-78 GR	NA
53	Ashish Steel Industries	A-93/4 GR	M
54	Ganga Industry	A-113 GR	M
55	Jindal Enterprises	A-116 GR	M
56	Prakash Re Rolling Works	A-131 GR	M
57	Sumeet	A-133 GR	NM
C.	**Block B**		
58.	Bhagwati Steels	B-25	M
59.	Pankaj Jain	B-27/2	NM
60.	Bhagwati Steels	B-28/4	M
61.	Premier Industries	B-62	M
62.	Bhawani Industries	B-62/1	M
63.	Shree Ganpati Industries	B-63	NM
64	Hari Ram Babu Lal	B-63	M
65	Onkar Steels	B-67/1	M
66	Naveen Kumar	B-68/1	NM
67	Sushil Aggarwal	B-68/1	NM
68	Mahavir Steel Industries	B-68/1	M
69	Sushil/Surender	B-68/1	NM
70	Singhal Udyog	B-70	M
71	Vijay kumar	B-71	NM
D.	**Block B Group**		
72	Goyal Enterprises	B-7 GR	M
73	Shiv Industries	B-7 GR	M
74	Tirupati Metal	B-8 GR	M
75	Bishwa Nath	B-9 GR	M
76	Akash Industries	B-22 GR	M
77	Siddatha Industries	B-31 GR	M
78	Parveen Jain	B-33/3 GR	NM
79	Gupta Enterprises	B-47/2 GR	M
80	Vardhman Metal Industries	B-50 GR	M
81	Vinod Jain Prop. S K Steel	B-58 GR	M
E.	**Block C**		
82	Singal Steel rolling	C-12/1	M

83	Parveen Jain	C-12/1	NM
84	U Like Exports	C-34	M
85	Vinayak Industries	C-36/1	M
86	Satpal Jain	C-36/1	NM
87	Guru Fakir Metal Udyog	C-37	M
88	Kamal Steel Industries	C-37/2	M
89	Shankar lal/Abhishek Industries	C-39/1	M
90	Rajinder Jain	C-40	M
91	Tirupati Industry	C-40/1	M
92	Hari Ram	C-40/3	M
93	Prime Enterprises	C-44	M
94	Ram Niwas Jain	C-54	NM
95	Parmod Steel	C-54	M
96	Tarun Kumar	C-55/1	NM
97	Rajeev Steel	C-55/1	NM
98	Vishal Industries	C-55/1	M
99	Gaurav Steel	C-55/1	M
100	Kusum Steel Co.	C-57	M
101	Avtar Refrigeration Industries	C-57/1	M
102	Balaji Steel	C-58/3	M
103	Eastern Engineering Works	C-86	M
F.	**Block Shed**		
104	Vikas Enterprises	Shed-43	M
105	Ravi Steel Industries	Shed-69	M
	Summary		
	Total Block A (including Group)	57	50
	Total Block B (including Group)	24	17
	Total Block C (including Shed)	24	19
	Overall Total Number	**105**	**86**

M – Matching (Name & Plot No.); NM – Not Matching

Table 4.2.1: List of Pickling Industries who Provided Copy of Pollution Control Adequacy Report

Sr. No.	Name of the unit	Address of the Unit	Capacity (TPD)	ETP Report Rcvd	APCS Report Rcvd
1.	Sagar Steel Industries	A-14	5.0	Yes	Yes
2.	Jai Paras Steel	A-16	1.0	Yes	Yes
3.	P.B. Steels	A-24	0.4	-	-
4.	Shree Luxmi Industries	A-39	0.4	Yes	Yes
5.	Kasturi Steel Industries	A-65	5.0	Yes	Yes
6.	Metal Fabricators	A-85/3	0.8	Yes	-
7.	Shri Ram Rolling Works	A-93/14	1.5	Yes	Yes
8.	Parsvnath Steels	A-95	2.0	Yes	-
9.	Aggarwal Industries	A-95/5	1.0	Yes	Yes
10.	Durga Industries	A-97/3	0.5	Yes	Yes
11.	Durga Industries	A-99/4	1.0	Yes	Yes
12.	Arihant Industries	A-101/1A	1.0	Yes	Yes
13.	Vishwakarma Metal	A-101/12	2.0	Yes	Yes
14.	A K Industries	A-102/1A	1.0	Yes	Yes
15.	Shiva Steels	A-102/6	1.0	Yes	Yes
16.	Mitul Industries	A-124	2.0	Yes	Yes
17.	Jay Kay Enterprises	A-127	5.0	Yes	Yes
18.	S.V. Industries	GR-A-59	2.0	Yes	Yes
19.	Ashish Steel	GR-A-93/4	1.0	Yes	Yes
20.	Ganga Industry	GR-A-113	5.0	Yes	-
21.	Bhagwati Steels	B-28/4	2.0	Yes	Yes
22.	Onkar Steels	B-67/1	2.5	Yes	Yes
23.	Goyal Enterprises	GR-B-7	0.4	Yes	Yes
24.	Tirupati Metal	GR-B-8	1.0	Yes	Yes
25.	Sidhartha Industries	GR-B-31	2.0	-	Yes
26.	Gupta Enterprises	GR-B-47/2	1.0	Yes	Yes
27.	Vardhman Metal Industries	GR-B-50	2.0	Yes	Yes
25.	U-Like Exports	C-34	1.5	Yes	Yes
29.	Kamal Steel Industries	C-37/2	1.2	Yes	Yes
30.	Rajinder Jain	C-40	2.0	Yes	-
31.	Tirupati Industries	C-40/1	2.0	Yes	Yes
32.	Hari Ram	C-40/3	1.2	Yes	-
33.	Prime Enterprises	C-44	2.0	Yes	Yes
34.	Vishal Industries	C-55/1	1.5	Yes	Yes
35.	Gaurav Steel	C-55/1	2.0	-	-
36.	Avtar Refrigeration Industries	C-57/1	2.0	Yes	Yes
37.	Balaji Steels	C-58/3	2.0	Yes	Yes

Source : CETP Society

Table 4.2.2: General Details of Pickling Industries in Wazirpur Industrial Area

Sr. No.	Name of the unit	Capacity (TPD)	Sheet Processed (Gauge)	No. of Days/ Week	Schedule (hrs/day)	Workers
1.	Sagar Steel Industries	0.5	18G-22G-26G	6	8-10	7-8
2.	Jai Paras Steel	1.0	22G-28G	-	8-12	7
3.	P.B. Steels	0.4	-	-	8-12	7
4.	Shree Luxmi Industries	0.4	18G-22G-26G	-	8-12	7
5.	Kasturi Steel Industries	5.0	22G-28G		8-12	10
6.	Metal Fabricators	0.8	18G-22G-24G	-	8	9
7.	Shri Ram Rolling Works	1.5	16G-26G	-	8-12	8
8.	Parsvnath Steels	2.0	-	-	8	-
9.	Aggarwal Industries	1.0	-	-	8-12	9
10.	Durga Industries	0.5	18G-22G-26G	6	8-12	7
11.	Durga Industries	1.0	18G-22G-26G	-	8	7
12.	Arihant Industries	1.0	18G-26G	-	8-12	9
13.	Vishwakarma Metal	2.0	18G-22G-26G		8-12	9
14.	A K Industries	1.0	-	-	8-12	7
15.	Shiva Steels	1.0	18G-22G-26G	-	8-12	7
16.	Mitul Industries	2.0	18G-26G	-	8-12	16
17.	Jay Kay Enterprises	5.0	-	-	8	22
18.	S.V. Industries	2.0	22G-26G	6	8-12	8
19.	Ashish Steel	1.0	18G-22G-26G	6	8	6
20.	Ganga Industry	5.0	18G-22G-26G	-	8	-
21.	Bhagwati Steels	2.0	22G-28G	-	8-12	9
22.	Onkar Steels	2.5	22G-28G	6	8-12	6
23.	Goyal Enterprises	0.4	22G-28G	-	8-12	-
24.	Tirupati Metal	1.0	22G-28G	-	8-12	-
25.	Sidhartha Industries	2.0	18G-22G-26G	6	8-12	9
26.	Gupta Enterprises	1.0	18G-22G-26G	-	8	8
27.	Vardhman Metal Industries	2.0	18G-22G-26G	-	8-12	6
28.	U-Like Exports	1.5	12G-16G	-	8	15
29.	Kamal Steel Industries	1.2	18G-26G	-	8-12	5
30.	Rajinder Jain	2.0	18G-22G-26G	-	8-12	6
31.	Tirupati Industries	2.0	22G-26G	-	8-12	8
32.	Hari Ram	1.2	18G-22G-26G	-	8-12	5
33.	Prime Enterprises	2.0	18G-22G-26G	6	8-12	8
34.	Vishal Industries	2.5	22G-28G	-	8-12	9
35.	Gaurav Steel	1.5	-	-	8	6
36.	Avtar Refrigeration Industries	2.0	-	-	8-12	7
37.	Balaji Steels	2.0	18G-22G-26G	-	8-12	8

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Table 4.2.3: Quantity of Acid used and Wastewater in Different Pickling Industries of Wazirpur Industrial Area

Sr. No.	Name of the unit	Report Issue Date	Capa-city (TPD)	Quantity of Acid used (L/d)		Quantity of Wastewater (L/d)
				Sulfuric Acid	Nitric Acid	
1.	Sagar Steel Industries	Sep, 2008	5.0	50	40	5000
2.	Jai Paras Steel	Jul, 2011	1.0	40	25	3000
3.	P.B. Steels	NA	0.4	25	20	2000
4.	Shree Luxmi Industries	Oct, 2008	0.4	25	20	2000
5.	Kasturi Steel Industries	Sep, 2013	5.0	50	48	5000
6.	Metal Fabricators	Apr, 2000	0.8	50	30	3300
7.	Shri Ram Rolling Works	Feb, 2006	1.5	50	35	4200
8.	Parsvnath Steels	Aug, 2007	2.0	NA	NA	3500
9.	Aggarwal Industries	Dec, 2012	1.0	20	20	1500
10.	Durga Industries	July, 2008	0.5	25	20	2000
11.	Durga Industries	May, 2000	1.0	25	25	2500
12.	Arihant Industries	Mar, 2004	1.0	35	25	3800
13.	Vishwakarma Metal	Mar, 2005	2.0	25	20	2500
14.	A K Industries	Dec, 2012	1.0	50	35	2500
15.	Shiva Steels	Feb, 2000	1.0	25	20	2000
16.	Mitul Industries	Aug, 2002	2.0	60	50	3700
17.	Jay Kay Enterprises	Nov, 2012	5.0	10	10	5800
18.	S.V. Industries	July, 2006	2.0	50	40	3800
19.	Ashish Steel	Feb, 2008	1.0	25	20	3000
20.	Ganga Industry	Aug, 2000	5.0	NA	NA	9500
21.	Bhagwati Steels	Sep, 2013	2.0	25	20	2500
22.	Onkar Steels	Sep, 2013	2.5	25	20	2500
23.	Goyal Enterprises	July,2011	0.4	20	25	2500
24.	Tirupati Metal	July,2011	1.0	20	25	2500
25.	Sidhartha Industries	Jan, 2009	2.0	50	50	7150
26.	Gupta Enterprises	Aug, 2011	1.0	50	35	3300
27.	Vardhman Metal Industries	Sep, 2000	2.0	40	15	3000
28.	U-Like Exports	Mar, 2007	1.5	60	35	4500
29.	Kamal Steel Industries	Feb, 2004	1.2	30	20	5500
30.	Rajinder Jain	May, 2005	2.0	50	20	5000
31.	Tirupati Industries	Feb, 2006	2.0	25	20	2500
32.	Hari Ram	Apr, 2000	1.2	30	20	5500
33.	Prime Enterprises	Nov, 2007	2.0	50	25	7000
34.	Vishal Industries	Oct , 2013	2.5	25	20	2500
35.	Gaurav Steel	Sep, 2014	1.5	25	20	3000
36.	Avtar Refrigeration Ind.	Aug, 2005	2.0	12	40	3500
37.	Balaji Steels	Sep,2008	2.0	50	20-35	3600

NA - Not Available, Values in Red color need verification

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Table 4.2.4: Specifications of Typical Air Pollution Control System in Pickling Industry

Sr. No.	Item	Nos.	Dimension / Capcity	Material of Construction
1.	Hood	1	3 m * 1.2 m * 0.75 m	MS with PP coating
2.	Wet Scrubber	1	0.75 m (dia) * 2.25 m (Ht)	MSEP
3.	Scrubber Liquid Collection Sump	1	300 litres	MSEP
4.	Scrubber Liquid Circulating Pump	1	1 HP; 100 L/min @ 10 m head	CI
5.	ID Fan	1	2 HP	MS
6.	Stack	1	375 mm dia and 11 m height above ground level	MS

Table 4.2.5a: Industry-wise Details of Air Pollution Control System and Stack Monitoring Results

Sr. No.	Particulars	Sagar Steel Industries	Jai Paras Steel	Shree Luxmi	Kasturi Steel
	Unit No. →	1	2	4	5
A.	**General Details**				
1.	Capacity (TPD)	5.0	1.0	0.4	5.0
2.	Nature of Unit	Pickling & Annealing	Pickling & Annealing	Cold Rolling & Pickling	Pickling
3.	Stack Attached to	Pickling Section	NA	Exhaust of Pickling Unit	NA
4.	Source of Emission	Pickling	Pickling	Acid Fumes from Pickling Activity	Acid Fumes from Pickling Activity
5.	Pollution Control Device	Wet Scrubber	Wet Scrubber	Wet Scrubber	Wet Scrubber
6.	Normal Operating (hr/ day)	8	8-12	8-12	8-12
7.	Type of Stack	GI (Epoxy Coated)	NA	NA	NA
8.	Diameter of Stack (cm)	37.5	25	15	30
9.	Stack Height from Ground (m)	8.5	14	11	9
10.	Stack Height above Roof (m)	4.2	NA	2	NA
B.	**Stack Monitoring Details**				
11.	Date of Sampling	06.07.2002	12.12.2006	14.01.2014	06.09.2013
12.	Sampling Period (min)	35	30	30	NA
13.	Ambient Temp. °C	36	36	14	NA
14.	Stack Gas Temp. °C	30	36	39	31
15.	Average Gas Velocity (m/s)	7.1	9.8	5.4	12.8
16.	Volumetric Flow Rate (Nm^3/hr)	2654	924	2359	2167
C.	**Pollutant Conc. (mg/Nm^3)**				
17.	SPM	7.0	29.8	NA	NA
18.	SO_2	ND	15.6	NA	NA
19.	NO_2	ND	1.3	NA	NA
20.	HCl	ND	NA	NA	NA
21.	Acid Mist (as H_2SO_4)	3.7	22	3.8	5.1
D.	**Meeting DPCC Norms**	Yes	Yes	Yes	Yes
E.	**Adequacy Study conducted by**	Sulabh IITR&T	Delhi Tech. University	GGSI Uni. Delhi	Delhi Tech. University

NA - Not Available, ND : Not Detected

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Table 4.2.5b: Industry-wise Details of Air Pollution Control System and Stack Monitoring Results

Sr. No.	Particulars	Shree Ram Rolling Works	Aggarwal Industries	Durga Industries	Durga Industries
	Unit No. →	7	9	10	11
A.	**General Details**				
1.	Capacity (TPD)	1.5	1.0	0.5	1.0
2.	Nature of Unit	Pickling	Pickling, Cold Rolling & Annealing	Pickling	Re-rolling of Stainless steel
3.	Stack Attached to	Acid Pickling Tank	NA	NA	Pickling Sectiob
4.	Source of Emission	NA	NA	Acid Fumes	Pickling
5.	Pollution Control Device	Wet Scrubber	Wet Scrubber, ID Fan & Stack	Wet Scrubber	Wet Scrubber
6.	Normal Operating (hr/ day)	8-12	8-12	8-12	8
7.	Type of Stack	NA	NA	NA	GI (Epoxy Coated)
8.	Diameter of Stack (cm)	25	25	25.4	38.50
9.	Stack Height from Ground (m)	14	12.1	12	11.50
10.	Stack Height above Roof (m)	2	NA	3	2.50
B.	**Stack Monitoring Details**				
11.	Date of Sampling	01.02.2006	13.10.2017	04.06.2008	10.07.2002
12.	Sampling Period (min)	30	32	NA	35
13.	Ambient Temp. °C	NA	30	NA	40
14.	Stack Gas Temp. °C	19	33	35	30
15.	Average Gas Velocity (m/s)	21.5	7	5.35	7.17
16.	Volumetric Flow Rate (Nm^3/hr)	NA	NA	914	2690.44
C.	**Pollutant Conc. (mg/Nm^3)**				
17.	SPM	37.5	16	40.96	7
18.	SO_2	NA	NA	37.22	ND
19.	NO_2	NA	NA	NA	ND
20.	HCl	NA	NA	NA	ND
21.	Acid Mist (as H_2SO_4)	6.1	14	21.22	3.70
D.	**Meeting DPCC Norms**	Yes	Yes	Yes	Yes
E.	**Adequacy Study conducted by**	IIT, Delhi	Delhi Tech. University	GGSI Uni. Delhi	Sulabh IITR&T

NA - Not Available, ND : Not Detected

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Table 4.2.5c: Industry-wise Details of Air Pollution Control System and Stack Monitoring Results

Sr. No.	Particulars	Arihant Industries	Vishwakarma Metal	A K Industries	Shiva Steels
	Unit No. →	12	13	14	15
A.	**General Details**				
1.	Capacity (TPD)	1.0	2.0	1.0	1.0
2.	Nature of Unit	SS Rolling	SS Sheet Pickling	SS Sheet Pickling	Pickling, Re-rolling & Annealing
3.	Stack Attached to	Acid Pickling Tank	Acid Pickling Tank	Pickling Bath	Wet Scrubber
4.	Source of Emission	Pickling	Pickling	Pickling	Acid Pickling Section
5.	Pollution Control Device	Wet Scrubber	Wet Scrubber	Wet Scrubber	
6.	Normal Operating (hr/ day)	8-12	8-12	8-12	8-12
7.	Type of Stack	NA	NA	NA	Wet Scrubber
8.	Diameter of Stack (cm)	25	38	37.5	35
9.	Stack Height from Ground (m)	11.5	11	11	7.50
10.	Stack Height above Roof (m)	3.0	2.5	2.5	2.0
B.	**Stack Monitoring Details**				
11.	Date of Sampling	04.05.2004	08.02.2005	15.11.2012	13.12.2002
12.	Sampling Perid (min)	30	30	NA	40
13.	Ambient Temp. °C	NA	NA	NA	26
14.	Stack Gas Temp. °C	51	24	28	26
15.	Average Gas Velocity (m/s)	8.8	6.4	3.8	5.70
16.	Volumetric Flow Rate (Nm^3/hr)	NA	NA	1495	1904.02
C.	**Pollutant Conc. (mg/Nm^3)**				
17.	SPM	48.5	55.5	37	5.0
18.	SO_2	NA	NA	NA	11.0
19.	NO_2	NA	NA	NA	25
20.	HCl	NA	NA	NA	ND
21.	Acid Mist (as H_2SO_4)	2.3	4.4	12	6.0
D.	**Meeting DPCC Norms**	Yes	Yes	Yes	Yes
E.	**Adequacy Study conducted by**	IIT, Delhi	IIT, Delhi	Delhi Tech. University	Sulabh IITR&T

NA - Not Available, ND : Not Detected

Table 4.2.5d: Industry-wise Details of Air Pollution Control System and Stack Monitoring Results

Sr. No.	Particulars	Mitul Industries	Jay Kay Enterprises	S V Industries	Ashish Steel
	Unit No. →	16	17	18	19
A.	**General Details**				
1.	Capacity (TPD)	1.5	2-2.5	2.0	1.0
2.	Nature of Unit	Pickling & Annealing	Pickling, Annealing & Cold Rerolling	Pickling	Pickling
3.	Stack Attached to	Pickling Section	Wet Scrubber	NA	Wet Scrubber
4.	Source of Emission	Pickling	Pickling	Pickling	Pickling
5.	Pollution Control Device	Wet Scrubber	Wet Scrubber	Wet Scrubber	Wet Scrubber
6.	Normal Operating (hr/ day)	12	8-10	8-12	8
7.	Type of Stack	Metal	NA	NA	NA
8.	Diameter of Stack (cm)	25	25	38	30
9.	Stack Height from Ground (m)	11	12.6	7.30	11
10.	Stack Height above Roof (m)	6	NA	1.50	5.0
B.	**Stack Monitoring Details**				
11.	Date of Sampling	15.07.2002	14.10.2014	NA	30.08.2014
12.	Sampling Perid (min)	30	40	NA	30
13.	Ambient Temp. °C	38	29	NA	35
14.	Stack Gas Temp. °C	29	34	NA	34
15.	Average Gas Velocity (m/s)	14.6	8.0	NA	6.86
16.	Volumetric Flow Rate (Nm^3/hr)	2536	NA	NA	1694
C.	**Pollutant Conc. (mg/Nm^3)**				
17.	SPM	20	20	NA	18.4
18.	SO_2	ND	NA	NA	ND
19.	NO_2	ND	NA	NA	ND
20.	HCl	NA	NA	NA	NA
21.	Acid Mist (as H_2SO_4)	2.3	15	NA	7.23
D.	**Meeting DPCC Norms**	Yes	Yes	Yes	Yes
E.	**Adequacy Study conducted by**	Sulabh IITR&T	Delhi Tech. University	GGSI Uni. Delhi	Delhi Tech. University

NA - Not Available, ND : Not Detected

Table 4.2.5e: Industry-wise Details of Air Pollution Control System and Stack Monitoring Results

Sr. No.	Particulars	Bhagwati Steels	Onkar Steels	Goyal Enterprises	Tirupati Metal
	Unit No. →	21	22	23	24
A.	**General Details**				
1.	Capacity (TPD)	2.0	2.5	1.0	1.0
2.	Nature of Unit	Stainless Steel Pickling	SS Pickling	Pickling,Annealing & Cold Rolling	Pickling,Annealing & Cold Rolling
3.	Stack Attached to	Exhaust of Pickling Unit	Pickling Section	Pickling Section	Pickling Section
4.	Source of Emission	Pickling	Acid Fumes from Pickling Activity	Acid Fumes from Pickling	Acid Fumes from Pickling
5.	Pollution Control Device	Wet Scrubber	Wet Scrubber	Wet Scrubber	Wet Scrubber
6.	Normal Operating (hr/ day)	8-12	8	8-12	8-12
7.	Type of Stack	NA	NA	NA	NA
8.	Diameter of Stack (cm)	20.5	40	25	25
9.	Stack Height from Ground (m)	10	11	13.5	14
10.	Stack Height above Roof (m)	4	3	4.5	4.5
B.	**Stack Monitoring Details**				
11.	Date of Sampling	16.09.2013	16.09.2013	18.07.2011	27.07.2011
12.	Sampling Perid (min)	NA	NA	NA	NA
13.	Ambient Temp. °C	NA	NA	NA	NA
14.	Stack Gas Temp. °C	31	30	30	30
15.	Average Gas Velocity (m/s)	12.6	14		
16.	Volumetric Flow Rate (Nm^3/hr)	4801	1527	1112	1112
C.	**Pollutant Conc. (mg/Nm^3)**				
17.	SPM	NA	NA	62	62
18.	SO_2	NA	NA	38.02	38.02
19.	NO_2	NA	NA	NA	NA
20.	HCl	NA	NA	NA	NA
21.	Acid Mist (as H_2SO_4)	11.7	10.7	21	21
D.	**Meeting DPCC Norms**	Yes	Yes	Yes	Yes
E.	**Adequacy Study conducted by**	Delhi Tech. University	Delhi Tech. University	Delhi Tech. University	Delhi Tech. University

NA - Not Available, ND : Not Detected

Table 4.2.5f: Industry-wise Details of Air Pollution Control System and Stack Monitoring Results

Sr. No.	Particulars	Sidhartha Industries	Gupta Enterprises	Verdhman Metal	U-Like Exports
	Unit No. →	25	26	27	28
A.	**General Details**				
1.	Capacity (TPD)	2.0	1.0	2.0	1.5
2.	Nature of Unit	Re-rolling of SS Sheets	Pickling	Pickling	Pickling
3.	Stack Attached to	Pickling Section	Pickling	NA	Pickling
4.	Source of Emission	Pickling	Acid Fumes from pickling	Pickling	Pickling Stack
5.	Pollution Control Device	Wet Scrubber	Wet Scrubber	Wet Scrubber	Wet Scrubber
6.	Normal Operating (hr/ day)	8	8	8-12	8
7.	Type of Stack	NA	NA	PVC	Metal
8.	Diameter of Stack (cm)	30	25	30	35
9.	Stack Height from Ground (m)	15	13.5	NA	11.7
10.	Stack Height above Roof (m)	NA	4.5	NA	NA
B.	**Stack Monitoring Details**				
11.	Date of Sampling	15.01.2014	16.08.11	21.08.2014	24.12.2013
12.	Sampling Perid (min)	30	NA	60	30
13.	Ambient Temp. °C	12	NA	37	18
14.	Stack Gas Temp. °C	46	29	34	72
15.	Average Gas Velocity (m/s)	7.94	7.40	9	9.36
16.	Volumetric Flow Rate (Nm^3/hr)	1887	1112	2163	2798
C.	**Pollutant Conc. (mg/Nm^3)**				
17.	SPM	67	62	72	44
18.	SO_2	ND	38.02	NA	ND
19.	NO_2	ND	NA	NA	ND
20.	HCl	NA	NA	NA	NA
21.	Acid Mist (as H_2SO_4)	9.3	21	NA	1.35
D.	**Meeting DPCC Norms**	Yes	Yes	Yes	Yes
E.	**Adequacy Study conducted by**	Delhi College of Eng.	Delhi Tech. University	IIT, Delhi	GGSI Uni. Delhi

NA - Not Available, ND : Not Detected

Table 4.2.5g: Industry-wise Details of Air Pollution Control System and Stack Monitoring Results

Sr. No.	Particulars	Kamal Steel Industries	Tirupati Metal	Hari Ram	Prime Enterprises
	Unit No. →	29	31	32	33
A.	**General Details**				
1.	Capacity (TPD)	1.2	1.0	1.2	4.0
2.	Nature of Unit	Pickling Unit of Flat Sheet	Pickling, Annealing & Cold Rolling	Pickling	Pickling, Annealing & Cold Rolling
3.	Stack Attached to	Acid Pickling Tank	Pickling Section	Exhaust of Pickling Anneling	Pickling Unit
4.	Source of Emission	Acid Pickling Tank	Acid Fumes from Pickling	Pickling	NA
5.	Pollution Control Device	Wet Scrubber	Wet Scrubber	Wet Scrubber	Wet Scrubber
6.	Normal Operating (hr/ day)	8-12	8-12	8-12	8
7.	Type of Stack	Plastic	NA	PVC	NA
8.	Diameter of Stack (cm)	20	15	10	25.6
9.	Stack Height from Ground (m)	8.5	NA	11	12
10.	Stack Height above Roof (m)	4.5	2	2	3.0
B.	**Stack Monitoring Details**				
11.	Date of Sampling	0.01.2014	NA	04.01.2014	24.08.2007
12.	Sampling Perid (min)	30	NA	30	NA
13.	Ambient Temp. °C	18	NA	15	NA
14.	Stack Gas Temp. °C	20	30	36	37
15.	Average Gas Velocity (m/s)	4.68		6.0	5.93
16.	Volumetric Flow Rate (Nm^3/hr)	559	1112	165	1862
C.	**Pollutant Conc. (mg/Nm^3)**				
17.	SPM	27	150	NA	13.94
18.	SO_2	ND	NA	NA	16.00
19.	NO_2	ND	NA	NA	NA
20.	HCl	NA	NA	NA	NA
21.	Acid Mist (as H_2SO_4)	5.2	50	2.9	9.12
D.	**Meeting DPCC Norms**	Yes	Yes	Yes	Yes
E.	**Adequacy Study conducted by**	IIT, Delhi	Uni. of Roodkee	Siel PE&CS	GGSI University, Delhi

NA - Not Available, ND : Not Detected

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Table 4.2.5h: Industry-wise Details of Air Pollution Control System and Stack Monitoring Results

Sr. No.	Particulars	Vishal Industries	Gaurav Steel	Avtar Refrigeration Industries	Balaji Steels
	Unit No. →	34	35	36	37
A.	**General Details**				
1.	Capacity (TPD)	2.5	1.5	2.0	2.0
2.	Nature of Unit	Stainless Steel Pickling	Pickling	Pickling	Pickling, Annealing & Cold Rolling
3.	Stack Attached to	Exhaust of Pickling Unit	NA	NA	NA
4.	Source of Emission	Pickling Stack	Pickling Exhaust Stack	Pickling	Pickling
5.	Pollution Control Device	Wet Scrubber	Wet Scrubber	Wet Scrubber	Wet Scrubber
6.	Normal Operating (hr/ day)	8-12	6-8	8-12	8-12
7.	Type of Stack	Metal	Plastic	NA	NA
8.	Diameter of Stack (cm)	25	25	NA	25.4
9.	Stack Height from Ground (m)	15	12.2	11.50	11.50
10.	Stack Height above Roof (m)	NA	NA	3.50	3.80
B.	**Stack Monitoring Details**				
11.	Date of Sampling	05.01.2014	01.09.2014	13.06.2008	12.09.2008
12.	Sampling Perid (min)	30	30	NA	NA
13.	Ambient Temp. °C	10	36	NA	NA
14.	Stack Gas Temp. °C	42	38	30	31
15.	Average Gas Velocity (m/s)	7.30	8.07	7.35	8.47
16.	Volumetric Flow Rate (Nm^3/hr)	1219.8	1365	1080	1466
C.	**Pollutant Conc. (mg/Nm^3)**				
17.	SPM	81	37	47.45	43.06
18.	SO_2	ND	ND	27.07	29.38
19.	NO_2	ND	NA	NA	NA
20.	HCl	NA	NA	NA	NA
21.	Acid Mist (as H_2SO_4)	8.8	10.8	15.31	16.75
D.	**Meeting DPCC Norms**	Yes	Yes	Yes	Yes
E.	**Adequacy Study conducted by**	Delhi Tech. University	NA	Delhi College of Eng.	GGSI Uni. Delhi

NA - Not Available, ND : Not Detected

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Table 4.2.6: Physico-chemical Characteristics of Untreated Wastewater in Different Pickling Industries of Wazirpur Industrial Area

Sr. No.	Name of the unit	Date of sampling	Unit Capacity (TPD)	Total Wastewater Generation (L/day)	pH	TSS (mg/L)	O&G (mg/L)
1.	Sagar Steel Industries	18.09.08	0.5	5000	3.9	54	10.4
2.	Jai Paras Steel	-	1.0	3000	NA	NA	NA
3.	P B Steels	-	0.4	2000	NA	NA	NA
4.	Shree Luxmi Industries	-	0.4	2000	NA	NA	NA
5.	Kasturi Steel Industries	-	5.0	5000	NA	NA	NA
6.	Metal Fabricators	-	0.8	3300	NA	NA	NA
7.	Shri Ram Rolling Works	-	1.5	4200	NA	NA	NA
8.	Parsvnath Steels	24.08.07	2.0	3500	3.25	160	7.20
9.	Aggarwal Industries	-	1.0	1500	NA	NA	NA
10.	Durga Industries	04.07.08	1.0	2000	1.93	113	10.80
11.	Durga Industries	-	0.5	2500	NA	NA	NA
12.	Arihant Industries	-	1.0	3800	NA	NA	NA
13.	Vishwakarma Metal	-	2.0	2500	NA	NA	NA
14.	A K Industries	-	1.0	2500	NA	NA	NA
15.	Shiva Steels	-	1.0	2000	NA	NA	NA
16.	Mitul Industries	12.07.02	2.0	3700	2.95	350	15.0
17.	Jay Kay Enterprises	-	5.0	5800	NA	NA	NA
18.	S.V. Industries	-	2.0	3800	NA	NA	NA
19.	Ashish Steel	-	1.0	3000	NA	NA	NA
20.	Ganga Industry	25.07.00	5.0	9500	1.9	50	6.2
21.	Bhagwati Steels	-	2.0	2500	NA	NA	NA
22.	Onkar Steels	02.08.08	2.5	2500	3.02	39	15.20
23.	Goyal Enterprises	-	0.4	2500	NA	NA	NA
24.	Tirupati Metal	-	1.0	2500	NA	NA	NA
25.	Sidhartha Industries	-	2.0	7150	NA	NA	NA
26.	Gupta Enterprises	-	1.0	3300	NA	NA	NA
27.	Vardhman Metal Industries	-	2.0	3000	NA	NA	NA
28.	U-Like Exports	13.03.07	1.5	4500	8.01	120	6.0
29.	Kamal Steel Industries	-	1.2	5500	NA	NA	NA
30.	Rajinder Jain	25.04.05	2.0	5000	2.0	114	1.8

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Sr. No.	Name of the unit	Date of sampling	Unit Capacity (TPD)	Total Wastewater Generation (L/day)	pH	TSS (mg/L)	O&G (mg/L)
31.	Tirupati Industries	-	2.0	2500	NA	NA	NA
32.	Hari Ram	-	1.2	5500	NA	NA	NA
33.	Prime Enterprises	24.08.07	2.0	7000	2.38	146	7.60
34.	Vishal Industries	-	2.5	2500	NA	NA	NA
35.	Gaurav Steel	-	1.5	3000	NA	NA	NA
36.	Avtar Refrigeration Industries	13.06.08	2.0	3500	1.96	181	10.40
37.	Balaji Steels	12.09.08	2.0	3600	3.86	184	11.60
	DPCC Limit				**5.5-9.0**	**250**	**10**

BDL - Below Detectable Limit, NA - Not Available
Note: BOD in influent is not analysed as acidity and heavy metals may inhibit the bacterial growth during analysis.

Table 4.2.7: Metal Content in Untreated Wastewater in Different Pickling Industries of Wazirpur Industrial Area

Sr. No.	Name of the Unit	Date of sampling	Total Waste water Generation (L/day)	Metal Concentration (mg/L)					
				Fe	Total Cr	Hexa Cr	Cu	Ni	Total
1.	Sagar Steel Industries	18.09.08	5000	113	2.1	0.18	4.0	117	236
2.	Jai Paras Steel	-	3000	NA	NA	NA	NA	NA	NA
3.	P B Steels	-	2000	NA	NA	NA	NA	NA	NA
4.	Shree Luxmi Industries	-	2000	NA	NA	NA	NA	NA	NA
5.	Kasturi Steel Industries	-	5000	NA	NA	NA	NA	NA	NA
6.	Metal Fabricators	-	3300	NA	NA	NA	NA	NA	NA
7.	Shri Ram Rolling Works	-	4200	NA	NA	NA	NA	NA	NA
8.	Parsvnath Steels	24.08.07	3500	205	13.4	6.7	8.2	24.2	252
9.	Aggarwal Industries	-	1500	NA	NA	NA	NA	NA	NA
10.	Durga Industries	04.07.08	2000	46.16	1.0	0.16	11.05	19.86	78.07
11.	Durga Industries	-	2500	NA	NA	NA	NA	NA	NA
12.	Arihant Industries	-	3800	NA	NA	NA	NA	NA	NA
13.	Vishwakarma Metal	-	2500	NA	NA	NA	NA	NA	NA

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Sr. No.	Name of the Unit	Date of sampling	Total Waste water Generation (L/day)	Metal Concentration (mg/L)					
				Fe	Total Cr	Hexa Cr	Cu	Ni	Total
14.	A K Industries	-	2500	NA	NA	NA	NA	NA	NA
15.	Shiva Steels	-	2000	NA	NA	NA	NA	NA	NA
16.	Mitul Industries	12.07.02	3700	35.8	28.1	6.9	17.3	13.9	95.07
17.	Jay Kay Enterprises	-	5800	NA	NA	NA	NA	NA	NA
18.	S.V. Industries	-	3800	NA	NA	NA	NA	NA	NA
19.	Ashish Steel	-	3000	NA	NA	NA	NA	NA	NA
20.	Ganga Industry	25.07.00	9500	1575	219	*	27	16	1837
21.	Bhagwati Steels	-	2500	NA	NA	NA	NA	NA	NA
22.	Onkar Steels	02.08.08	2500	24.7	0.2	BDL	3.7	19.0	47.6
23.	Goyal Enterprises	-	2500	NA	NA	NA	NA	NA	NA
24.	Tirupati Metal	-	2500	NA	NA	NA	NA	NA	NA
25.	Sidhartha Industries	-	7150	NA	NA	NA	NA	NA	NA
26.	Gupta Enterprises	-	3300	NA	NA	NA	NA	NA	NA
27.	Vardhman Metal Industries	-	3000	NA	NA	NA	NA	NA	NA
28.	U-Like Exports	13.03.07	4500	2.86	1.64	0.44	0.73	1.33	6.56
29.	Kamal Steel Industries	-	5500	NA	NA	NA	NA	NA	NA
30.	Rajinder Jain	25.04.05	5000	24.8	2.3	NIL	NIL	1.7	28.9
31.	Tirupati Industries	-	2500	NA	NA	NA	NA	NA	NA
32.	Hari Ram	-	5500	NA	NA	NA	NA	NA	NA
33.	Prime Enterprises	24.08.07	7000	168.8	16.2	7.11	11.07	18.3	214.4
34.	Vishal Industries	-	2500	NA	NA	NA	NA	NA	NA
35.	Gaurav Steel	-	3000	NA	NA	NA	NA	NA	NA
36.	Avtar Refrigeration Industries	13.06.08	3500	10.47	1.17	0.23	11.05	105.22	128.1
37.	Balaji Steels	12.09.08	3600	236.53	0.65	BDL	2.23	25.27	264.7
	DPCC Limit			**3.0**	**2.0**	**0.10**	**3.0**	**3.0**	**10.0**

NA : Not Available; BDL : Below Detectable Limit

Table 4.2.8: Details of Typical Effluent Treatment Plant

Sr. No.	Process Unit	Nos.	Capacity/Size	Material of Construction
1.	Collection/Equalization Tank	3	20,000 L	Masonry (underground)
2.	Reaction cum Settling Tank	1	6,600 L	MS + EP
3.	Filter Press	1	45 cm * 45 cm & 36	MS + CI
4.	Effluent Transfer Pump	1	2 HP, 3000 L/hr	MS + CI
5.	Agitator	1	1.5 HP	MS + CI

Table 4.2.9: Physico-chemical Characteristics of Treated Wastewater in Different Pickling Industries of Wazirpur Industrial Area

Sr No.	Name of the unit	Date of sampling	Total Wastewater Generation (LPD)	pH	TSS (mg/L)	O&G (mg/L)	BOD_3 at 27 °C (mg/L)
1.	Sagar Steel Industries	18.09.08	5000	7.1	37	2.8	8
2.	Jai Paras Steel	27.07.11	3000	7.1	120	9.2	10.5
3.	P B Steels	04.07.16	2000	7.3	6.4	1.0	NA
4.	Shree Luxmi Industries	04.07.16	2000	7.2	60	1.6	NA
5.	Kasturi Steel Industries	28.06.16	5000	6.9	22	0.8	NA
6.	Metal Fabricators	08.08.14	3300	7.8	40	<4	NA
7.	Shri Ram Rolling Works	03.09.13	4200	6.9	93	<4	ND
8.	Parsvnath Steels	24.08.07	3500	7.7	54	2.0	6
9.	Aggarwal Industries	13.10.17	1500	6.8	34	BDL	28.5
10.	Durga Industries	04.07.08	2000	7.1	37	3.6	12
11.	Durga Industries	12.07.16	2500	7.2	22	1.2	NA
12.	Arihant Industries	11.07.16	3800	7.5	26	1.2	NA
13.	Vishwakarma Metal	03.09.13	2500	8.6	97	<4	NA
14.	A K Industries	13.10.17	2500	6.8	38	BDL	28
15.	Shiva Steels	16.01.14	2000	7.7	56	2.0	NA
16.	Mitul Industries	12.07.02	3700	7.8	15	2.1	NA
17.	Jay Kay Enterprises	14.10.17	5800	6.9	38	BDL	27
18.	S.V. Industries	03.09.13	3800	8.5	72	<4	NA
19.	Ashish Steel	01.07.14	3000	8.2	72	<3	NA
20.	Ganga Industry	25.07.00	9500	8.4	29	0.4	4
21.	Bhagwati Steels	12.06.15	2500	6.9	34	1.0	NA

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Sr No.	Name of the unit	Date of sampling	Total Wastewater Generation (LPD)	pH	TSS (mg/L)	O&G (mg/L)	BOD_3 at 27 °C (mg/L)
22.	Onkar Steels	02.08.08	2500	7.8	12	3.2	14
23.	Goyal Enterprises	18.07.11	2500	7.1	118	8.0	10
24.	Tirupati Metal	27.07.11	2500	7.1	120	9.2	10
25.	Sidhartha Industries	19.01.09	7150	7.6	28	Nil	NA
26.	Gupta Enterprises	16.08.11	3300	7.1	120	9.2	10.5
27.	Vardhman Metal Industries	22.08.14	3000	7.3	60	<4	NA
28.	U-Like Exports	13.03.07	4500	7.4	57	2.0	38
29.	Kamal Steel Industries	03.01.14	5500	7.31	62	5.6	NA
30.	Rajinder Jain	25.04.05	5000	7.7	67	NIL	NA
31.	Tirupati Industries	13.06.14	2500	7.5	31	<4	NA
32.	Hari Ram	06.01.14	5500	7.7	58	4.0	NA
33.	Prime Enterprises	24.08.07	7000	7.2	59	2.4	12
34.	Vishal Industries	04.09.13	2500	8.6	64	4.0	NA
35.	Gaurav Steel	02.09.14	3000	8.0	56	<3.0	NA
36.	Avtar Refrigeration Industries	13.06.08	3500	7.2	31	14.0	NA
37.	Balaji Steels	12.09.08	3600	6.9	18	4	12.0
	DPCC Limit			**5.5-9.0**	**250**	**10.0**	**30**

NA : Not Available

Table 4.2.10: Metal Content in Treated Wastewater in Different Pickling Industries of Wazirpur Industrial Area

Sr. No.	Name of the unit	Date of sampling	Total Waste water Generation (LPD)	Metal Concentration (mg/L)					
				Fe	Total Cr	Hexa Cr	Cu	Ni	Total Metal
1.	Sagar Steel Industries	18.09.08	5000	0.55	0.68	0.09	1.41	0.50	3.14
2.	Jai Paras Steel	27.07.11	3000	1.10	0.82	0.05	1.60	1.20	4.00
3.	P B Steels	04.07.16	2000	1.4	1.3	ND	ND	0.5	3.2
4.	Shree Luxmi Industries	04.07.16	2000	1.1	0.6	ND	ND	1.1	3.5
5.	Kasturi Steel Industries	28.06.16	5000	0.75	0.83	ND	0.92	0.88	3.38
6.	Metal Fabricators	08.08.14	3300	0.65	0.29	ND	0.39	0.45	1.78
7.	Shri Ram Rolling Works	03.09.13	4200	1.4	0.25	ND	0.27	2.2	4.12
8.	Parsvnath Steels	24.08.07	3500	2.12	0.83	0.04	1.08	1.16	5.19
9.	Aggarwal Industries	13.10.17	1500	1.55	1.22	BDL	0.16	0.28	3.21
10.	Durga Industries	04.07.08	2000	0.66	0.31	0.06	0.55	0.99	2.51
11.	Durga Industries	12.07.16	2500	0.46	0.34	ND	0.43	0.07	1.3
12.	Arihant Industries	11.07.16	3800	0.55	0.78	ND	0.39	0.55	2.27
13.	Vishwakarma Metal	03.09.13	2500	2.8	1.65	ND	0.45	0.61	5.51
14.	A K Industries	13.10.17	2500	1.88	1.11	BDL	0.15	0.1	3.24
15.	Shiva Steels	16.01.14	2000	1.06	0.22	0.03	0.03	0.02	1.36
16.	Mitul Industries	12.07.02	3700	1.80	1.60	ND	2.20	0.87	6.47
17.	Jay Kay Enterprises	14.10.17	5800	1.69	1.22	BDL	0.16	0.33	75.8
18.	S.V. Industries	03.09.13	3800	2.09	1.84	ND	0.56	0.6	5.09
19.	Ashish Steel	01.07.14	3000	2.14	0.58	ND	1.31	0.98	5.99
20.	Ganga Industry	25.07.00	9500	0.11	0.05	BDL	0.07	0.11	0.34
21.	Bhagwati Steels	12.06.15	2500	1.50	1.34	ND	0.16	0.22	3.22
22.	Onkar Steels	02.08.08	2500	2.04	0.02	BDL	0.45	0.06	2.57
23.	Goyal Enterprises	18.07.11	2500	1.11	0.80	0.04	1.61	1.19	4
24.	Tirupati Metal	27.07.11	2500	1.10	0.82	0.05	1.60	1.20	4
25.	Sidhartha Industries	19.01.09	7150	0.4	0.2	Nil	0.3	0.1	1.0
26.	Gupta Enterprises	16.08.11	3300	1.10	0.82	0.05	1.60	1.20	4.0
27.	Vardhman Metal Industries	22.08.14	3000	0.72	0.28	ND	0.30	0.31	1.61
28.	U-Like Exports	13.03.07	4500	0.70	0.35	0.06	0.50	0.52	2.07
29.	Kamal Steel Industries	03.01.14	5500	2.24	0.82	ND	0.44	0.25	4.99
30.	Rajinder Jain	25.04.05	5000	0.76	0.82	NIL	NIL	0.61	2.19

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Sr. No.	Name of the unit	Date of sampling	Total Waste water Generation (LPD)	Metal Concentration (mg/L)					
				Fe	Total Cr	Hexa Cr	Cu	Ni	Total Metal
31.	Tirupati Industries	13.06.14	2500	0.28	0.15	ND	0.48	0.16	1.07
32.	Hari Ram	06.01.14	5500	1.45	0.26	0.04	0.05	0.03	1.83
33.	Prime Enterprises	24.08.07	7000	2.20	0.90	0.06	1.47	1.12	5.69
34.	Vishal Industries	04.09.13	2500	1.36	0.18	0.05	0	0.16	1.99
35.	Gaurav Steel	02.09.14	3000	1.98	0.67	ND	1.01	1.9	6.56
36.	Avtar Refrigeration Industries	13.06.08	3500	0.66	0.38	0.04	0.45	1.52	3.01
37.	Balaji Steels	12.09.08	3600	1.28	0.27	BDL	0.71	0.89	3.15
	DPCC Limit			**3.0**	**2.0**	**0.10**	**3.0**	**3.0**	**10.0**

NA : Not Available; BDL : Below Detectable Limit

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Chapter 5

Summary of Study Findings

This Chapter summarises various components of Environmental Carrying Capacity of Wazirpur Industrial Area, status of pickling industries and its impact, and the status of CETP sludge dumped in the park outside CETP premises.

5.1 Environmental Carrying Capacity of Wazirpur Industrial Area

5.1.1 Air Quality related

A. Air Quality Levels in WIA and Delhi during December 11-18, 2019

Average ambient air quality levels monitored at 3 locations in the Wazirpur Industrial Area (WIA) during December 11-18, 2019 are compared with the corresponding air quality levels measured at 17 other locations in Delhi (monitored by CPCB/ DPCC), representing different land use classification/ activity zones. The average values along with National Ambient Air Quality Standards (NAAQS) are given in **Table 5.1.1**.

Perusal of the table indicates that there is marginal difference in the concentration levels of PM_{10} and $PM_{2.5}$ measured in WIA and in Delhi. SO_2 levels are less, whereas NO_2 levels are more in WIA. High levels of NO_2 in WIA are attributed to the huge traffic movement on the ring road, and also some industrial activities.

Average concentration levels of PM_{10} and $PM_{2.5}$ in both WIA and Delhi exceeded the NAAQS, whereas levels of SO_2 and NO_2 were found within the limits.

Thus one can conclude that the air quality levels in the entire Delhi are more or less similar, however, there may be some variations due to the magnitude of activities at the local level.

Table 5.1.1: Comparison of Average Air Quality Status in Wazirpur Industrial Area with Levels Observed in Delhi during December 11-18, 2019

Sr. No.	Parameter	Average AQ Levels in WIA (µg/m^3)	Average AQ Levels in Delhi* (µg/m^3)	NAAQS (24 Hrs Avg) (µg/m^3)
1.	PM_{10}	234	228	100
2.	$PM_{2.5}$	147	156	60
3.	SO_2	6	9	80
4.	NO_2	72	58	80

*Average of 17 air quality monitoring sites representing different landuse and activity areas

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B. Seasonal Variation in Air Quality Levels in WIA

Further, seasonal variation in air quality levels in Wazirpur Industrial Area (measured continuously at Ashok Vihar & Wazirpur site) is analyzed for the period from December 1, 2018 to November 30, 2019. Continuous monitoring is done by CPCB/ DPCC. The average concentration on PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO during winter, summer, monsoon and post-monsoon season is given in **Table 5.1.2**.

Table 5.1.2: Seasonal Variation in Average Ambient Air Quality in Wazirpur Industrial Area (December 2018 - November 2019)

Sr. No.	Parameter	Pollutant concentration (µg/m^3)				NAAQS (24 h Avg.) (µg/m^3)
		Winter (Dec 2018-March 2019)	Summer (April-June 2019)	Monsoon (July- Sept. 2019)	Post-Monsoon (Oct-Nov, 2019)	
1.	PM_{10}	326	260	145	323	100
2.	$PM_{2.5}$	203	88	45	193	60
3.	SO_2	22	24	12	17	80
4.	NO_2	64	65	35	54	80
5.	CO*	1.85	1.34	1.06	1.8	2.0

*CO concentration is in mg/m^3. Source: CPCB Website

Perusal of table indicates that concentration levels of PM_{10} and $PM_{2.5}$ exceeded prescribed NAAQS during winter, summer and post-monsoon seasons. Levels in winter and post-monsoon were comparable; whereas levels in summer were considerably less. Levels of PM_{10} and $PM_{2.5}$ were found with the limits during monsoon season.

Concentration levels of other important pollutants like SO_2, NO_2 and CO were found within the limits in all the seasons, lowest being in monsoon season.

It is pertinent to mention that high levels of PM_{10} and $PM_{2.5}$ are of concern in the entire Delhi during post monsoon and winter months (October-March months) for past few years, and both Central and State Govt. have taken several steps to deal with it.

Therefore, higher levels of PM_{10} and $PM_{2.5}$ is the outcome of various sources of air pollution in Delhi & NCR, and not limited to the various activities taking place in the Wazirpur Industrial Area only.

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5.1.2 Wastewater related

A. Status of Drains in WIA

As detailed earlier in Section 3.2, there are two drains/wastewater streams in the Wazirpur Industrial Area known as:

- Conveyance system carrying wastewater from industries and connected to the CETP (hereinafter referred to Drain A)
- Storm water drain not connected to CETP (hereinafter referred to Drain B). This storm water drain also carries part of wastewater from the industries, other establishments and slums in the area.

During field studies, average flow rate of drain connected to CETP (Drain A) was found to be 3.3 MLD, whereas average flow rate of storm water drain (Drain B) was observed to be about 15 MLD. Average water quality characteristics of both the drains as determined by NEERI Study team during December 2019 are given in **Table 5.1.3**.

Observations

- Flow rate of Drain B (not connected to CETP) was found much higher (about 15 MLD) in comparison to the Drain A, connected to CETP (3.3 MLD)
- Concentration of certain parameters like TDS, FDS, Chlorides, Fluoride, Ammonia, Cu, Fe, Mn, Ni, Pb, Sr and Zn was found more in the Drain A, whereas certain other parameters like TSS, Sulfate, Nitrate, Sulfide, BOD, TKN and Cr were found to be more in the Drain B. COD was found to be more or less same in both the drains.
- Perusal of characteristics indicates that Drain A carries wastewater more of industrial nature, whereas Drain B is more of sewage, mixed with some industrial streams, particularly chromium based industrial effluent. Surprisingly, pH of Drain B was found to be more acidic (pH 2.5).
- Many physico-chemical parameters and metals present in Drain A and B exceeded the discharge norms, thus require treatment. **It is therefore recommended that DPCC must ensure that no industrial wastewater is discharged into the storm water drain, and all the industries operating illegally be closed.**

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Table 5.1.3: Water Quality Characteristics of Drains Connected to CETP and not Connected to CETP

Sr. No.	Parameters	Average Wastewater Quality Characteristics of Drain/Stream		*Discharge Standard
		Connected to CETP	Non-Connected to CETP	
A.	**Physical Parameters (mg/L)**			
1.	pH	3.5	2.5	**6.0 – 9.0**
2.	TSS	1915	3297	**100**
3.	TDS	3911	1625	**-**
4.	FDS drying at 550°C	3297	1319	**2100**
B.	**Chemical Parameters (mg/L)**			
5.	Chloride	830	267	**1000**
6.	Sulphate	1356	1888	**1000**
7.	Phosphate	3	3.0	**5/NS**
8.	Nitrate	29	36	**10/NS**
9.	Total Residual Chlorine	-	-	**1**
10.	Fluoride	8	6.0	**2**
11.	Ammonia	14	-	**50/NS**
12.	Sulphide	1.1	1.8	**2**
13.	Phenol	0	0	**1**
14.	Oil & Grease	0	0	**10**
15.	SAR	30	10	**< 3**
C.	**Demand Parameters (mg/L)**			
16.	BOD	262	359	**30/100**
17.	COD	959	955	**250**
18.	TKN	43	56	**50/NS**
D.	**Heavy Metals Concentration (mg/L)**			
19.	Cd	0	0	**0.005**
20.	Cr	52	15	**-**
21.	Cu	15	3.6	**3**
22.	Fe	609	150	**3**
23.	Mn	49	18	**-**
24.	Ni	8	2.3	**3**
25.	Pb	13	3.1	**0.1**
26.	Sr	3.6	1.8	**-**
27.	Zn	1	0.5	**5**
E.	**Flow Rate (MLD)**	**3.3**	**15.0**	**-**

All values are in mg/L, except pH and flow rate.

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B. Status of CETP

Performance of the CETP with respect to different parameters was evaluated by NEERI in December 2019, and results are given in **Table 5.1.4**.

- Perusal of table indicates that the system performed very well with respect to removal of TSS (99%), BOD (92%), COD (87%) and metals (96-99.5%), except for Mn (85%) and Sr (25%).
- The system also helped in reduction of chemical parameters like chlorides, sulfates, nitrates, phosphates, ammonia and sulfide considerably (65-77% reduction). However, TDS & FDS levels increased as result of required chemical dosing of lime and polyelectrolyte.
- pH also increased from 3.5 (highly acidic) to 7.7 (slightly alkaline).
- All the physico-chemical parameters and metals were found to conform to the discharge norms, except TDS/FDS, Fluoride, and marginally w.r.t. to nitrate.
- The CETP was not meeting the standards prescribed mainly for Fixed Dissolved Solids (FDS) and Fluoride and is required to upgrade its facilities so as to achieve the standards prescribed for treated wastewater/effluent.

Table 5.1.4: Performance Status of CETP

Sr. No.	Parameters	Untreated WQ at the CETP Inlet	Treated WQ at CETP Outlet	Percent Reduction	*Discharge Standard
A.	**Physical Parameters (mg/L)**				
1.	pH	3.5	7.7		**6.0 – 9.0**
2.	TSS	1915	25	99	**100**
3.	TDS	3911	**4509**	(+) 15	**-**
4.	FDS drying at 550°C	3297	**3747**	(+) 14	**2100**
B.	**Chemical Parameters (mg/L)**				
5.	Chloride	830	263	68	**1000**
6.	Sulphate	1356	435	68	**1000**
7.	Phosphate	3	0.7	77	**5/NS**
8.	Nitrate	29	10.1	65	**10/NS**
9.	Total Residual Chlorine		0.3	-	**1**
10.	Fluoride	8	**10.0**	(+) 25	**2**
11.	Ammonia	14	3.6	74	**50/NS**
12.	Sulphide	1.1	ND	100	**2**
13.	Phenol	0	ND	-	**1**
14.	Oil & Grease	0	0.0	-	**10**
15.	SAR	30	20	33	
C.	**Demand Parameters (mg/L)**				
16.	BOD	262	20	92	**30/100**
17.	COD	959	128	87	**250**
18.	TKN	43	38	12	**50/NS**
D.	**Heavy Metals Concentration (mg/L)**				
19.	Cd	0	0	-	**0.005**
20.	Cu	52	0.1	99	**3**
21.	Cr	15	BDL	100	**-**
22.	Fe	609	0.5	100	**3**
23.	Mn	49	8.3	85	**-**
24.	Ni	8	0.3	96	**3**
25.	Pb	13	0.04	100	**0.1**
26.	Sr	3.6	2.7	25	**-**
27.	Zn	1	0.0	100	**5**
E.	**Flow Rate (MLD)**	3.3	3.3	-	**-**

All values are in mg/L, except pH and flow rate.

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C. Sludge Generation and Disposal

- Depending upon the wastewater quality characteristics and amount of chemical dosing required, a huge amount of sludge is generated (about 3-4 tons/day) in the CETP, which is at present is being stored in the CETP premises. This sludge contains high concentration of different metals like Cr, Cu, Fe, Mn, Ni, Pb, & Zn, which are removed from the wastewater in the treatment process. Presently, about 15000 tons of sludge is stored in the CETP premises, accumulated over the years. The sludge (fresh as well as stored) is recommended to be disposed-off at the hazardous waste landfill site (TSDF), being developed by DSIIDC.

5.1.3 Soil Quality related

- Soil samples were collected from Park (B block) and garden/Park outside the CETP premises. The samples were analysed for various physico-chemical parameters and metal content.
- Analysis of samples revealed that the soils were neutral in pH.
- Metal Content in the soils was assessed and was compared with Indian Standards (Awasthi 2000). Concentration of all the metals was found to be considerably high in the soil sample collected from the Park in B block, as compared to the soil of garden outside CETP premises. B Block Park soil exceeded the standards marginally with respect to Copper (Cu: 178 mg/kg > 170 mg/kg).
- Though there is no Indian Standard for Chromium (Cr), Iron (Fe) and Manganese (Mn), yet level of these metals were found to be considerably high in the Park soil, indicating possibility of wastewater discharge from certain industries or some industrial solid waste disposal in the Park.
- The assessment made by CPCB in 2019 also indicate dumping of hazardous sludge upto the depth of 9.5 ft. – 10.5 ft. Assessment of damage caused to the soil due to leaching of heavy metals from hazardous waste dumped at 9.5 ft.-10.5 ft. depth may require further detailed investigation by an expert agency.

5.1.4 Parks/Garden/Greenery/ Vegetation related

- The floral diversity was assessed through observation and listing of tree species within the Wazirpur industrial area. Trees in the industrial area are planted in the Green Belt (A Block), CETP premises, Community Centre and Park in B block of the industrial area.
- The road side plantation is found to be sparse. Among the road side plantation within the industrial area few trees of peepal (*Ficus religiosa*), Karanj (*Millettia*

pinnata), goolar (*Ficus racemosa*) and Ashoka (*Saraca asoca*) have been planted. Overall vegetation in Wazirpur industrial area is sparse.

- Green cover/vegetation in the WIA is only 5.5%, whereas nearly 18% open space is available. Green cover/vegetation in the WIA needs to be improved to minimum 10% by planting suitable trees, wherever possible.

5.1.5 Slums related

- Remote sensing analysis followed by ground truthing indicates that considerable amount of area is covered under Slums. Many places like along the railway line, public open space, parking areas, land plots etc., are believed to be encroached.
- Unskilled and semi-skilled manpower working mostly in the Wazirpur Industrial Areas as well as parts of Delhi are residing here. Besides working in industries and other establishments, many are involved in their own small business/ household activities.
- Majority of the slums houses are made up of brick, plastered with cement and roofs of stone or concrete. The actual population residing in all the slum areas of WIA is not known, however unofficial figure says, it could be upto 2 lakhs. This also results in to generation of sewage/wastewater, municipal solid waste and air emissions due to burning of multiple fuels.
- Such areas are lacking proper basic amenities required by the people, and maintaining proper sanitation and hygiene in the area would be a big challenge.
- In order to assess the magnitude of environmental pollution caused by slums in the WIA, detailed social analysis of the slum area by an expert agency may be required.

5.1.6 Ground Water Quality Status in the Study Area and Delhi

CPCB (2019) assessed ground water quality near the Wazirpur CETP Area, wherein three samples were collected from borewells located within CETP premises and DJB pump house located in front of CETP and at the back of CETP. The depth of bore wells is reported to be around 120 feet. Ground water quality at the locations near CETP area wrt 6 parameters defined by CGWB is compared against the ground water quality of North West District alongwith the adjacent districts to Wazirpur Industrial Area, North and Central districts, as presented in **Table 5.1.5**.

Perusal of table indicates that the concentration levels of different parameters near CETP area are much less as compared to the levels observed in North West Delhi district. However, nitrate level was found to exceed the permissible limits at all the three locations and iron at the pump house at the backside of CETP. Presence of high nitrate in other districts also indicates that this is of geo-genic nature.

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Table 5.1.5: Comparison of GWQ Parameters Exceeding the Permissible Limit in North West Delhi with Levels Observed near CETP Area

Sr. No.	Parameters	DWQ Standards (BIS:10500 - 2012)	Range of Values Exceeding BIS Limits in the District (CGWB Report 2018)			CPCB Inspection Report 2019		
			North West	North	Central	Site A	Site B	Site C
1.	Electrical Conductivity	3000	3063-8900	Nil	3989	1595*	857*	1957*
2.	Chlorides	1000	1134-2511	Nil	Nil	132	90	166
3.	Fluoride	1.5	1.76-4.07	1.85	Nil	-	-	-
4.	Nitrate	45	56.3-363	52.7-125	655	205	49	128
5.	Iron	1.0	Nil	1.12	2.8	0.63	0.10	1.40
6.	Arsenic	0.01	Nil	Nil	Nil	BDL	BDL	BDL

All values are in mg/L except electrical conductivity, which is in µS/cm.

Site A - CETP Premises; Site B- DJB Pump house in front of CETP; Site C - DJB Pump house at back of CETP

*Calculated from TDS Value (TDS = 0.67 x EC).

CGWB 2018. Ground Water Quality in Shallow Aquifers in India, Central Ground Water Board, Ministry of Water Resources RD & GR Govt. of India, Faridabad

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5.2 Status of Pickling Industries and Related Issues

5.2.1 Process and Waste Management Practices Adopted

The pickling industries in Wazirpur Industrial Area are operating for more than 4 decades and provide raw material to utensils manufacturing industry sector. This has developed in the industrial area over the years, which produces different type of products, catering to the needs of the country as well as other countries. Pickling industry in WIA is basically an intermediate industry which removes scales and stains, resulted due to conversion of thick gauge metal sheet (18 G) to fine gauge (24/26 G) in hot/cold rolling mills.

Almost all the units in Wazirpur Industrial Area process SS 201 grade steel sheets, which contain about 72% Iron (Fe), 13-14% Chromium (Cr), 9-10% Manganese (Mn), 1-1.5% Copper (Cu), 0.5-1.0 Nickel (Ni), and remaining Silica (4-6%).

In the pickling process involving removal of scales and stains, two acid baths are used. First acid bath contains sulfuric acid and the second bath nitric acid. About 10 litres of H_2SO_4 and 10 litres of HNO_3 along with 500 litres water in each bath is used per ton of SS Sheet. With successive pickling process, the strength of acid reduces, which is maintained up by addition of fresh acid. High strength acid is procured in 40 litres cans.

Normally, during gauge conversion through hot/cold rolling, scales deposited on the surface are removed in pickling process. This scale removed from the surface is about 1-1.5% (i.e. 10-15 kg/ton of material). This scaled material also contains high percentage of Iron and recycled back for re-processing of Iron/Steel. It is sold at a rate of about Rs. 4-5 /- per kg to the in furnace operating units.

The spent liquor (spent acid) formed due to successive acid pickling of metal sheets is stored separately in drums/cans. At the instructions of DPCC, at present more than 500 cans of 40 litres capacity, properly sealed with identification of industry, are kept in the CETP premises, for the want of safe disposal guidelines from DPCC.

Sludge generated from the acid bath, containing very low pH and high metal content is collected and stored in drums/cans within the industry premises. About 2 kg of sludge/ton of material is generated in the process, which is removed periodically from the acid bath. At present, each industry is having about 20-25 tons of this sludge stored in their premises. This sludge is to be disposed off through authorised Hazardous Waste vendors, however waiting for further instructions/directions from DPCC.

5.2.2 Adequacy of Pollution Control Measures

Study of Stainless Steel Pickling Industry processes indicate that three types of wastes are generated in the industry:

- Air emissions (mainly acid fumes) from pickling process

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- Wastewater from spent acid bath, spent wash water bath, floor washing and scrubber containing acids, oil & grease and metal contents
- Hazardous solid waste/sludge from effluent treatment plant containing high metals content.

Analysis of pollution control/waste management data of the 37 pickling industries revealed that:

- For control of air pollution/acid fumes generated during pickling process, all the units have installed scrubber based air pollution control system. Alkaline water is used as scrubbing medium to neutralize the acid fumes and the scrubbed water is recirculated multiple times. Further, adequacy of air pollution control system has been assessed by reputed institutions and found that acid mist concentration in the exit gas was much below the DPCC permissible limit of 50 mg/Nm^3.
- Regarding treatment of wastewater generated in the industry, all the units have installed primary effluent treatment plant (PETP) consisting of Collection/ Equalization Tank, Reaction sum Settling Tank, Clarifier (Sedimentation Tank), Filter Press, Chemical Dosing Tanks, Effluent transfer pump, Sludge pump, Agitator etc. and treated water meeting the DPCC norms is discharged to the conveyance system/drain leading to CETP. Further, adequacy of effluent treatment system is evaluated by reputed institutions, and found that all the industries have met DPCC discharge norms. Industries are storing spent acid/ sludge within their premises and at the CETP premises.
- Regarding hazardous sludge generated from the filter press of ETP, it is stored in separate containers in the industry premises, which is also to be disposed off as per provisions of Hazardous Waste Rules, 2016.
- Primary effluent treatment plant (PETP) has been installed to meet the prescribed standards.
- Emission control system (ECS) has been installed to meet the prescribed standards.
- The trade effluent after treatment in the PETP is discharged into the conveyance system leading to CETP, laid by DJB.

The above analysis is made based on the examination/evaluation of the details provided by various agencies during the present study, however the assessment of the overall functioning of each unit could not be done at this stage by the CSIR-NEERI, as all the units were found closed down.

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5.3 Status of Sludge Dumped in the Park outside the CETP Premises

5.3.1 Background

It has been alleged that sludge from WIA CETP has been disposed off/ dumped in the open area outside the CETP premises (hereinafter referred as CETP Park, as this area has been fenced and some plantation has been done in the area last year). The area of the CETP Park is about 2000 m^2, which also houses transformer of CETP.

Detailed discussions with the CETP officials were held to understand the issue. It is revealed that the open area outside the CETP premises was a low lying area at the time of CETP commissioning. Further, due to the paucity of space for storage of sludge within the CETP premises, CETP Society requested the concerned authorities to allow temporary storage of CETP sludge with proper shed and other arrangements.

In this regard, perusal of copy of letter No. WIPC(CETP)S/Feb/2010 dated 23.02.2010 (copy attached as **Annexure 5.1**) addressed to the Secretary Environment, Govt. of Delhi reveals that:

- The CETP was authorized to store Hazardous Waste (Sludge) upto December 2007. As per the agreement dated 20.07.2005, between the Govt. of Delhi and CETP Societies, "The Govt. shall identify temporary storage site for hazardous waste and ensure it is fully operational by Dec 31, 2005, and after one year, the sludge/hazardous waste will be disposed of at the disposal facility." However, no suitable mechanism could be worked out for safe disposal of CETP sludge even till date, and as a result, a huge amount of sludge has piled up in the CETP premises (to the tune of about 15000 tons).
- As an immediate solution to the problem, at that point of time, it was proposed to create "Captive Hazardous Waste Facility" at the land adjoining to Wazirpur CETP, under the provisions of Hazardous Waste Management & Handling Rule, 2008. The said open land was in the possession of DSIIDC. However, no decision was taken in this regard by the concerned authorities, at that point of time.

Further perusal of CETP Society letter no. WIPC(DDA)/2016/407 dated 06.07.2016 addressed to the Vice Chairman, DDA, (copy of letter attached as **Annexure 5.2)** reveals that:

- Hon'ble NGT vide its Order dated May 19, 2016 directed to explore the possibility of identifying and allocating additional land to CETP Plant Wazirpur, for which a joint inspection of CETP Plant, Wazirpur and adjoining areas was carried out by the officers of DDA, DSIIDC, North DMC, CPCB and DPCC on May 31, 2016.
- During the inspection, it was observed that the piece of land, where Hazardous waste was dumped may be utilized as a temporary storage facility for the Hazardous waste till the site for TSDF is allotted/developed by the

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DSIIDC. It means dumping of hazardous waste on that land was acknowledged by that time. This also indicates that the dumped Sludge may of the age of 8-14 years.

- In the follow-up meeting on 06/06/2016, it was decided by MD, DSIIDC that DDA shall allot the identified land to CETP Society for the temporary storage of hazardous waste, and thereafter fencing around the land shall be done by DDA together with removal of malba on the land, however, the said land is yet to handed over to CETP Society for its intended usage.

With the above background, it is clear that the land situated adjoining to the boundary wall and entrance of the CETP WIA (presently referred as CETP Park), was identified for developing it as the temporary hazardous waste storage facility, wherein some hazardous waste was already dumped illegally without taking any protective and containment measures, any time during 2008-2015.

Therefore, dumping of CETP sludge buried in the open area in front of CETP premises was known to all the concerned Authorities/Departments, however, no timely action and measures were taken to prevent the damage to the soil.

5.3.2 Assessment of CETP Sludge & Contaminated Soil in CETP Park

In light of the fact that the CETP sludge/material was buried/dumped in the CETP Park, the extent of sludge dumping, its characteristics and possible impact on ground water quality was assessed by CPCB in 2019, report of which was submitted to Hon'ble NGT on 05.04.2019.

CPCB 2019 Report found that the characteristics/metal contents of material dumped/ buried at a depth of 10.5 ft and 9.5 ft were similar to that of sludge stored at the CETP premises, thereby, it can be concluded that CETP sludge has been dumped/ buried at the CETP Park outside, over the years.

Further, recently, CSIR-NEERI as part of the Carrying Capacity of Wazirpur Industrial Area, also studied the following aspects to assess the linkage/extent of damage due to sludge dumping/burying at the CETP Park area:

- Characteristics of Suspected Sludge Contaminated Soil at the CETP Park
- Metal content in fresh and stored sludge within CETP premises
- Leaching potential of metals from fresh and stored Sludge within CETP premises
- Leaching potential of metals from sludge mixed soil collected from rightside corner of CETP Park

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Details of sampling locations, analytical procedure and results are presented earlier in Sections 3.5 & 3.6. The findings given in the CPCB 2019 report are also discussed. Further, summary of the results and way forward is presented here.

Summary of metal content present in stored sludge (2006-2018) along with its leaching potential and also metal content present in the sludge contaminated soil (upto 2 ft depth) and its leaching potential is presented along with the Soil Quality Standards and threshold limits for TLCP/ WET procedure in **Table 5.3.1**.

Table 5.3.1: Summary of Metal Content in Stored Sludge & Sludge Containing Soil and their Leaching Potential

Sr. No.	Metal	Stored Sludge (2006-2018) (Analysis of 8 Samples)		CETP Park Soil (Rightside Corner upto 2ft depth)		Soil Quality Standard (Awasthi 2000) (mg/kg)	Thresh-old Limit (TCLP/ WET) (mg/L)
		Average Metal Content (mg/kg)	Average Leachable Metal (WET) (mg/L)	Average Metal Content (mg/kg)	Average Leachable Metal (WET) (mg/L)		
1.	Cd	1	0.01	3	0.0	**3-6**	1
2.	Co	64	1.0	32	0.4	-	80
3.	Cr	15669	**20**	17758	2.5	-	5
4.	Cu	2345	**46**	2391	16	**135-170**	25
5.	Fe	120039	151	135229	22	-	-
6.	Mn	6916	**129**	4970	**36**	-	10
7.	Ni	1506	19	701	3	**75-150**	20
8.	Pb	2146	**41**	2683	**16**	**250-500**	5
9.	Zn	255	0.5	148	0.3	**300-600**	**250**

Note: In WET Method, leachability of metals is more than TCLP method.

The values in **blue** colour indicates exceedence to the Threshold Limit.

Awasthi SK (Ed.) (2000). Prevention of Food Adulteration Act No. 37 of 1954. Central and State Rules as Amended for 1999, Ashoka Law House, New Delhi.

Observations

Perusal of table indicates that:

- Average metal content in the sludge samples collected from different storage piles representing different age of sludge (1-2 years, 3-6 years, 8-14 years) compares well with the average metal content in the soil (sludge mixed) collected from the right side corner of the park upto 2 ft.

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- In the Park soil, concentrations of certain metals like Cu (2391 mg/kg > 170 mg/kg), Ni (701 mg/kg > 150 mg/kg), Pb (2683 mg/kg >500 mg/kg) exceed the permissible limits of agricultural soils. Besides, very high level of Cr (17758 mg/kg) and Fe (135229 mg/kg) was observed. The soil standards are basically formulated for agricultural fields where edible crops, vegetable and fruits etc. are grown. Certain tree species can tolerate higher levels of metal concentrations, and the present piece of land is not envisaged to be used for any such agricultural purpose.
- Average concentration of certain leachable metals was found exceeding the threshold value in the sludge stored within CETP premises, (Cr: 20mg/L > 5 mg/L; Cu: 46 mg/L > 25 mg/L; Mn: 129 mg/L> 10 mg/L and Pb: 41 mg/L > 5 mg/L), whereas the leachable concentration of metals in the sludge contaminated soil was found to exceed only for Mn (36 mg/L > 10 mg/L); and Pb (16 mg/L > 5 mg/L).
- The magnitude of leaching from sludge contaminated soil was found to be much less as compared to the leaching from stored sludge. For example average content of Cr in stored sludge was 15669 mg/kg and in soil it was more (17758 mg/kg), whereas in leachate leaching from stored sludge was more (20 mg/L) as compared to the soil sludge (2.5 mg/L). Similar observation is made for Cu, Fe & Pb. The low magnitude of leaching at the depth of 1-2 ft indicates that leaching might have already occurred and the sludge is stabilized at this depth. CPCB's Report indicated presence of sludge at the depth of about 10 ft. Leaching potential of sludge dumped at the depth of about 10 ft or more may be assessed separately, if required. The study may include detailed characterization at different depths, metal leaching potential assessment, damage assessment and restoration plan.
- Relative leaching potential of stored sludge and soil sludge is depicted in **Fig. 5.3.1.**

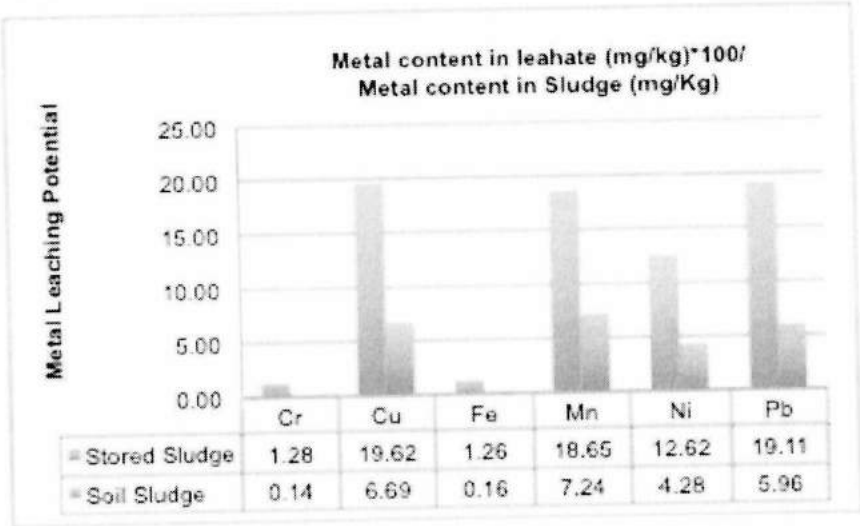

Fig. 5.3.1: Relative Metal Leaching Potential of Stored Sludge and Soil Sludge

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5.3.3 Groundwater Quality in the Nearby Area

CPCB collected 3 samples from the bore wells located in the premises of CETP, and from DJB pump house located in the vicinity of CETP and analyzed for metal content as given in **Table 5.3.2**. Perusal of table indicates that most of the metals like As, Cd, Co, Cr, Cu, Ni, Pb, Se and V were found below the detectable limit (BDL). Only Fe (at 2 locations) and Mn (at all 3 locations) and Pb at one location were found to exceed the BIS Drinking Water Quality Standards.

Presence of high Fe and Mn concentration may be due to geo-genic contamination of deep bore pipes (more than 100 ft), and does not appear to be affected by the soil sludge/ CETP sludge. Further, sampling and analysis may be carried out to ascertain persistence of metal content in these ground water sources.

Table 5.3.2: Comparison of GWQ Parameters Exceeding the Permissible Limit in North West Delhi and Levels near CETP Area

Sr. No.	Metal	CETP Premises	DJB Pump house in front of CETP	DJB Pump house at back of CETP	DWQ Standards-Acceptable Limit (BIS:10500- 2012)
1.	As	BDL	BDL	BDL	0.01
2.	Cd	BDL	BDL	BDL	0.03
3.	Co	BDL	BDL	BDL	-
4.	Cr	BDL	BDL	BDL	0.05
5.	Cu	BDL	BDL	BDL	0.05
6.	Fe	**0.63**	0.10	**1.40**	0.30
7.	Mn	**2.09**	**0.12**	**0.92**	0.10
8.	Ni	BDL	BDL	BDL	0.02
9.	Pb	BDL	BDL	**0.02**	0.01
10.	Se	BDL	BDL	BDL	0.01
11.	V	BDL	BDL	BDL	-
12.	Zn	0.02	BDL	0.06	5

All values are in mg/L. The values in blue colour indicates exceedence to the Standards.

CPCB Inspection Report (2019), Annexure E.

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Chapter 6

Conclusion and Recommendations

(Carrying Capacity, Damage Assessment and Mechanism for operating Hazardous Industries in the Wazirpur Industrial Area)

6.1 Background

This matter of M.A. No. 1715/2018 & M.A. No. 20/2019 in Execution Application No. 11/2017 in OA No. 159/2013; All India Lokadhikar Sangathan Vs. Govt. of NCT of Delhi & Ors., is related to illegally operating stainless steel pickling (SSP) industries in violation of Master Plan of Delhi in spite of orders of the Hon'ble Supreme Court in M.C Mehta Vs. Union of India & Ors. (2004) 6 SCC 588. and were required to be shifted out of Delhi, within three years from 23.09.2013.

The major issues observed by Hon'ble NGT, in this matter, are as follows:

i) There is no amendment to the Master Plan.

ii) No study has been carried out, which can be the basis to justify amendment of the Master Plan.

iii) Mere setting up of ETPs/CETP is not enough to permit activities of prohibited industries in violation of the Master Plan.

iv) Huge amount of hazardous waste is being generated and dumped and is not being scientifically disposed.

Hon'ble NGT in its order dated 07/02/2019 directed as under:

"However, before considering the matter further, it is necessary to ascertain the impact of the industry on the air quality of Delhi, which is already polluted, on river Yamuna which is also subjected to severe pollution by several polluting activities, industrial as well as municipal, impact on the green belt and the inhabitants on account of huge hazardous waste already dumped and further potential for generation of such hazardous waste, if the pickling industry is to be allowed and the mechanism, if any, to deal with the poisonous liquids flowing in the area as depicted in the photographs caused damage to the environment, including the ground water. It is also necessary to ascertain the quantification of damage already caused and the cost of restoration of the environment, required to be incurred.

The above question may also require conducting of carrying capacity of the area on the anvil of sustainable development in permitting such hazardous and polluting activity."

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The CSIR-NEERI was assigned the task of conducting the study of the Wazirpur Industrial area, by the CPCB in compliance of NGT Order, to address/conclude on the following points:

i) Carrying Capacity of the Wazirpur Industrial Area;

ii) Assessment /quantification of the damage already caused to the environment and the cost of restoration;

iii) Mechanism by which pickling and other hazardous industries could be allowed in the Wazirpur Industrial Area without affecting the environment.

Keeping the above in view, CSIR-NEERI carried out a detailed study, which has been presented in the previous Chapters of this report, and the conclusions drawn with respect to the above three points and recommendations made for environmental sustainability of Wazirpur Industrial Area are presented in the following sections.

6.2 Carrying Capacity of the Wazirpur Industrial Area

The carrying capacity with respect to Air, Water (Drains and Ground Water), CETP, CETP Sludge & Soil in the Park, outside the CETP Premises is presented here.

6.2.1 Air

Overall average (average of daily average concentrations at 3 locations) concentrations of PM_{10}, $PM_{2.5}$, NO_2 & SO_2 at Wazirpur Industrial Area (WIA) were found to be 234 $\mu g/m^3$, 147 $\mu g/m^3$, 72 $\mu g/m^3$ and 6 $\mu g/m^3$ respectively, whereas these values for Delhi (average of 17 locations) were found to be 228 $\mu g/m^3$, 156 $\mu g/m^3$, 58 $\mu g/m^3$ and 9 $\mu g/m^3$, respectively.

Further analysis of two CAAQMS data of Ashok Vihar and Wazirpur sites indicates that PM_{10} & $PM_{2.5}$ levels are high (exceeding limits) during post-monsoon, winter and summer seasons and the trend is similar to that of the entire Delhi.

Therefore, it may be concluded that higher levels of PM_{10} and $PM_{2.5}$ are the outcome of various sources of air pollution in Delhi & NCR, and not limited to the activities taking place in the Wazirpur Industrial Area only.

6.2.2 Water

Drains: It was observed during the study that a PWD storm water drain is flowing into the WIA. This PWD storm water drain is carrying storm water/ wastewater/ sewage water from the up-stream of the WIA, and also from the WIA. The study team also observed that some of the individual industrial units are discharging the water/waste

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water into the storm water drains of the area. These storm water drains are ultimately mixing with the PWD drain entering the WIA and flowing out of the WIA without treatment. The average flow of the storm water drain as observed during the study was around 15 MLD.

pH of the drain water was found acidic in nature. The water quality characteristics of the drain water were almost similar to the waste water reaching the CETP through the conveyance system. This indicates that some of the individual units in the WIA are either not connected to the CETP conveyance system or they are discharging the untreated/partially treated industrial effluent into the storm water drains of the WIA. The untreated wastewater of storm water drain leads to the Yamuna river, thus causing water pollution.

The total pollution load (in terms of kg/hr or kg/day) of storm water drain was found to be much higher (upto 8 times with respect to different parameters) as compared to the wastewater stream passing through the CETP.

The discharge of industrial effluents in the storm water drains of the Wazirpur Industrial Area, is one of the most significant limiting factor w.r.t. carrying capacity of WIA. DPCC is required to identify such industries/discharges, to ensure that no industrial effluent is discharged illegally in the storm water drains. All the industrial effluent must be routed through CETP, for treatment and achievement of prescribed standards, before discharging into the environment.

In view of the above, at present, the WIA can not be considered to have the carrying capacity to operate polluting industries, which generate acidic effluent containing hazardous heavy metals, till the time illegal discharges in the storm water drain ultimately leading to River Yamuna are stopped and all the effluent is routed to CETP, to achieve the prescribed norms before anything is discharged into the environment.

Ground Water: *With regard to ground water quality, it was found that the concentration levels of different parameters in WIA are less as compared to the levels observed in North West Delhi district. However, nitrate level was found to exceed the permissible limits, like other districts, indicating that it may be of geo-genic nature.*

6.2.3 Existing CETP

The effluent flow to CETP was found in the range of 3.0 - 3.7 MLD, which is very less (about 14%) as compared to the design capacity of 24 MLD. pH of the waste water reaching the CETP was highly acidic in nature, which indicates that some of the industrial units did not neutralize the acid before its discharge into the CETP conveyance system. However, the pH of the treated water from the Wazirpur CETP is conforming to the discharge standards. Evaluation of the efficiency of CETP indicated that Wazirpur

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CETP is capable to achieve the effluent discharge standards for all the chemical parameters except for Fluoride, and FDS (fixed dissolved solids).

The CETP requires improvement in performance with respect to the discharge standards for FDS and fluoride. This becomes more significant in view of the fact that presently CETP is operated at just around 14% of its capacity. However, any addition of effluent load will further require proper assessment/ evaluation of CETP for its upgradation requirement (if any) to meet the standards for all the parameters.

Utilization of CETP treated water was found to be very minimal/ negligible and after treatment, the treated water ultimately meets River Yamuna.

6.2.4 CETP Sludge

A huge amount of sludge is generated in the CETP (about 3 - 4 tons/day), which is at present is being stored in the CETP premises. This sludge contains high concentration of different metals like Cr, Cu, Fe, Mn, Ni, Pb, & Zn, which are removed from the wastewater in the treatment process. Presently, about 13000-15000 tons of sludge is stored within the premises of CETP, accumulated over the years, in the absence of any TSDF (Treatment, Storage and Disposal Facilities) in Delhi.

Apart from the above, Individual Industrial Units, generating acidic effluents, also generate hazardous sludge during preliminary treatment to neutralize the acidic effluent, before discharging to the conveyance system leading to the CETP. This hazardous sludge generated by individual industrial units is stored within their premises, in the absence of any TSDF in Delhi. The sludge (fresh as well as stored) is supposed to be disposed-off at a hazardous waste landfill site (TSDF), which is yet to be developed by DSIIDC.

The sludge can be utilized to manufacture bricks under the Rule 9 of Hazardous and Wastes (Management and Transboundary Movement) Rules, 2016. A trial is being made in this regard at M/s Bhiwadi Jal Pradushan Nivaran Association, Alwar, Rajasthan as per documents provided by CETP Society (**Annexure 6.1**). DSIIDC and CETP Society should explore the possibility of manufacturing bricks/ tiles/ blocks etc. out of sludge generated/ stored at the Wazirpur CETP, by involving an institute with expertise in this field such as CSIR-CBRI (Central Building Research Institute, Roorkee) / CSIR-CRRI (Central Road Research Institute, New Delhi).

Since, at present, there is no TSDF in Delhi and the quantity of hazardous sludge is expected to go up considerably, if the industries which are closed at the moment, are allowed to operate without any proper arrangement for disposal of Sludge. Besides this, routing the illegally discharged effluent in the storm water

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drains of WIA, through CETP, will further add to the quality of hazardous waste. In the absence of TSDF and any other option for disposal of hazardous sludge, Wazirpur Industrial Area can not be considered to have carrying Capacity w.r.t . Hazardous waste disposal. Under the circumstances, the CETP and the individual industry have to make adequate and safe provision for storage of sludge generated within their premises, till TSDF is developed.

On the same issue, possibility of transport/disposal of CETP sludge outside Delhi was explored. It was intimated by DPCC that M/s Green Gene Enviro Protection & Infrastructure Private Limited, Village Sighpur, Near Toll Naka, Tehsil Kapasan, Distt. Chittorgarh, Rajastahan-312207, has been granted authorization for collection and transportation of sludge from CETPs in Delhi, and for Pre-processing, Co-processing and disposal in Cement Plants of the said firm at Chittorgarh, Rajasthan vide HWM Authorization No. DPCC/HWM/2020/3096-3104 dated 04/02/2020 for a period of one year. This is based on the authorization granted to M/s Green Gene Enviro Protection & Infrastructure Private Limited by Rajasthan Pollution Control Board under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, with the condition that Authorization will cease if TSDF for hazardous waste in Delhi is made operational within one year (**Annexure 6.2**).

However, examination of the authorization granted to M/s Green Gene Enviro Protection & Infrastructure Private Limited by Rajasthan Pollution Control Board under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, for operating a facility for collection, generation, pre-processing, storage, waste processing of Hazardous waste, vide No. F(HSW)/Chittorgarh (Kapasan)/2246 91)/2017-2018/4290-430, dated 25/9/2018 indicated that the said agency is authorized to dispose off only 0.5 MT/annum of chemical sludge from wastewater treatment (**Annexure 6.3**).

Therefore, with 13000-15000 MT sludge stored in Wazirpur Industrial Area (WIA) CETP, this agency may take 26000-30000 years to lift the sludge from CETP and hence, the authorization granted by DPCC to this agency as a temporary arrangement is not expected to serve any purpose of creating any carrying capacity with respect to the Hazardous Sludge Disposal, unless the agency is authorized to take away substantial quantity, so as to clear all the sludge in a year or so.

6.2.5 Soil (Park outside the CETP Premises)

Soil samples were collected from the Park outside the CETP premises at a depth of 1 ft and 2 ft. and were analysed for various physico-chemical parameters and metal content. Leaching potential of the soil samples was also assessed.

Metal content in soil samples collected from the Park outside the CETP premises in the present study was compared with the earlier study conducted by CPCB in 2019, wherein samples were collected from 9.5 ft. to 10.5 ft. depth. It was found that soil at 9.5-10.5 ft, appears to be a layer of sludge/ waste material mixed with soil. Evaluation of the

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data collected in both the studies indicates that the concentration of certain metals like Cr, Cu, Fe, Mn, Ni and Zn was relatively high at the depth of 10.5 ft and 9.5 ft , as compared to the contents of the metals observed at the 1-2 ft depth at the right-side corner of the Park.

Overall high level of metal content in the right side corner soil samples indicate the possibility of untreated water discharge or sludge dumping without taking measures to prevent contamination of soil. Non-leaching behaviour of metals observed at a depth upto 1-2 ft observed in the present study indicates that leaching might have already occurred beyond 2 ft. or stabilized. The quantum of damage occurred to the soil at lower depths requires further study/investigation by an expert agency, to suggest a proper restoration plan, if required. Otherwise, the said land/Park may be developed with green belt or for creating a facility for utilization of hazardous sludge generated in the Wazirpur Industrial area for brick manufacturing.

In view of the limitations explained above w.r.t. Water, Soil, CETP and hazardous waste disposal, allowing hazardous industries generating acidic effluents and chemical sludge such as Pickling and Electroplating may not be recommended, unless or until these limitations are removed to create adequate assimilative/ carrying capacity.

6.3 Assessment / Quantification of the Damage Already Caused to the Environment and the Cost of Restoration

During the study conducted by CSIR-NEERI, the damage caused to the Environment has been observed w.r.t. the following:

i) Damage to Surface water, due to illegal discharge of industrial effluents in the storm water drain, which is leading to Yamuna River,

ii) Damage to surface water through the discharge of treated water from CETP without complying with the prescribed standards for FDS & Fluoride, leading to Yamuna River

iii) Damage to the soil in the park outside the CETP premises, due to illegal & un-scientific dumping of hazardous chemical waste without taking measures to prevent contamination of Soil (during 2008-2015).

Accordingly, the assessment of the damage caused to the environment has been made, to recover the damage cost, for the restoration of the environment.

6.3.1 Assessment / Quantification of Damage caused to Surface Water/ Storm Water

The water quality characteristics of the drain water were found to be almost similar to that of the wastewater reaching the CETP through the conveyance system, which indicated that some of the individual units in the WIA are either not connected to the CETP conveyance system or they are discharging the untreated industrial effluent into the storm water drains of the WIA.

Though pH and the heavy metals are the main pollutants of concerns in the hazardous industries, generating acidic effluents such as pickling and electroplating industries, the damage assessment is considered in a holistic manner for the non-treatment of the effluent going into the surface water/storm water drains.

Total damage cost is considered as the cost saved/ benefits achieved by the concerned authority by not having proper wastewater/sewage treatment system in totality to the discharge standards for all the parameters. The key factors considered for environmental compensation/ damage cost are the capital cost for the treatment facility, O&M cost and anticipated environmental damage occurred over 5 years period as:

Environmental Damage Cost = Average capital cost of wastewater treatment facility + O & M Cost + Environmental damage occurred

Approximate capital cost for treatment of 15 MLD wastewater = Rs. 20.0 Cr.

Operation & Maintenance cost (@ Rs. 30 Lakhs/month) = Rs. 3.6 Cr./year

Total O&M Cost for 5 Years = Rs. 18 Cr.

Environmnetal damage/ penality = Equivalent to O & M Cost

Total lum-sum Environmental Damage Cost for 5 years = Rs. 20.0 Cr. + Rs. 18.0 Cr. + Rs. 18.0 Cr. **=> Rs. 56.0 Cr.**

The above cost does not include the cost of land for constructing the wastewater treatment facility.

Since SPCBs/PCCs are required to ensure that no industrial discharge/ illegal discharge is made into the storm water drains, Rs. 56.0 Crores towards Environmental Damage Cost as calculated above towards the damage caused to surface water through illegal discharge of industrial effluent/other wastewaters containing hazardous chemicals in the storm water drain, may be imposed. DPCC may identify the sources of illegal discharges/ Illegal Industries involved in discharging the industrial effluent/other wastewaters containing hazardous chemicals to recover the total Environmental Damage Cost for restoration of the environment of the Wazirpur Industrial Area.

Further, DPCC may be asked to ensure that discharge/ illegal discharge of industrial effluent/ other wastewaters containing hazardous chemicals into the

storm water drains is immediately stopped, failing which, additional Environment Damage Cost of Rs. 76.7 Lakhs/ month, as estimated above, may be imposed till the time discharge into the storm water drains, is stopped.

Additional deterrent damage cost to prevent illegal discharge in future: Total of Annual O&M cost plus environmental damage cost and 10% on the capital cost of treatment facility; i.e. Rs. 3.6 + Rs. 3.6 Cr.+ Rs. 2.0 Cr. => Rs. 9.2 Cr./ annum (Rs. 76.7 Lakhs/ month).

6.3.2 Assessment/Quantification of Damage caused to Surface Water through discharge of Treated Water from CETP, without Complying with the Prescribed Standards for FDS and Fluoride

CSIR-NEERI carried out the overall performance evaluation of the CETP for the present operational practice and found that the CETP performed well with respect to removal of TSS (99%), BOD (92%), COD (87%) and metals (96-99.5%), except for Mn (85%) and Sr (25%). The system also helped in reduction of chemical parameters like chlorides, sulfates, nitrates, phosphates, ammonia and sulfide considerably (65-77% reduction). However, TDS & FDS levels increased as a result of required chemical dosing of lime and polyelectrolyte. pH raised to meet the discharge norm. ***All the physico-chemical parameters and metals were found to conform to the discharge norms, except for FDS and Fluoride, which were found to be beyond prescribed norms. Further, the CETP was found to operate only at 14% of its designed capacity of 24 MLD.***

It has been observed that concentrations of both the parameters, FDS and Fluoride were high in the treated water from CETP as compared to the inlet water to the CETP. This could be due to the following reasons:

- The treatment regime in the CETP is Physico-chemical wherein the coagulants are added to remove the impurities. ***It appears that the coagulants are being added to the wastewater to remove the impurities; however, the precipitated impurities are not being removed efficiently.***
- During the survey, it was also found that a large amount of sludge and silt has been accumulated in the treatment units of the CETP. It appears that this sludge and silt is increasing the FDS and Fluoride concentration in the treated water from the CETP. After the addition of coagulant and flocculant, the waste water is passed through the tube settler and then to Dual Media Filter and Activated Carbon Filter. ***It appears that these units are not working well at Wazirpur CETP and needed maintenance for optimal operation.***

Proper cleaning and change of some filters of the CETP would have helped in achieving the discharge norms for these parameters, to ensure that the

receiving environment is not affected through the discharge of CETP treated water.

In view of the above, cost saved on maintenance and cleaning multiplied by an appropriate deterrent factor, i.e. Rs. 1.5 Crores (as calculated below) is recommended to be considered as environmental damage cost, to be imposed on CETP, for not complying with the prescribed norms.

Environmnetal Damage Cost to be imposed on CETP: Rs. 50 Lakhs (cost saved on maintenance) + Rs. 25 Lakhs as interest (@10%/year) x 2 as deterrent factor = Rs. 150 Lakhs (i.e. Rs. 1.5 Cr.).

Further, CETP Operator may be asked to clear the silt/sludge within 3 months, to improve the efficiency of CETP in order to comply with the prescribed parameters, to prevent further damage to the environment, failing which EC may be imposed by DPCC based on EC methodology developed by CPCB.

6.3.3 Assessment/Quantification of Damage to Soil in the Park outside CETP Premises

The study conducted by CSIR-NEERI at a depth of 1ft. – 2ft. and by CPCB at a depth of 9.5 ft.-10.5 ft. indicated overall high level of metal content in soil samples due to possible dumping of hazardous chemical sludge without taking measures to prevent contamination of soil. Non-leaching behaviour of metals observed at a depth upto 1-2 ft observed in the present study indicates that leaching might have already occurred beyond 2 ft. However, the quantum of damage occurred to the soil at lower depths requires further study/investigation to suggest a proper restoration plan.

CPCB's "Guidelines on Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Wastes and Penalty" (**Annexure 6.4** with relevant portion only), specifies an amount of Rs. 20 lacs - Rs. 3.5 Crores (depending on the small dump to large dump covering an area of more than 100 m^2) for Site Assessment/ Risk Assessment w.r.t. Dumping of hazardous wastes in Open grounds without secondary containment and an amount of Rs. 1 Crore – Rs. 25 Crores for remediation.

Since the area of land directly affected in this matter is about 2000 m^2, it is recommended that an amount of Rs. 3.5 Crores may be imposed for Site Assessment/ Risk Assessment to be made by an expert agency and for preparing a remediation plan.

Based on the documents examined by CSIR-NEERI on this issues, it was observed that the land situated adjoining to the boundary wall and entrance of the CETP Wazirpur Plant (presently referred as CETP Park), was identified for developing it as the temporary hazardous waste storage facility, wherein some hazardous waste was already dumped, any time during 2008-2015. Therefore, dumping of CETP sludge in open area in front of CETP premises was known to all the concerned Authorities/Departments, however, no timely action and measures were taken to prevent the damage to the soil.

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In view of the above, an Environmental Cost of Rs. 3.5 Crore is proposed for making site assessment/risk assessment of the contaminated site by an expert institute and for preparation of remediation plan. This may be recovered proportionately from the Agencies involved in Operation of CETP during 2008-2015.

6.4 Mechanism for Allowing Pickling and Other Hazardous Industries in the Wazirpur Industrial Area without affecting the Environment

In view of the fact that the Individual Industries in the Wazirpur Industrial Area have installed Primary ETP, to neutralize the acids and remove metal contaminants, before conveying the effluent to CETP for further treatment; and CETP is operating at only 14% capacity and has the adequate hydraulic treatment capacity to take care of additional quantities of effluent, Pickling and other hazardous industries could be allowed in the Wazirpur Industrial Area without affecting the environment, ***only if excluded from the negative list of Master Plan of Delhi-2021 (MPD-21) by Union Urban Ministry based on the applicable criteria,*** subject to the following mechanism/conditions, within the available assimilative/ carrying capacity of WIA:

1. ***Illegal discharge of Industrial Effluents into the storm waters is stopped*** and all the effluent is routed through CETP only. DPCC is required to ensure the stoppage of all the illegal discharges into the environment.

2. ***CETP is upgraded to enhance efficiency*** w.r.t. treatment and achievement of norms for different parameters, with additional pollution load, expected after starting operation of such industries.

3. ***Arrangement for disposal of Hazardous sludge already stored within the premises of CETP & Individual Industrial Units and also the additional higher quantity of hazardous sludge***, to be generated is made either in TSDF which is yet to be established by DSIIDC besides creating an adequate facility to store fresh Hazardous sludge at CETP or Establishment of Common Acid Recovery Plant, for recovery & reuse of acids in the process with the minimised generation of hazardous sludge.

4. Spent acid generated from acid bath can be treated separately by installing an appropriate acid recovery plant in CETP premises.

5. Typical pollution load from a pickling industry with 5 TPD capacity has been presented in **Table 6.4.1**, which may be used by DPCC to estimate the number of pickling units, which can be allowed to operate with the assimilative capacity, if permitted by Hon'ble NGT.

Table 6.4.1: Waste Generation Scenario from a Typical 5 TPD Pickling Industry

Sr. No.	Item	Value
1.	SS Production Capacity, tons/day	5
2.	Sulfuric Acid Consumption, litres (@10L/ton)	50
3.	Hydrochloric Acid Consumption, litres (@10L/ton)	50
4.	Water Consumption, litres (@2000 L/ton)	10,000
5.	Domestic Water Consumption, litres (@2000 L/unit)	2,000
6.	Total Wastewater Generation, (considering 100% in effluent), litres	12,100
7.	Spent Acid Generation from Acid Bath, litres (@4 L/ton)	20
8.	Spent Acid Sludge Generation from Acid Bath, kg (@2 kg/ton)	10
9.	Scale/impurities Generation from Washing, kg @15 kg/ton	75

General Measures Suggested for Running Polluting Industries

In general, to run the polluting industry in the WIA, the following set of measures may be followed:

1. All the industries to ensure installation and operation of air pollution control system to comply with emission norms of DPCC.
2. All the industries to ensure installation and operation of the primary-effluent treatment plant to comply with discharge norms of DPCC.
3. All the industries to conduct quarterly evaluation of the adequacy of pollution control systems in the 1st year and then on six-monthly basis from 2nd year onwards - Third party evaluation/ guidance preferably by reputed research/ academic institutions.
4. Make provision for separate collection of spent acid for common storage/ treatment at CETP.
5. Make provision for separate collection of spent sludge/PETP sludge for common storage/ treatment at CETP. CETP Society to create a facility with the financial support of industries and maintain related industry-wise daily records for ease of operation on day to day basis, which ultimately shall be sent to TSDF, being developed by DSIIDC.
6. All the industries to workout plan to minimize consumption of fresh water and hence wastewater generation at the individual industry level.
7. No industry shall dispose/throw of any solid/liquid waste in the parks & gardens/ on land, and hazardous waste to be stored and disposed off at TSDF only.
8. Plantation/greenery in WIA needs to be increased to a minimum 10% of the total area of WIA, ensuring regular monitoring and growth of plants.

9. The industries may be required to maintain daily records of the following, besides complying with the terms of the consent to operate granted by DPCC:
    a. Metal processing/production
    b. Acids consumption
    c. Water consumption
    d. Wastewater Generation/ discharge
    e. Caustic Soda/other ETP chemicals consumption
    f. Industry operating hours
    g. APCS operating hours
    h. ETP Operating hours
    i. Quantity of Spent Sludge generation
    j. Disposal of Spent Sludge
    k. Quantity of ETP Sludge generation
    l. Disposal of ETP Sludge
    m. Quantity of scaled material generation
    n. Disposal of scaled material
    o. Power consumption
    p. Any other relevant aspect.

6.5 Suggested Restoration Plan for Environmental Sustainability of WIA

The Environmental Damage cost may be used for the restoration of the environment of Wazirpur Industrial Area. The restoration plan to be prepared by concerned agencies may include the following:

6.5.1 Air Quality Improvement Plan

1. All the industries shall strictly comply with the applicable stack emission norms.
2. All the DG sets users (industries/commercial establishments etc.) shall strictly comply with the applicable emission norms.
3. All the commercial & private vehicles entering into the Wazirpur Industrial area shall have valid Pollution Under Control (PUC) certificate.
4. All the internal roads shall be properly maintained and cleaned regularly to avoid re-suspension of road dust during vehicles movement.
5. Adequate provision (with basic amenities) for parking of commercial vehicles shall be made to avoid congestion on roads.

6. Sink for air pollution shall be created by increasing the green cover in the Wazirpur industrial area to the extent possible (upto 10% from the existing level of 5.5% in WIA).
7. Use of wood, coal, dung cake etc. shall be prohibited in the Wazirpur Industrial Area. Further, in order to assess the magnitude of environmental pollution caused by slums in the WIA, detailed social analysis of the slum area by an expert agency may be required.

6.5.2 Wastewater Management Plan

The required wastewater treatment and disposal approach to be adopted for Wazirpur Industrial Area, emphasizing the need for proper segregation of wastewater stream and utilization of treated water is depicted in **Fig. 6.5.1**.

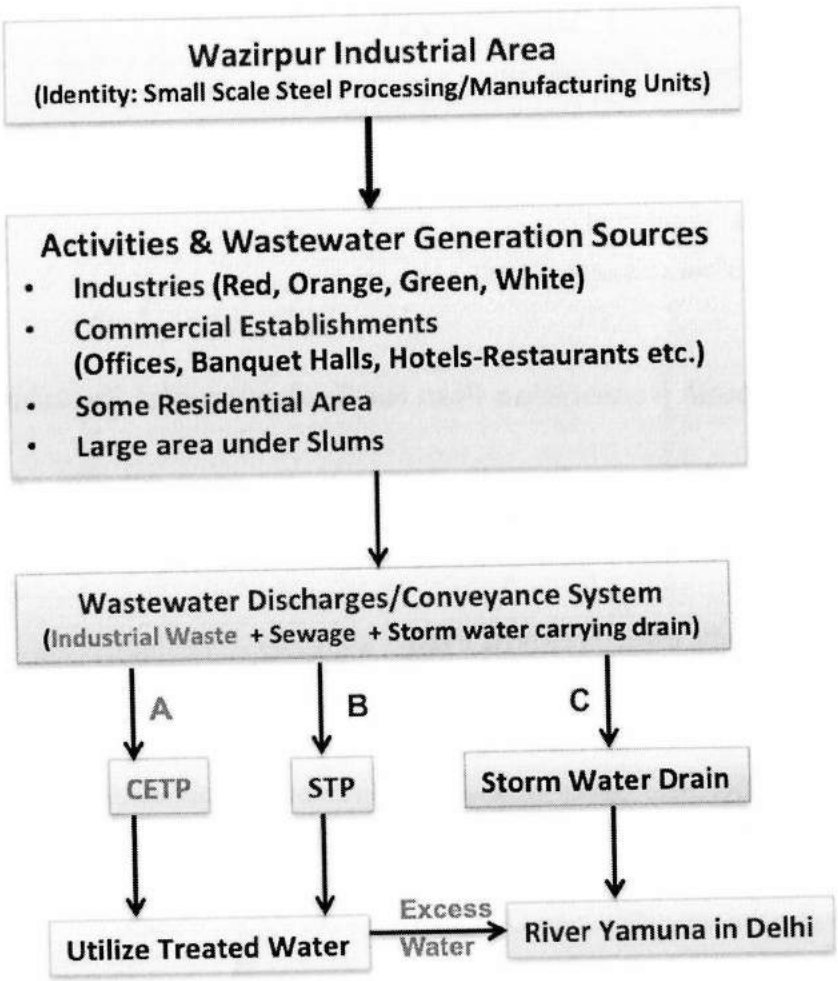

Fig. 6.5.1: Suggested Wastewater Stream Segregation, Treatment and Disposal Approach for Wazirpur Industrial Area

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1. All the indutries shall strictly follow the wastewater discharge norms as per the consent to operate issued by DPCC.
2. All the drains carrying industrial wastewater shall be connected to the drain/ conveyance system/ channel leading to CETP for appropriate treatment.
3. Sewage generated in the Wazirpur Industrial Area shall flow through the sewage network and shall lead to the STP for treatment.
4. The storm water drain shall be carrying only storm water, and any mixing of industrial wastewater/ sewage shall be treated as a violation.
5. The CETP Society shall ensure treatment of industrial wastewater to the applicable discharge norms of MoEF&CC/CPCB.
6. It is pertinent to mention that CETP was designed about 2 decades ago by CSIR-NEERI to cater the need of water-polluting industries (including pickling industries) in the WIA to the capacity of 24 MLD.
7. Once all the wastewater streams are connected to the CETP, it will further require an assessment of the performance of existing CETP units and subsequently, upgradation of the CETP shall be worked out to meet the applicable discharge norms.
8. CETP Society shall install necessary online monitoring system for the parameters suggested by DPCC/ CPCB.
9. CETP Society shall explore the possibility of utilization of treated water to the extent possible.
10. CETP Society shall maintain daily records containing details of chemicals consumption, wastewater flow, power consumption, sludge generation, operating hours etc.
11. CETP Society shall carry out third party evaluation of CETP performance, preferably by reputed research/ academic institution on six-monthly basis.

6.5.3 Hazardous Waste Management Plan

Depending upon the wastewater quality characteristics and amount of chemical dosing required, a huge amount of sludge is generated (about 3-4 tons/day) in the CETP, which is at present being stored in the CETP premises. This sludge contains high concentration of different metals like Cr, Cu, Fe, Mn, Ni, Pb, & Zn, which are removed from the wastewater in the treatment process. Presently, about 15000 tons of sludge is stored in the CETP premises, accumulated over the years.

The CETP sludge (fresh as well as stored) is recommended to be disposed-off at the hazardous waste landfill site (TSDF), being developed by DSIIDC. Besides, all the pickling as well as other hazardous waste generating industries/ activities have stored hazardous waste in their premises, which shall also be disposed off at the TSDF. The overall approach for hazardous waste generation, management and ultimate disposal is depicted in **Fig. 6.5.2.**

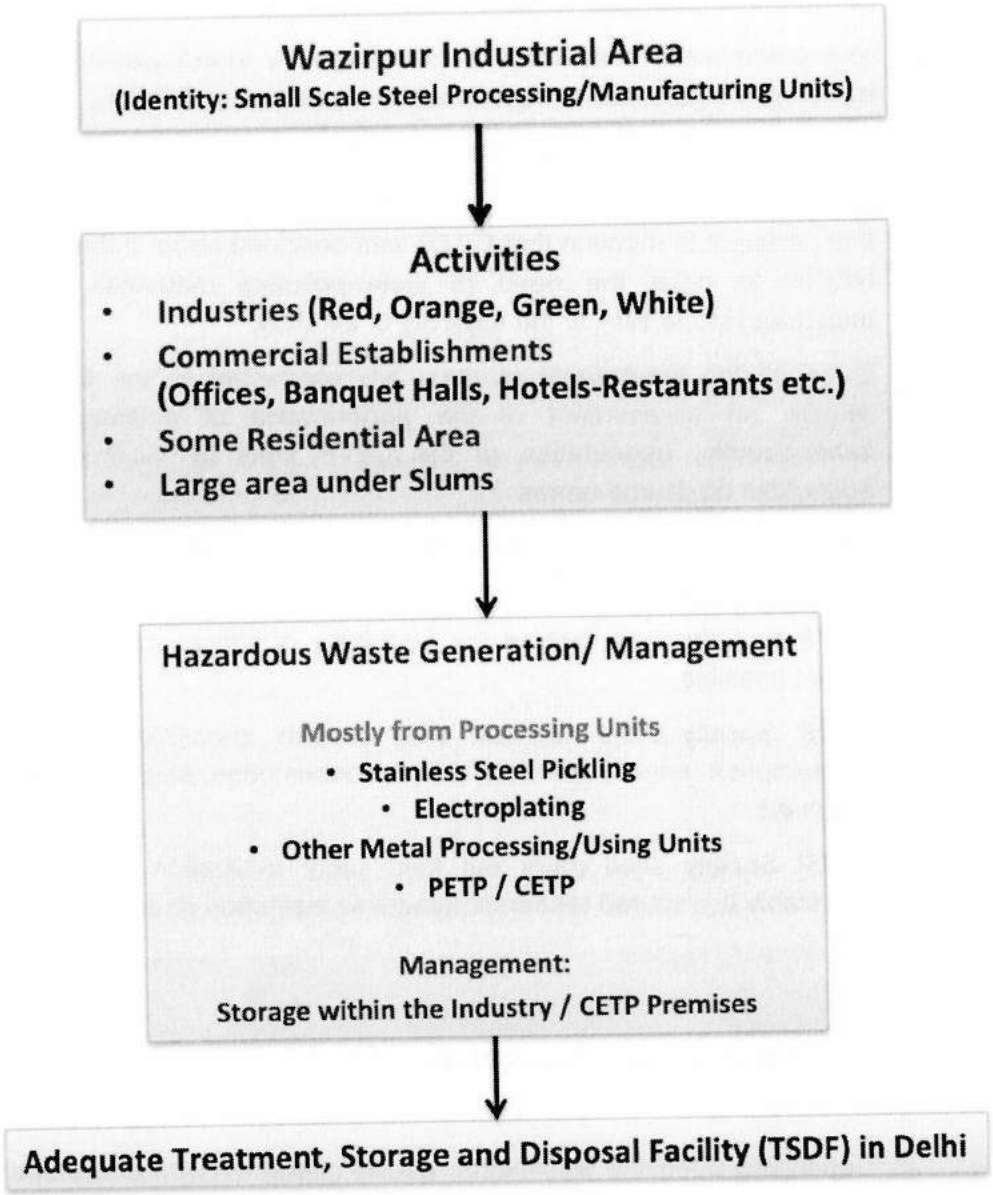

Fig. 6.5.2: Hazardous Waste Generation, Management and Ultimate Disposal Approach

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6.5.4 Post Implementation Assessment

Detailed analysis of environmental situation prevailing in the Wazirpur Industrial Area and also understanding the economic and social importance of the long-existing industrial area for Delhi and the country, certain improvement plans as suggested in earlier sections shall be required to be taken up by the concerned authorities/department as well as industries at different levels to ensure environmental sustainability of the Wazirpur Industrial Area. Further, various red and orange category industries (particularly pickling & electroplating units) need to modernize their processes such that waste generation is minimized, and the wastes (air, liquid & solid/hazardous) generated are taken care at the source itself to the extent possible.

This will necessitate establishing green industry norm for the specific sector through benchmarking in terms of consumption of various resources (raw materials, water, fuel, power etc.) and wastes generation per ton of product manufacture.

Therefore, it will be necessary that the dynamic framework is used for assessing the carrying capacity of the Wazirpur Industrial Area after implementation of suggested measures. The study should encompass compliance status by red & orange category industries as well as other large establishments, assessment of environmental quality status w.r.t air quality, wastewater generation & treatment, CETP performance, ground water quality, solid/hazardous waste generation & management, soil and flora in parks & gardens, infrastructure network and socio-economic analysis. Various attributes and monitoring/ assessment from the carrying capacity point of view need to be periodically assessed and communicated.

DPCC and DSIIDC may coordinate with the assistance of CETP Society and other concerned stakeholders to ensure environmental sustainability of WIA in the long run.

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Annexures

Annexure 1.1

SPEED POST / Email

No: IPC-V(SSI)/2019/RA-1 June 21, 2019

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Maharashtra
Email: director@neeri.res.in

Sub : Submission of Techno-Commercial Proposal for conducting a study w.r.t. NGT Order dated 07/02/2019 in the matter of M.A. No. 1715/2018 & M.A. No. 20/2019 in Execution Application No. 11/2017 in OA No. 159/2013; All India Lokadhikar Sangathan Vs Govt. of NCT of Delhi & Ors.

Sir,

This has reference to the Hon'ble NGT order dated 07/02/2019 related to Wazirpur Industrial Area, in the matter of M.A. No. 1715/2018 & M.A. No. 20/2019 in Execution Application No. 11/2017 in OA No. 159/2013; All India Lokadhikar Sangathan Vs Govt of NCT of Delhi & Ors (Copy enclosed). The main content of the order is :

"However, before considering the matter further, it is necessary to ascertain the impact of the industry on the air quality of Delhi which is already highly polluted, on river Yamuna which is also subjected to severe pollution by several polluting activities, industrial as well as municipal, impact on the green belt and the inhabitants on account of huge hazardous waste already dumped and further potential for generation of such hazardous waste, if the pickling industry is to be allowed and the mechanism, if any, to deal with the poisonous liquids flowing in the area as depicted in the photographs caused damage to the environment, including the ground water. It is also necessary to ascertain the quantification of damage already caused and the cost of restoration of the environment, required to be incurred.

The above questions may also require conducting of carrying capacity of the area on the anvil of sustainable development in permitting such hazardous and polluting activity.

To enable this to be done, we constitute an Expert Committee comprising representatives from a senior Scientist of CPCB, a senior Scientist of National Environmental Engineering Research Institute (NEERI) and a senior Scientist of IIT, Roorkee. The nodal agency will be the CPCB.

The Committee may visit the site and study the above issues and furnish a report to this Tribunal. If viability of such industries in the area is found, the conditions and precautions required in the matter may be mentioned."

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The Expert Committee constituted in the above matter has made the following recommendation:

"It is recommended to conduct a detailed study including assessment of carrying capacity considering all types of industries and other activities with potential of air, soil and water pollution generation in this industrial area, since Pickling is only one of the intermediate process industries linked with a number of other upstream and downstream industries in the region. This study will also involve evaluation of CETPs for suggesting better pre-treatment of pickling liquor, cleaner production, improved air pollution control measures and upgradation of CETPs for tertiary treatment including nitrogen removal. This study may be undertaken under the supervision of the Expert Committee constituted as per Hon'ble NGT Order in this matter and is estimated to take 6 months' time for completion of the study and preparation of the report."

Since one of the members (Dr. S.K. Goyal, Sr. Principal Scientist & Head, CSIR-NEERI Delhi Zonal Centre, A 93-94, Naraina Industrial Area, Phase I, New Delhi 110028) in the Expert Committee constituted as per orders of Hon'ble NGT, is from NEERI, it is proposed to get the above study, as recommended by the Expert Committee alongwith the quantification of damage already caused and the cost of restoration of the environment required *to be incurred besides covering other points of order passed by Hon'ble NGT,* conducted from NEERI for better co-ordination and supervision.

Therefore, NEERI is requested to submit the Techno-commercial proposal for conducting the above study at the earliest.

Yours faithfully,

(Ajay Aggarwal)
Additional Director & DH, IPC-V
pcissidivision7@gmail.com

Copy to:
Dr. S.K. Goyal
Sr. Principal Scientist & Head, CSIR-NEERI Delhi Zonal Centre,
A 93-94, Naraina Industrial Area, Phase I,
New Delhi 110028, Email: sk_goyal@neeri.res.in

Annexure 2.1

सी एस.आई.आर.- राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसन्धान संस्थान
दिल्ली क्षेत्रीय केंद्र, ए – 93, 94, फेज – I
नारायणा औद्योगिक क्षेत्र, नई दिल्ली – 110 028, भारत
मुख्यालय: नेहरू मार्ग, नागपुर – 440020, महाराष्ट्र

From:
Dr. S.K. Goyal
Sr. Principal Scientist & Head

CSIR-National Environmental Engineering Research Institute, Delhi Zonal Centre, A-93/94, Phase-I, Naraina Industrial Area, **New Delhi – 110 028, India**
Headquarter: Nehru Marg, Nagpur - 440020, Maharashtra

December 2, 2019

To,
Dr. Arun Mishra
Member Secretary
Delhi Pollution Control Committee (DPCC)
4 th & 5th Floor, ISBT Building,
GT Karnal Road, Kashmere Gate, Delhi
Email: msdpcc@nic.in

Sub: "Assessment of Carrying Capacity of Wazirpur Industrial Area with Possibility of Existence of Pickling Industries in the Region in an Environmentally Sustainable Manner"- Request for details of industries/other establishments located in the Wazirpur Industrial Area, New Delhi

Ref: Hon'ble NGT Order dated 18.7.2017 in the matter of O.A. No. 159/2013

Sir,

This has reference to the Hon'ble NGT order dated 18.7.2019 in the matter of O.A. No. 159/2013, All India Lokadhikar Sangathan Vs Govt. of NCT, wherein CPCB was directed to carry out the above study. CPCB in-turn entered into MoU with CSIR-NEERI to undertake the study.

The study involves mapping of all the industries (including pickling industries) with process details, consumption and product details, waste generation etc. This also includes mapping of other establishments in the industrial area.

It is therefore, requested to kindly share the relevant details of all the industries/ establishments located in the Wazirpur Industrial Area with their location marked on a map.

Copy of letter from CPCB is attached for your kind reference. The above information is requested at the earliest to maintain the time schedule. In view of urgency of matter, Staff from NEERI Delhi Office may be deputed for any assistance, if required.

Thanking You and wish best regards,

Your's sincerely,

(S.K. Goyal) 2.12.19

Copy to: Dr. Ajay Aggarwal, AD & Div. Head, IPC-V, CPCB, Delhi
(email: ipc5division.cpcb@gov.in).

Phone: +91 11-45609107; Telefax: +91 11-45609106; Email:sk_goyal@neeri.res.in;goyalneeri@gmail.com

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सी.एस.आई.आर.- राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसन्धान संस्थान
दिल्ली क्षेत्रीय केंद्र, ए – 93, 94, फेज -1
नारायणा औद्योगिक क्षेत्र, नई दिल्ली - 110 028, भारत
मुख्यालय: नेहरू मार्ग, नागपुर – 440020, महाराष्ट्र

From:
Dr. S.K. Goyal
Sr. Principal Scientist & Head

CSIR-National Environmental Engineering Research Institute, Delhi Zonal Centre, A-93/94, Phase-I, Naraina Industrial Area, **New Delhi - 110 028, India**
Headquarter: Nehru Marg, Nagpur - 440020, Maharashtra

December 2, 2019

To,
Er. Sharat Kumar
SE, DSIIDC,
Wazirpur Industrial Area,
Wazirpur, Delhi, 110052
Email: kumar.dsiidc@gmail.com

Sub: "Assessment of Carrying Capacity of Wazirpur Industrial Area with Possibility of Existence of Pickling Industries in the Region in an Environmentally Sustainable Manner"- Request for details of industries/other establishments located in the Wazirpur Industrial Area, New Delhi

Ref: Hon'ble NGT Order dated 18.7.2017 in the matter of O.A. No. 159/2013

Sir,

This has reference to the Hon'ble NGT order dated 18.7.2019 in the matter of O.A. No. 159/2013, All India Lokadhikar Sangathan Vs Govt. of NCT, wherein CPCB was directed to carry out the above study. CPCB in-turn entered into MoU with CSIR-NEERI to undertake the study.

The study involves mapping of all the industries (including pickling industries) with process details, consumption and product details, waste generation etc. This also includes mapping of other establishments in the industrial area.

It is therefore, requested to kindly share the relevant details of all the industries/ establishments located in the Wazirpur Industrial Area with their location marked on a map.

Copy of letter from CPCB is attached for your kind reference. The above information is requested at the earliest to maintain the time schedule. In view of urgency of matter, Staff from NEERI Delhi Office may be deputed for any assistance, if required.

The above information is also required for the study being done for DSIIDC.

Thanking you and wish best regards,

Your's sincerely,

(S.K. Goyal)

Copy to: Dr. Ajay Aggarwal, AD & Div. Head, IPC-V, CPCB, Delhi
(email: ipc5division.cpcb@gov.in)

Phone: +91 11-45609107; Telefax: +91 11-45609106; Email:sk_goyal@neeri.res.in;goyalneeri@gmail.com

सी.एस.आई.आर.- राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसन्धान संस्थान
दिल्ली क्षेत्रीय केंद्र, ए - 93, 94, फेज - I
नारायणा औद्योगिक क्षेत्र, नई दिल्ली - 110 028, भारत
मुख्यालय: नेहरू मार्ग, नागपुर – 440020, महाराष्ट्र

From:
Dr. S.K. Goyal
Sr. Principal Scientist & Head

CSIR-National Environmental Engineering Research Institute, Delhi Zonal Centre A-93/94, Phase-I, Naraina Industrial Area, **New Delhi – 110 028, India**
Headquarter: Nehru Marg, Nagpur - 440020, Maharashtra

December 2, 2019

To,
Shri Jay Kumar Bansal
President, Wazirpur CETP Society
Wazirpur Industrial Area,
Wazirpur, Delhi, 110052
Email: info@jaykumarenterprises.org

Sub: "Assessment of Carrying Capacity of Wazirpur Industrial Area with Possibility of Existence of Pickling Industries in the Region in an Environmentally Sustainable Manner"- Request for details of industries/other establishments located in the Wazirpur Industrial Area, New Delhi

Ref: Hon'ble NGT Order dated 18.7.2017 in the matter of O.A. No. 159/2013

Sir,

This has reference to the Hon'ble NGT order dated 18.7.2019 in the matter of O.A. No. 159/2013, All India Lokadhikar Sangathan Vs Govt. of NCT, wherein CPCB was directed to carry out the above study. CPCB in-turn entered into MoU with CSIR-NEERI to undertake the study.

The study involves mapping of all the industries (including pickling industries) with process details, consumption and product details, waste generation etc. This also includes mapping of other establishments in the industrial area. It is therefore, requested to kindly share the following:

1. Details of all the industries/ establishments located in the Wazirpur Industrial Area with their location marked on a map
2. Details of road network, water supply sanitation, power supply
3. Details of solid & Liquid waste generation and disposal facilities
4. Details of population residing within the industrial area
5. Details of pickling industry, locations, capacity, process adopted and quantity of wastes (air, wastewater & solid waste) generated, and waste management practices followed
6. Any other document relevant for the study

Copy of letter from CPCB is attached for your kind reference. The above information is requested at the earliest to maintain the time schedule.

Thanking you and wish best regards.

Your's sincerely,

(S.K. Goyal) 2-12-19

Copy to: Dr. Ajay Aggarwal, AD & Div. Head, IPC-V, CPCB, Delhi
(email: ipc5division.cpcb@gov.in)

Phone: +91 11-45609107, Telefax: +91 11-45609106, Email:sk_goyal@neeri.res.in,goyalneeri@gmail.com

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केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA

CPCB/IPC-V/NGT-OA-159/WIA/2019

November 25, 2019

TO WHOM IT MAY CONCERNED

Sub: Memorandum of Understanding (MoU) between NEERI and CPCB for conducting the study "Assessment of carrying capacity of Wazirpur Industrial Area with possibility of existence of pickling industries in the region in environmentally sustainable manner".

The Hon'ble NGT vide its order dated 18.7.2019, in the matter of O.A. No. 159/2013, All India Lokadhikar Sangathan vs Govt of NCT, directed to carry out study on the above cited subject. In order to execute the task, CPCB has entered into Memorandum of Understanding (MoU) with CSIR- NEERI, Delhi Zone, Naraina, New Delhi-110028 on November 6, 2019.

In order to carry-out this study/task, CSIR-NEERI may require information/data from the concerned stakeholder as well as may visit the industrial area/industries. CPCB hereby requests all the stakeholders to provide the information/data or to allow NEERI to visit their premises as when requested/required by NEERI. Kindly extend full co-operation to NEERI in order to execute the study for timely submission to Hon'ble NGT. Considering the time constraint, the matter may please be considered on priority.

A Aggarwal

(Ajay Aggarwal)
AD & Div. Head, IPC - V

'परिवेश भवन' पूर्वी अर्जुन नगर, दिल्ली-110032
Parivesh Bhawan, East Arjun Nagar, Delhi-110032
दूरभाष/Tel : 43102030, 22305792, वेबसाईट/Website : www.cpcb.nic.in

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Annexure 3.1

Leaching Studies

According to the Solid & Hazardous Wastes (Management and Transboundary Movement) Rules, 2016, Hazardous waste is defined as; any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes or substances.

"The SCHEDULE II [rule 3 (1) (17) (ii)] of Solid & Hazardous Wastes (Management and Transboundary Movement) Rules, 2016, lists, the waste constituents with concentration limits as detailed in Table I. Class A is based on leachable concentration limits using Toxicity Characteristic Leaching Procedure (TCLP) & Waste Extraction Test (WET) method. The testing method for list of constituents at A1 to A61 in Class-A is based on TCLP and for extraction of leachable constituents; USEPA Test Method 1311 is used. The testing method for list of constituents at A62 to A79 in Class-A is based on Waste Extraction Test (WET), Procedure is given in Appendix II of section 66261 of Title 22 of California Code regulation (CCR)."

The leaching potential of the elements present in the Sludge samples was determined using the TCLP & WET tests. Considering the nature of Sludge samples, only metals were analyzed in the leachates. The air dried sludge samples finely ground using a mortar and pestle, and passed through a sieve No.10 (2mm pore size)

Toxic Characteristic Leaching Procedure (TCLP)

This method is based on USEPA Method 1311-Toxicity Characteristics Leaching Procedure (TCLP), is applicable to the determination of mobility of metals and semi-volatile organic compound in solids. As per the recommended procedure the solid to liquid ratio of 1:20 was used. Extraction experiments included addition of 5 g solid sample in a polypropylene bottle followed by the addition of 100 mL of extraction fluid (5.7 mL of glacial acetic acid was diluted to 1000 mL milli Q water). 64.3 mL of 1 N NaOH was added and the pH adjusted to 4.93±0.2). The mixture was thoroughly mixed for 18 h on a rotary shaker at 30 "g at room temperature. This procedure was undertaken to maximize the detectability of inorganic constituents of the Sludge samples. The samples were allowed to settle for 30 min to sediment visible particles, and then filtered with a 2.5 mm filter (Whatman® No. 42) to remove suspended particles. Finally, each sample was centrifuged at 600 "g for 15 min at room temperature to collect the supernatant, and filter sterilized using 0.22 mm syringe filter.

The concentration of various metals in the leachates was determined using ICP-OES. (Model: Prodigy High Dispersion ICP, M/S Teledyne Leeman Labs).

Waste Extraction Test (WET)

Sludge samples were leached in the 1:10 solid to liquid ratio using of 0.2 M sodium citrate at pH 5.0 + 0.1. 10g solid sample was transferred to polypropylene flasks to which 100ml citrate buffer was added and was agitated for 48 hours on rotary shaker. Leached

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solution was then filtered and analyzed on ICP- OES. (Model: Prodigy High Dispersion ICP, M/s Teledyne Leeman Labs).

SCHEDULE II

[See rule 3 (1) (17) (ii)]

List of waste constituents with concentration limits

Class A: Based on leachable concentration limits [Toxicity Characteristic Leaching Procedure (TCLP) or Soluble Threshold Limit Concentration (STLC)]

Class	Constituents	Concentration in mg/l
(1)	(2)	(3)
A1	Arsenic	5.0
A2	Barium	100.0
A3	Cadmium	1.0
A4	Chromium and/or Chromium (III) compounds	5.0
A5	Lead	5.0
A6	Manganese	10.0
A7	Mercury	0.2
A8	Selenium	1.0
A9	Silver	5.0
A10	Ammonia	50*
A11	Cyanide	20*
A12	Nitrate (as nitrate-nitrogen)	1000.0
A13	Sulphide (as H_2S)	5.0
A14	1,1-Dichloroethylene	0.7
A15	1,2-Dichloroethane	0.5
A16	1,4-Dichlorobenzene	7.5
A17	2,4,5-Trichlorophenol	400.0
A18	2,4,6-Trichlorophenol	2.0
A19	2,4-Dinitrotoluene	0.13
A20	Benzene	0.5
A21	Benzo (a) Pyrene	0.001
A22	Bromodicholromethane	6.0
A23	Bromoform	10.0
A24	Carbon tetrachloride	0.5
A25	Chlorobenzene	100.0
A26	Chloroform	6.0
A27	Cresol (ortho+ meta+ para)	200.0
A28	Dibromochloromethane	10.0
A29	Hexachlorobenzene	0.13
A30	Hexachlorobutadiene	0.5
A31	Hexachloroethane	3.0
A32	Methyl ethyl ketone	200.0
A33	Naphthalene	5.0
A34	Nitrobenzene	2.0
A35	Pentachlorophenol	100.0
A36	Pyridine	5.0
A37	Tetrachloroethylene	0.7
A38	Trichloroethylene	0.5

(1)	(2)	(3)
A39	Vinyl chloride	0.2
A40	2,4,5-TP (Silvex)	1.0
A41	2,4-Dichlorophenoxyacetic acid	10.0
A42	Alachlor	2.0
A43	Alpha HCH	0.001
A44	Atrazine	0.2
A45	Beta HCH	0.004
A46	Butachlor	12.5
A47	Chlordane	0.03
A48	Chlorpyriphos	9.0
A49	Delta HCH	0.004
A50	Endosulfan (alpha+ beta+ sulphate)	0.04
A51	Endrin	0.02
A52	Ethion	0.3
A53	Heptachlor (& its Epoxide)	0.008
A54	Isoproturon	0.9
A55	Lindane	0.4
A56	Malathion	19
A57	Methoxychlor	10
A58	Methyl parathion	0.7
A59	Monocrotophos	0.1
A60	Phorate	0.2
A61	Toxaphene	0.5
A62	Antimony	15
A63	Beryllium	0.75
A64	Chromium (VI)	5.0
A65	Cobalt	80.0
A66	Copper	25.0
A67	Molybdenum	350
A68	Nickel	20.0
A69	Thallium	7.0
A70	Vanadium	24.0
A71	Zinc	250
A72	Fluoride	180.0
A73	Aldrin	0.14
A74	Dichlorodiphenyltrichloroethane (DDT), Dichlorodiphenyldichloroethylene (DDE), Dichlorodiphenyldichloroethane (DDD)	0.1
A75	Dieldrin	0.8
A76	Kepone	2.1
A77	Mirex	2.1
A78	Polychlorinated biphenyls	5.0
A79	Dioxin (2,3,7,8-TCDD)	0.001

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Note:

(1) The testing method for list of constituents at A1 to A61 in Class-A, shall be based on Toxicity Characteristic Leaching Procedure (TCLP) and for extraction of leachable constituents, USEPA Test Method 1311 shall be used.
(2) The testing method for list of constituents at A62 to A79 in Class- A, shall be based on Soluble Threshold Limit Concentration (STLC) and Waste Extraction Test (WET) Procedure given in Appendix II of section 66261 of Title 22 of California Code regulation (CCR) shall be used.
(3) In case of ammonia (A10), cyanide (A11) and chromium VI (A64), extractions shall be conducted using distilled water in place of the leaching media specified in the TCLP/STLC procedures.
(4) A summary of above specified leaching/extraction procedures is included in manual for characterization and analysis of hazardous waste published by Central Pollution Control Board and in case the method is not covered in the said manual, suitable reference method may be adopted for the measurement.
(5) In case of asbestos, the specified concentration limits apply only if the substances are in a friable, powdered or finely divided state.
(6) The hazardous constituents to be analyzed in the waste shall be relevant to the nature of the industry and the materials used in the process.
(7) Wastes which contain any of the constituents listed below shall be considered as hazardous, provided they exhibit the characteristics listed in Class-C of this Schedule :

Annexure 4.1

सी.एस.आई.आर.- राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसन्धान संस्थान
दिल्ली क्षेत्रीय केंद्र, ए - 93, 94, फेज -I
नारायणा औद्योगिक क्षेत्र, नई दिल्ली - **110 028, भारत**
मुख्यालय: नेहरू मार्ग, नागपुर – 440020, महाराष्ट्र

From:
Dr. S.K. Goyal
Sr. Principal Scientist & Head

CSIR-National Environmental Engineering Research Institute, Delhi Zonal Centre, A-93/94, Phase-I, Naraina Industrial Area, **New Delhi – 110 028, India**
Headquarter: Nehru Marg, Nagpur - 440020, Maharashtra

NEERI-DZC/ WIA-CC/2020/ **February 11, 2020**

To,
Shri J.K. Bansal
President CETP Society and
Industries Association, Wazirpur Industrial Area
Wazirpur, Delhi, 110052
Email: info@jaykayenterprises.org

Sub: "Assessment of Carrying Capacity of Wazirpur Industrial Area with Possibility of Existence of Pickling Industries in the Region in an Environmentally Sustainable Manner"- Request for information wrt individual pickling industry as per attached Questionnaire.

Ref: Hon'ble NGT Order dated 18.7.2017 in the matter of O.A. No. 159/2013

Sir,

The information provided for 23 pickling industries in the Wazirpur Industrial Area (out of total 105 units) in the form of pollution adequacy report was analysed and discussed with you today. It has been observed that some of the adequacy reports are as old as 20 years and many industries have undergone changes wrt different attributes over a period of time.

Therefore, in order to assess the current situation as well as prepare future scenario, it is required that the pickling industries who desire to continue to operate in the Wazirpur Industrial Area should provide details wrt their industry as per the attached Questionnaire.

It is requested you to kindly circulate this letter along with questionnaire among the pickling industry members of Wazirpur Industrial Area and submit the desired information **latest by February 15, 2020**.

Thanking you and wish best regards,

Your's sincerely,

Sgoyal

(S.K. Goyal)

Copy to: Dr. Ajay Aggarwal, AD & Div. Head, IPC-V, CPCB, Delhi
(email: ipc5division.cpcb@gov.in)

Phone: +91 11-45609107; Telefax: +91 11-45609106; Email:sk_goyal@neeri.res.in;goyalneeri@gmail.com

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Questionnaire Form – Feb 11, 2020

Details of Pickling Industries in Wazirpur Industrial Area

Sr. No.	Particular	Details
1.	Name of the Unit	
2.	Address of the Unit with coordinates	
3.	Contact details of Owner (Mobile No. & Email)	
4.	Year of Establishment	
5.	Consent to Establish/ Consent to Operate Permisison obtained from DPCC (attach copy of letter and form submitted)	
6.	Date of Certificate Issued by DPCC	
7.	Production Capacity (installed capacity, TPD)	
8.	No. of operating hours/day	
9.	No. of persons employed	
10.	Details of raw material used	
11.	Manufacturing Process (attach process details)	
12.	Quantity of acids used (per ton of product)	
13.	**Total Water Requirement (KL/day)**	
a	Industrial/ process	
b	Cooling	
c	Domestic	
d	Others	
14.	Source of Water	
15.	Wastewater/ Effluent discharge (KL/d)	
a	Industrial/process (Spent acid bath, Spent wash water, floor washing)	
b	Cooling (Scrubber)	
c	Domestic	
d	Others	
16.	Location of effluent discharge	
17.	Details of ETP Installed (attach unit wise details with capcity and process flow diagram)	
18.	Characteristics of Inlet to ETP and at outlet (Use separate sheet)	
19.	Discharge details of ETP Treated water	
20.	Whether effluent discharge rate/quality is monitored regularly & by whom	
21.	Test Reports of Last 2 samplings	
22.	Type and Quantity of solid waste generated	
23.	Quantity of ETP Sludge generated and disposal	
24.	Quantity of other solid wastes generated and disposal	
25.	Details of air pollution control system installed with last test report (please attach copy of complete report)	

Note: Details to be provided by all the individual Pickling Industry separately who wish to continue operation in Wazirpur Industrial Area. The information should reach in hard copy and softcopy by February 15, 2020 at email ID: pardeepchouhan07@gmail.com

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Annexure 4.2

Details of Adequacy Study Carried out for Air Pollution Control System Installed at Pickling Industries in Wazirpur Industrial Area

Sr. No.	Name of the unit	APCS Adequacy Study Conducted by	Report Issue Date
1.	Sagar Steel Industries	Prof. K.N.Gupta Sulabh International Institute of Technical Research & Training, Defence Colony, New Delhi	July 2002
2.	Jai Paras Steel	Not Available	-
3.	P.B.Steels	NA	
4.	Shree Luxmi Industries	Prof. Amarjeet Kaur University School of Environmental Management, Guru Govind Singh Indraprasth University, Delhi-06	Oct 2008
5.	Kasturi Steel Industries	Dr. S.K Singh Civil & Department Engineering Department, Delhi Technological University (Formerly Delhi College of Engineering) Bawana Road, Delhi-42	Sep 2013
6.	Metal Fabricators	Not Available	-
7.	Shri Ram Rolling Works	Prof. B.K.Guha Environmental Engineering Group Chemical Engineering Department Indian Institute of Technology, Delhi	Feb 2006
8.	Parsvnath Steels	Not Available	-
9.	Aggarwal Industries	Mr. Sunil Tirkey Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Dec 2012
10.	Durga Industries	Prof. Amarjeet Kaur University School of Environmental Management, Guru Govind Singh Indraprasth University, Delhi-06	Aug 2008
11.	Durga Industries	Prof. K.N.Gupta Sulabh International Institute of Technical Research & Training, Defence Colony, New Delhi	July 2002
12.	Arihant Industries	Prof. B.K.Guha Environmental Engineering Group Chemical Engineering Department Indian Institute of Technology, Delhi	March 2004
13.	Vishwakarma Metal	Prof. B.K.Guha Environmental Engineering Group Chemical Engineering Department Indian Institute of Technology, Delhi	March 2005

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14.	A K Industries	Mr. Sunil Tirkey Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Dec 2012
15.	Shiva Steels	Prof. K.N.Gupta Sulabh International Institute of Technical Research & Training, Defence Colony, New Delhi	April 2003
16.	Mitul Industries	Prof. S. Ramachandran Sulabh International Institute of Technical Research & Training, New Delhi-45	August 2002
17.	Jay Kay Enterprises	Dr. Bharat Jh. Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Nov 2012
18.	S.V Industries	Prof. Amarjeet kaur University School of Environment Management, Guru Gobind Singh Indraprastha University, Kashmere Gate, Delhi-06	July 2006
19.	Ashish Steel	Dr. S.K. Singh Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	July 2011
20.	Ganga Industry	Not Available	-
21.	Bhagwati Steels	Dr. S.K.Singh Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Sept. 2013
22.	Onkar Steels	Dr. S.K Singh Civil & Department Engineering Department, Delhi Technological University (Formerly Delhi College of Engineering) Bawana Road, Delhi-42	Sep 2013
23.	Goyal Enterprises	Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	July 2011
24.	Tirupati Metal	Dr. S.K.Singh Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	July 2011
25.	Sidhartha Industries	Dr. S.K.Singh Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Jan 2009
26.	Gupta Enterprises	Dr. S.K.Singh Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	August 2011

27.	Vardhman Metal Industries	Prof. B.K.Guha Environmental Engineering Group Chemical Engineering Department Indian Institute of Technology, Delhi	May 2005
28.	U-Like Exports	Prof. Amarjeet kaur University School of Environment Management, Guru Gobind Singh Indraprastha University, Kashmere Gate, Delhi-06	April 2007
29.	Kamal Steel Industries	Prof. B.K.Guha Environmental Engineering Group Chemical Engineering Department Indian Institute of Technology, Delhi	Feb. 2005
30.	Rajinder Jain	NA	-
31.	Tirupati Industries	Prof. V.K. Tewari Science & Technology Entrepreneurship Park, University of Roorkee	Sep 2000
32.	Hari Ram	NA	-
33.	Prime Enterprises	Prof. Amarjeet kaur University School of Environment Management, Guru Gobind Singh Indraprastha University, Kashmere Gate, Delhi-06	Nov. 2007
34.	Vishal Industries	Dr. S.K.Singh Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Oct. 2013
35.	Gaurav Steel	NA	-
36.	Avtar refrigeration	Prof. S.K Singh Dept. Of Civil & Environmental Engineering Delhi College of Engineering, Delhi-42	August 2005
37.	Balaji Steels	Prof. Amarjeet kaur University School of Environment Management, Guru Gobind Singh Indraprastha University, Kashmere Gate, Delhi-06	Sep 2008

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Annexure 4.3

Details of Adequacy Study Carried out for PETP Facility Installed at Pickling Industries in Wazirpur Industrial Area

Sr. No.	Name of the unit	ETP Adequacy Study Conducted by	Report Issue Date
1.	Sagar Steel Industries	Prof. Amarjeet Kaur University School of Environmental Management, Guru Govind Singh Indraprasth University, Delhi-06	Sept, 2008
2.	Jai Paras Steel	Dr. S.K Singh Civil & Department Engineering Department, Delhi Technological University (Formerly Delhi College of Engineering) Bawana Road, Delhi-42	July 2011
3.	P.B.Steels	NA	
4.	Shree Luxmi Industries	Prof. Amarjeet Kaur University School of Environmental Management, Guru Govind Singh Indraprasth University, Delhi-06	Oct 2008
5.	Kasturi Steel Industries	Dr. S.K Singh Civil & Department Engineering Department, Delhi Technological University (Formerly Delhi College of Engineering) Bawana Road, Delhi-42	Sep 2013
6.	Metal Fabricators	K.K Sinha Environment Division, National Productivity Council, New Delhi	April 2000
7.	Shri Ram Rolling Works	Prof. B.K.Guha Environmental Engineering Group Chemical Engineering Department Indian Institute of Technology, Delhi	Feb 2006
8.	Parsvnath Steels	Dr. Arun Kansal University School of Environment Management GGS Indraprastha University Delhi	August 2007
9.	Aggarwal Industries	Mr. Sunil Tirkey Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Dec 2012
10.	Durga Industries	Prof. Amarjeet Kaur University School of Environmental Management, Guru Govind Singh Indraprasth University, Delhi-06	July 2008
11.	Durga Industries	Director Mr. Rajat Gupta National Productivity Council	March 2000

12.	Arihant Industries	Dr. A. K. Gupta AET Infrastructural Environmental Consultancy Services Pvt. Ltd.	June 2001
13.	Vishwakarma Metal	Dr. Bharat Jh. Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Nov 2012
14.	A K Industries	Director Mr. Rajat Gupta Environment Division, National Productivity Council, New Delhi	May 2000
15.	Shiva Steels	H.S. Chourasia Environment Division, National Productivity Council, New Delhi	Feb 2000
16.	Mitul Industries	Rajat Gupta Environment Division, National Productivity Council, New Delhi	April 2000
17.	Jay Kay Enterprises	Dr. Bharat Jh. Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Nov. 2012
18.	S.V Industries	S.V. Industries Wenco Consultancy Pvt. Ltd	May 2000
19.	Ashish Steel	Dr. S.K. Singh Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	July 2011
20.	Ganga Industry	Environment Division, National Productivity Council, New Delhi	August 2000
21.	Bhagwati Steels	Dr. S.K.Singh Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Sept. 2013
22.	Onkar Steels	Dr. S.K Singh Civil & Department Engineering Department, Delhi Technological University (Formerly Delhi College of Engineering) Bawana Road, Delhi-42	Sep 2013
23.	Goyal Enterprises	Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	July 2011
24.	Tirupati Metal	Dr. S.K.Singh Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	July 2011
25.	Sidhartha Industries	Dr. S.K.Singh Civil & Environmental Engineering Department,	Jan 2009

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		Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	
26.	Gupta Enterprises	Dr. S.K.Singh Civil & Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	August 2011
27.	Vardhman Metal Industries	Prof. S. Ramachandran Siel Projects Engineering & Consultancy Services 15, Shivaji Marg, New Delhi-15	Sept. 2000
28.	U-Like Exports	Prof. Amarjeet kaur University School of Environment Management, Guru Gobind Singh Indraprastha University, Kashmere Gate, Delhi-06	March 2007
29.	Kamal Steel Industries	Prof. B.K.Guha Environmental Engineering Group Chemical Engineering Department Indian Institute of Technology, Delhi	Feb. 2004
30.	Rajinder Jain	Prof. B.K.Guha Environmental Engineering Group Chemical Engineering Department Indian Institute of Technology, Delhi	May 2005
31.	Tirupati Industries	Prof. Amarjeet kaur University School of Environment Management, Guru Gobind Singh Indraprastha University, Kashmere Gate, Delhi-06	Feb. 2006
32.	Hari Ram	Mr. Surender Kumar Siel projects Engineering & consultancy services	April 2000
33.	Prime Enterprises	Prof. Amarjeet kaur University School of Environment Management, Guru Gobind Singh Indraprastha University, Kashmere Gate, Delhi-06	Oct. 2007
34.	Vishal Industries	Dr. S.K.Singh Environmental Engineering Department, Delhi Technological University, Formerly Delhi College of Engineering, Bawana Road, Delhi-42	Oct. 2013
35.	Gaurav Steel	NA	-
36.	Avtar refrigeration	Prof. S.K Singh Dept. Of Civil & Environmental Engineering Delhi College of Engineering, Delhi-42	August 2005
37.	Balaji Steels	Prof. Amarjeet kaur University School of Environment Management, GGS IP University, Kashmere Gate, Delhi-06	Sep 2008

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Annexure 5.1

Wazirpur Industrial Pollution

ADARSH COMPLEX (IInd FLOOR) PLOT NO.3, COMMUNITY CE
PHONE : 27371582 TEL. FA

ASHOK VIHAR (110052)
SP ED829741024 2IN
Counter No:2,OP-Code:1
To:DHARMENDER KUMAR,N P- ESTATE
New Delhi, PIN:110
From:WAZIRPUR INDU POLL CONT , WI A DELHI -52
Wt:15grams,
Amt:12.00 , 23/02/2010 , 12:10
Taxes:Rs.1.32<<Track on www.indiapost.gov.in>>

Ref. No.: WIPC(CETP)S/FEB/2010

TO,
SH. DHARMENDER KUMAR
Secretary Environment, Govt. of Delhi
DPCC 4th floor ISBT Building
Kashmiri Gate Delhi

Sub: Hazardous Waste Accumulated in the Wazirpur CETP.

Dear Sir,

With reference to our several letters on the longstanding issue, which is in the knowledge of the Hon'ble Chief Secretary, Delhi, Hon'ble Commissioner of Industry, Hon'ble Chairman, DPCC, and also to your good office but we are deeply pained to say that action from the Government's end is still awaited.

It is submitted that an **authorization was issued to us only for storage of Hazardous Waste up to Dec. 2007** under Hazardous waste Management & Handling Rules, 1989 and amendments. The responsibility for storage, treatment and disposal of Hazardous waste was entrusted on the Government of Delhi (ref. Clause D 17) of the agreement dated 20.7.2005 (Government of Delhi & CETP societies) which runs as under.

"The Government shall identify temporary storage site for hazardous waste and ensure it is fully operational by Dec.31.2005 and after one year the sludge /hazardous waste will be disposed of at the disposal facility"

It is submitted that though we were supposed to store sludge up to Dec 2007, but it is regretted that the hazardous waste is lying and piling up in the plant since its commissioning. Not only the storage facility provided by DSIIDC in the CETP premises had been exhausted but six storage sheds constructed by the society for safe storage of hazardous waste have also been tired –out. Hence, it is necessary to make arrangement to transport /shift the Hazardous waste from CETP premises as agreed by the Government, (ref: Clause D 17 of the agreement dated 20.7.2005) as also necessary for smooth operation and maintenance of the plant. In case no such arrangement are made, the CETP operation will have to be suspended for the want of safe storage of hazardous waste facility as the sludge is also accumulated in the hardware's of the plant.

The immediate solution to the aforesaid problem is to create "Captive Hazardous Waste Facility" as provided in the Hazardous waste Management & Handling Rules, 2008. The land adjoining to Wazirpur CETP for construction of HW storage facility is already in possession of the DSIISC, several requests to handover the said land to our society has been made the Hon'ble Chief Secretary, Delhi and Hon'ble Commissioner of Industry but matter is pending consideration since over 3 years.

We therefore once again request to make arrangement either to transport /shift sludge from Wazirpur CETP or to handover the land adjoining CETP premises to enable us to construct Captive Hazardous Waste facility in accordance to the provisions as laid down in the Hazardous Waste Management & Handling Rules, 2008 as are also followed by all the state boards in their respective areas.

Thanking You,
Yours Faithfully,

(Rajpal Gupta)
Chairman

Copy to: The Appropriate Authority, CETP Cum Jt. Commissioner Industries
Udyog Sadan, 419 FIE, Patpargani Indl Area, Delhi

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Annexure 5.2

ANNEXURE - VI

Regn. No.: S/67107

Wazirpur Industrial Pollution Control (CETP) Society (Regd.)

202, DARSH COMPLEX, 2nd FLOOR, PLOT NO. 3, COMMUNITY CENTRE, WAZIRPUR INDUSTRIAL AREA, DELHI-110 052

PHONE : 27371582, 27373512

Bhagwan Dass
Patron
9582450432

Raghuvansh Arora
Patron
9810029290

Ref. No. WIPC/DOS/2016/407 Dated: 06/07/2016

Umesh Gupta
Chairman
9810024057

Jai Kumar Bansal
President
9811025308

Ved Bansal
Vice Chairman
9810181907

Prakash Asran
Convener
9811032999

Dinesh Mittal
Sr. Vice President
9910339763

Pradeep Gupta
Sr. Vice President
9810007620

Rakesh Kapoor
Vice President
9899000221

Ashok Jindal
Vice President
9811098467

Satish Jain
General Secretary
9810078734

Naresh Bajaj
Finance Secretary
9811082979

Kailash Jain
Secretary
9312916355

Vijay Goyal
Secretary
9873387732

Subhash Bansal
Secretary
9810046793

Sushil Bansal
Secretary
9811173818

To,

The Vice Chairman,

Delhi Development Authority,

1st Floor,"B" Block,

Vikas Sadan,INA,

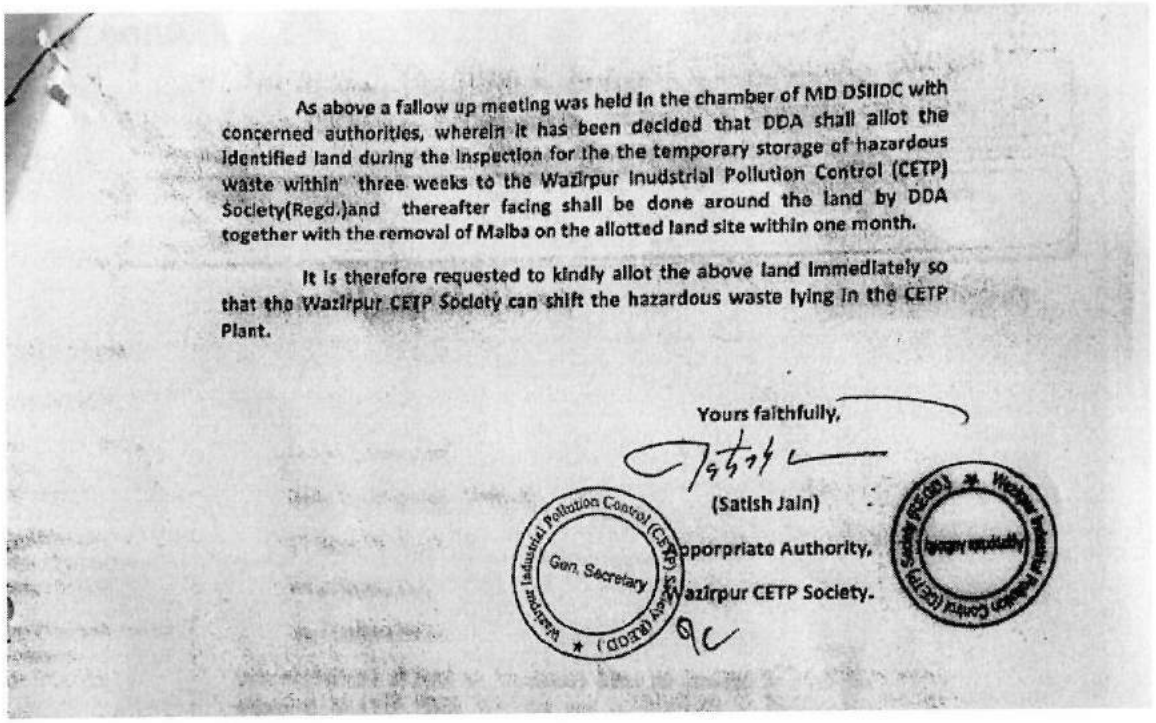
New Delhi-110023.

Sub:-Allotement of land on Temporary basis for storage of hazardous waste adjoining to CETP Plant, Wazirpur and construction of temporary strorage facility.

Sir,

Kindly refere to the letter no.DSIIDC/SE/(Env)/NGT/Hazardous Waste/2016, on the subjected cited above, this is to inform you that this matter comes as per direction of Hob'ble NGT order dt.19th May 2016 titled M/S Ashok Vihar Mitra Mandal Vs. Govt of NCT of Delhi & Ors.,regarding dumping of Hazardous waste outside the premises of Wazirpur CETP Plant.

After receiving the direction from Hon,ble NGT, MD DSIIDC hold the meeting with the concerned authorities i.e DDA,DSIIDC,North Delhi Municipal Corporation,CPCB and DPCC for submitting the Compliance/Status report before NGT with regard to its direction on 27/05/2016. One of the major directions related to exploring the possibility to indentifying and allocating additional land to the CETP Wazirpur for storage of Hazardous waste, for this a joint inspection of CETP Plant Wazirpur and adjoining areas will be conducted by the officers of DDA,DSIIDC, North Delhi Muncipal Corporation,Central Poliuation Control Board and DPCC on 31th May,2016. The inspection of CETP Wazirpur Plant and adjoining areas was carried by the Inspecting Team. During the inspection it was observed that the piece of land, where hazardours waste is dumped may suit fit for a temporary storage facility for the hazardous waste till Treatment,Storage and Disposal Facility(TSDF) site will be developed. As this land is situated adjoining to the boundary wall and entrance of the CETP Wazirpur Plant, as the land belongs to DDA. The officers of DDA present during the inspection said that this land shall be allotted to the CETP Wazirpur Plant by DDA for the construction of strorage facility on Temporary basis.



As above a fallow up meeting was held in the chamber of MD DSIIDC with concerned authorities, wherein it has been decided that DDA shall allot the identified land during the inspection for the the temporary storage of hazardous waste within three weeks to the Wazirpur Inudstrial Pollution Control (CETP) Society(Regd.)and thereafter facing shall be done around the land by DDA together with the removal of Malba on the allotted land site within one month.

It is therefore requested to kindly allot the above land immediately so that the Wazirpur CETP Society can shift the hazardous waste lying in the CETP Plant.

Yours faithfully,

(Satish Jain)

Appropriate Authority,

Wazirpur CETP Society.

Wazirpur Industrial Pollution Control (CETP) Society (REGD.) Gen. Secretary

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Annexure 6.1

SPEED POST

F. No. B-29016/(55-951)/19/WM-II 10359 December 30, 2019

To

M/s Bhiwadi Jal Pradushan Nivaran Association
CETP-1, RIICO Industrial Area, Bhiwadi,
Alwar, Rajasthan - 301019

Sub.: Trail Run Permission for utilization of CETP sludge for manufacturing of bricks under Rule 9 of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 - Regarding

Sir,

This has reference to your application seeking approval under Rule 9 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, for utilization of CETP sludge generated from neutralization facility of CETP for manufacturing of bricks.

The unit is permitted to utilize 30 Tonnes CETP sludge with flyash, lime and cement/gypsum as per trial run protocol per day for 3 days at M/s Bhiwadi Jal Pradushan Nivaran Association, Alwar, Rajasthan, for the purpose of trial study in presence of CPCB and SPCB officials subject to the following conditions and as per the enclosed protocol:

1. The handling and transportation of CETP sludge from the source of generation to the utilization area shall be carried out through mechanical conveyor system to storage hopper/mixing unit in environmentally safe manner. The storage of CETP sludge shall be carried out under a covered shed and impervious base.
2. The trial run shall be completed within 30 days from the starting date of trial run and the unutilized CETP sludge, if any, and other hazardous waste generated during utilization shall be stored within the premises and disposed in accordance with the provisions stipulated under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
3. The unit shall maintain proper ventilation in the work zone and process areas.
4. All personnel involved in the plant operation shall wear proper personal protective equipment such as gloves, masks, hard hats, safety shoes, eye protection, etc. for safety measures.
5. The trial run shall be brought to the notice of personnel involved in the operations.
6. The unit shall maintain proper records of CETP sludge (w.r.t. source, quantity, utilized, stored, disposed etc.) and the same be produced for verification by SPCB/CPCB officials.
7. Monitoring/Sampling during the trial run shall be conducted as per the enclosed monitoring protocol. The unit shall engage an NABL accredited or ISO17025/EPA recognized laboratory for carrying out the monitoring of trial utilization as per the protocol prepared by CPCB. The laboratory shall have the accreditation /recognition for the said parameters specified for the trial run protocol. In case the unit is unable to engage any laboratory having the said accreditation for any parameters, international labs accredited under ISO 17025 are engaged for analysis of such parameters.
8. The unit shall inform Regional Directorate of CPCB, Bhopal, and this office about their preparedness of carrying out trial run at least 15 days in advance so as to enable CPCB and SPCBs official in participating in the said trial utilization and monitoring. CPCB shall collect few random samples for analysis in its own laboratory for verification purpose during the same.
9. Trial run monitoring shall be conducted at peak load (@ 30 tonnes CETP sludge/day).
10. The laboratory engaged shall submit a trial utilization report including other information as prescribed in the monitoring protocol on completion of trial run study directly to Head office, Delhi.
11. Validity of this trial run shall be for a period of three months from the day of issue of this letter.
12. The unit shall obtain authorization for trial run from the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016 for generation, storage and utilization of CETP sludge.

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13. It shall be responsibility of the unit to take all safeguards while handling, transportation, storing, utilization, etc. of the CETP sludge so as to avoid any accidents, environmental damages etc. In the event of such accidents/damages, the unit alone shall have sole responsibility and liability of the same.

The permission granted for trail run does not absolve the unit (occupier) in complying with other provisions laid down under the Environment (Protection) Act, 1986/ Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016 /The Air (Prevention and Control of Pollution) Act, 1981 /The Water (Prevention and Control of Pollution) Act, 1974.

Yours faithfully,

(Abhey Singh Soni)
Add. Director & Head
Waste Management-II Division

Encl.: As above

Copy to:

1 The Member Secretary
Rajasthan State Pollution Control Board
4, Institutional Area, Jhalana Doongri
Jaipur – 302 004, Rajasthan.

: For kind information and with request to facilitate trial utilization of the aforesaid hazardous waste by M/s Bhiwadi Jal Pradushan Nivaran Association, Alwar, Rajasthan, please.

2 The Regional Director
Central Pollution Control Board
4thFloor, Sahkar Bhawan,
North TT Nagar, Bhopal – 462 003

: With a request to co-ordinate with Rajasthan State Pollution Control Board for joint inspection of the aforesaid unit upon receipt of preparedness from the unit as above and verify the utilization process, Pollution Control/ Safety Arrangement, Hazardous Waste Storage Facility etc as per ***Annexure I*** and the aforesaid protocol. Further, CPCB team shall also collect few random samples for analysis in its own laboratory for verification purpose. The inspection report along with the analysis report in this regard including information as per the enclosed protocol shall be sent to this office within 20 days of the trial run. Please also verify the credentials of third party laboratory being engaged by applicant for trial run.

(Abhey Singh Soni)

Annexure-I

Criteria for assessment of utilization process

The following factors may be considered while assessing the environmental soundness of utilization technologies:

1. Source of generation/procurement of CETP sludge.
2. Pollution potential of emissions/discharges in to the environment.
3. Extent of use of hazardous/ toxic chemicals.
4. Quantum of use of resources and utility such as energy, steam, water etc.
5. Degree of reuse, recovery and recycling of resources.
6. The quality of materials/ resources recovered.
7. The quantity and quality of residue generation.
8. Source of point/ fugitive emission in the utilization process, if any, and may conduct necessary monitoring thereof.
9. Prevention and control of fugitive emissions.
10. Potential exposure of workman and surrounding community.
11. Potential of soil & ground water contamination.
12. Degree of manual handling.
13. Amenability to prevention, control & mitigation of potential environmental impacts.
14. Potential EHS hazards & risks.
15. Adequacy of the facilities for HW storage, handling & disposal.
16. Quantity of residue generated and its mode of disposal.
17. TSDF membership.
18. Any incidental discharges has to be identified & monitoring of said parameters shall be carried thereof.

PROTOCOL OF TRIAL RUN FOR UTILIZATION OF CETP SLUDGE FOR MANUFACTURING OF BRICKS

In acid neutralization facility, spent acids (i.e., H_2SO_4 and HCl) generated from electroplating industries are neutralized with CaO which produces sludge cakes ($CaCl_2$ or $CaSO_4$) and water. The sludge generated from the process is recognized as CETP sludge. The hazardous waste in form of CETP sludge falls under the category – 35.3 of Schedule I of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. Typical characteristics of CETP sludge generated from the process are given in table below:

Sl. No.	Parameter	Results (mg/L)	Detection Limit (mg/L)	Max Concentration (mg/L)
1.	Barium (as Ba)	0.06	0.01	100.0
2.	Molybdenum (as Mo)	Not Detected	0.01	350
3.	Silver (as Ag)	Not Detected	0.01	5.0
4.	Vanadium (as V)	Not Detected	0.01	24.0
5.	Antimony (as Sb)	Not Detected	0.01	15
6.	Manganese (as Mn)	12.6	0.01	10.0
7.	Cobalt (as Co)	0.15	0.01	80.0
8.	Thallium (as Tl)	0.02	0.01	7.0
9.	Berrylium (as Be)	Not Detected	0.01	0.75
10.	Selenium (as Se)	Below detection Limit	0.005	1.0
11.	Flouride (as F)	3.1	0.1	180.0
12.	Sulphide (as H_2S)	Not Detected	0.07	5.0
13.	Ammonia	10	1	50

Utilization Process:

CETP sludge generated from acid neutralization facility is added into pan mixer with lime, cement/gypsum and fly ash. The proposed composition of CETP sludge, lime, cement/gypsum and fly ash will be 30%, 15%, 10% and 45% respectively in one brick. The materials, together in proposed composition will be added into Pan Mixer for about 5-10 minutes for making a homogenous mixture. The homogenous mixture is carried from pan mixer to brick making machine on a conveyor belt. Bricks manufactured from the machine will be kept for 3 days under sun drying process and then atleast 28 days for curing in CETP treated water before selling.

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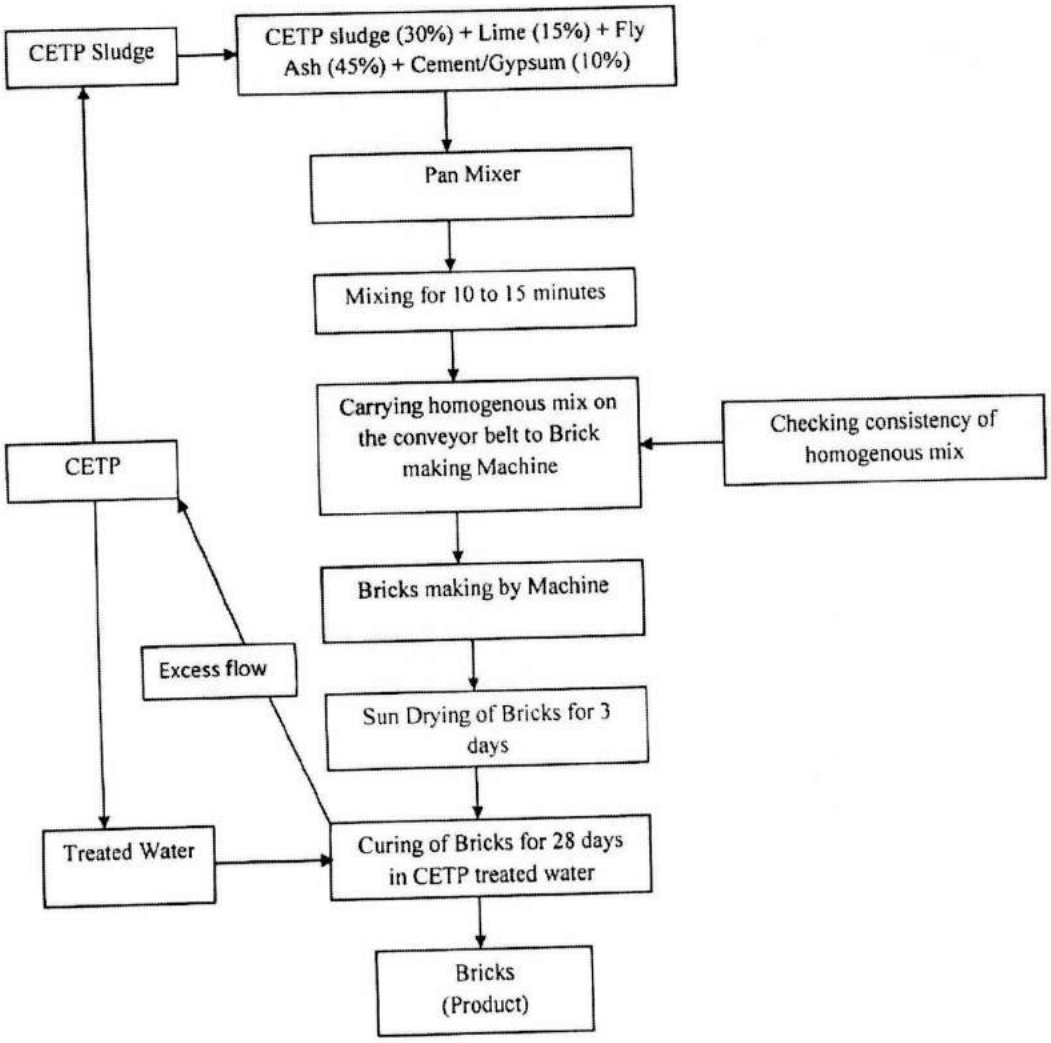

Process Flow Diagram

PART- A TRIAL RUN PROTOCOL

1.0 Work zone Emission Monitoring:

1.1	Sampling location	:	Work zone area having maximum potential of fugitive emissions (to be decided by inspecting team)
1.2	Parameters	:	PM_{10}, $CaSO_4$
1.3	Duration	:	Not exceeding 8 hrs of operation of the process Unit
1.4	No of Samples	:	3-8

The following standards may be applicable:

Parameter	Standards
PM_{10}	5 mg/m^3
$CaSO_4$	5 mg/m^3

2.0 Analysis of Waste Water

a) The analysis shall be done for the possible contamination before and after treatment.

3.a.1 Samples to be collected : Effluent before and after treatment

3.a.2 Parameters : Adsorbable Organic Halides (AOX), pH, Phenolic Compounds, B.O.D., C.O.D, Cyanide, Mercury, Heavy Metals (Cd + As + Pb + Cr + Cu +Mn + Ni + Zn)

4.0 Analysis of Hazardous waste (CETP Sludge)

The proximate and ultimate analysis of CETP sludge shall be done for contamination in it. Range specific analysis result shall also be included.

i. Moisture Content
ii. Nitrogen as nitrate
iii. Total concentration of Heavy metals (Cr, Cd, Cu, Ni, Pb, Zn, As, Mn)
iv. Mercury
v. Flouride

5.0 Analysis of Product (Bricks)

The analysis shall be done with and without utilization of CETP sludge for the possible contamination in it. Range specific analysis result shall also be included.

i. Acidity Content
ii. Flouride, Mercury, Nitrate
iii. Total concentration of Heavy metals (Cr, Cd, Cu, Ni, Pb, Zn, As, Mn)
iv. Comprehensive strength
v. Water absorption
vi. Efflorescence
vii. Drying shrinkage

} As per IS 12894:2002

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Annexure 6.2

By Speed Post

DELHI POLLUTION CONTROL COMMITTEE
DEPARTMENT OF ENVIRONMENT, GOVT. OF NCT OF DELHI
5thFLOOR, ISBT BUILDING, KASHMERE GATE, DELHI-110006
visit us at : http://dpcc.delhigovt.nic.in

FORM-2

Grant of Authorisation under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016, as amended to date

File No: HWM Authorisation No. DPCC/HWM/2020/3096-3104 Dated:04-02-2020

The Managing Director of M/s Green Gene Enviro Protection & Infrastructure Private Limited, Village- Singhpur, Near Toll Naka, Tehsil- Kapasan, District- Chittorgargh, Rajasthan-312207. (hereinafter referred as **"Operator"**) is hereby granted Authorisation for Collection and Transportation of sludge from CETPs (Common Effluent Treatment Plants) in Delhi and for Pre-Processing, Co-Processing, and Disposal in Cement Plants of the said firm at Chittorgargh, Rajasthan. The said Firm/Operator has got Authorisation for Collection, Generation, Pre-Processing, Storage, Waste Processing of Hazardous Waste under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 from Rajasthan State Pollution Control Board (RSPCB) vide Authorisation No. F(HSW)/Chittorgargh(Kapasan)/2246(1)/2017-2018/4298-4300 Dated 25.09.2018 valid from 25.09.2018 to 31.08.2023.

1. The Authorisation shall be in force of one year period with the condition that Authorisation will cease if Treatment, Storage and Disposal Facility (TSDF) for Hazardous Waste in Delhi is made functional within one year.
2. The Authorisation is subject to the conditions stated below issued by DPCC & RSPCB and such conditions as may be specified in the Rules for the time being in force under the Environmental (Protection) Act, 1986.

(D. K. Singh)
Sr. Env. Engineer (WMC-II)
Delhi Pollution Control Committee

DEEPAK KR. SINGH
Sr. Env. Engineer
Delhi Pollution Control Committee
4th & 5th Floor, ISBT Building,
Kashmere Gate, New Delhi-110006

Terms and Conditions of Authorisation:

1. The Operator shall comply with the provisions of the Environment (Protection) Act, 1986 and the Rules made there under.
2. The Authorisation shall be produced for inspection at the request of an officer of the DPCC/RSPCB/CPCB.
3. The person authorized shall not rent, lend, sell, transfer or otherwise transport the Hazardous and Other Wastes except what is permitted to this Authorisation without obtaining prior permission of the DPCC/RSPCB.
4. Any unauthorised change in personnel equipment or working conditions as mentioned in the application by the person authorized shall constitute a breach of this authorisation.
5. The person authorised shall implement Emergency Response Procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire, etc., and their possible impacts and also carry out mock drill in this regard at regular interval of time.
6. The person authorised shall comply with provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty".
7. It is duty of the authorised person to take prior permission of DPCC to close down the facility.
8. The imported Hazardous and Other Wastes shall be fully ensured for transit as well as for any accidental occurrence and its clean-up operation.
9. The Operator shall follow the manifest system (Form-10) provided under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
10. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.

11. The Authorisation is valid subject to the fulfilment of all other statutory requirements in other Laws/ Acts Rules as applicable.
12. In order to ensure Disposal of Hazardous Waste, Operator shall deploy GPS enabled trucks for Collection and Transportation of CETP sludge (Hazardous Waste) and provide instant information in this regard including Pre-Processing and Co-Processing of CETP sludge in Cement Plants. The Operator shall use waste tracking mobile application for providing instant information on WhatsApp relating to movement of waste to DPCC as well as Rajasthan State Pollution Control Board from collection point till final Pre-Processing and Co-Processing in the Cement Plants.
13. The Operator shall apply fresh for Revision/ Grant of Authorisation in case of any change in the project profile/process/products etc or any deviation from the submitted information to this office.
14. The Operator shall submit the date of start of collection and transportation facility to DPCC before commissioning the collection & transporting facility.
15. The Operator of the facility shall **only accept CETP sludge for Pre-Processing and Co-Processing in the Cement Plants/ Facility** covered under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 from the CETPs located in NCT of Delhi.
16. The CETP sludge must be safely collected in leak proof containers and shall be duly marked in a manner suitable for handling and transport and the packaging shall be easily visible and be able to withstand physical conditions and climatic factors.
17. Each container shall be clearly marked to identify its contents and the date of accumulation at the facility and such information for each consignment is recorded and maintained in the operating records at the facility.
18. The Operator must inspect and if necessary, analysed each hazardous waste consignment received at the facility to determine whether it matches with the identity the waste specified on the accompanying manifest.
19. Wherever and whenever hazardous material is being handled, all personnel involved in the transportation must have immediate access to an emergency communication device, such as mobile or any other communication system capable of external assistance.
20. All the personnel including drivers must be will informed about the hazardous management procedure relevant to the positions in which they are employed. All the facility personnel must be trained to ensure that they are able to respond effectively to emergency.
21. The operator shall ensure that no adverse impact on the air, soil and water including groundwater, takes place due to activities for which authorisation has been granted. Comprehensive safety measures must be followed in handling of wastes and the staff must be properly trained.
22. The operator shall ensure that no possibility of a fire, explosion or any sudden release of hazardous waste to air, soil, sub-surface or water is there while handling and transporting the waste which could threaten human health or environment.
23. In case of occurrence of an accident, complete details must be sent to DPCC/RSPCB at the earliest along with details of immediate and remedial measures taken.
24. In no case any hazardous wastes shall be disposed off on land, in any drain or stream. There should not be any spillages of hazardous chemicals, used containers of hazardous chemicals such as highly corrosive, explosive must be safely collected and stacked.
25. The operator of the facility shall be liable for all damages caused to the environment or third party due to improper handling and for transportation of the hazardous waste.
26. The Operator shall be responsible for clean-up operation, in case of spillage, leakage or any other accidental discharge of hazardous wastes and keep the DPCC suitably informed.
27. The Operator shall ensure that hazardous waste are packed, stored and transported as per the guidelines issued by the CPCB from time to time.
28. Transport of Hazardous Wastes shall be in accordance with provisions of the rules made by the Central Government under the Motor Vehicles Act, 2019 (as amended to date) and other guidelines issued from time to time.
29. Monthly collection and utilization progress report maintaining the quantity of above waste being lifted and Co-processed in Cement Plants shall be submitted to DPCC by every 5th day of the next month without fail in a specified format.
30. Operator shall maintain the record of hazardous waste handled by him in Form-3 and prepare and submit to the DPCC and Rajasthan State Pollution Control Board, an annual return containing the details specified in Form 4 on or before the 30th day of June following to the financial year to which that return relates.
31. The occupier shall provide the Operator with the relevant information in Form 9 regarding the hazardous nature of waste.
32. The operator of the facility shall be liable to pay financial Penalties as levied for any violation of the provisions under these rules by the state pollution control board.

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33. An application for the renewal of an Authorisation shall be made at least 60 days in advance.
34. Any other conditions for compliance shall be applicable as per the guidelines issued by MOEF&CC/CPCB/DPCC/RSPCB from time to time.

These issues as per the decisions taken by the Committee for II (a) Category cases headed by Chairman, DPCC in its meeting held on 14.10.2019.

To,

1. The Managing Director,
M/s Green Gene Enviro Protection & Infrastructure Private Limited,
Village Singhpur, Near Toll Naka, Tehsil- Kapasan,
District- Chittorgargh,
Rajasthan-312207

DEEPAK KR. SINGH
Senior Environment Engineer
Delhi Pollution Control Committee
4th & 5th Floor, ISBT Building,
Kashmere Gate, New Delhi-110006

(D. K. Singh)
Sr. Env. Engineer (WMC-II)
Delhi Pollution Control Committee

Copy to:-

1. The Member Secretary Central Pollution Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110032.
2. The Commissioner of Industries, Govt. of NCT of Delhi, 419, Udyog Sadan, FIE, Patparganj, Delhi-110092.
3. The Managing Director, DSIIDC, N-Block, Bombay Life Building, Connaught Circus, New Delhi-110001.
4. President of all Common Effluent Treatment Plant Societies in Delhi.
5. PS to Chairman, DPCC-for kind information to Chairman, DPCC please
6. PA to Member Secretary, DPCC-for kind information to MS, DPCC please.
7. In-charge IT Cell-for uploading on Website of DPCC.
8. Master File, WMC-II.

(Shyam Sunder)
Env. Engineer (WMC-II)
Delhi Pollution Control Committee

Annexure 6.3

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RAJASTHAN STATE POLLUTION CONTROL BOARD
4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159600,5159695Fax: 0141-5159697

Registered

File No: F(HSW)/Chittorgarh(Kapasan)/2246(1)/2017-2018/4298-430 **Date:-** 25/09/2018
0
Unit Id : 90319

M/s GREEN GENE ENVIRO PROTECTION AND INFRASTRUCTURE PRIVATE LIMITED
370, S V P Road, Shop 8, Plot 384, Cigaretwala Building, Opposite CBI Prathna Samaj, Nr Harkishandas Hospital, Mumbai-400004, Maharashtra India. ,
Mumbai Tehsil:Mumbai
District:Mumbai

Sub:- Authorization for operating a facility for Collection, Generation, Pre-Processing, Storage, Waste Processing of Hazardous Wastes Under Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.

Ref:- Your application dated : 24/08/2018 received on 25/08/2018 and subsequent corresponde

Sir

1 Number of authorization RPCB/HWM/2018-2019/HSW/HSW/253.

2 Application Number : 223014 dated : 24/08/2018 .

3 **Unit Head of M/s GREEN GENE ENVIRO PROTECTION AND INFRASTRUCTURE PRIVATE LIMITED is hereby granted an authorization based on the enclosed signed inspection report for Collection, Generation, Pre-Processing, Storage, Waste Processing of Hazardous waste on the premises situated at Near Toll Naka, Tehsil: Kapasan District: Chittorgarh.**

Details of Authorization

SNo	Type of Hazardous waste	Category		Quantity/ Unit	Hazardous Waste Disposal Practice
		Sch	Code		
1	Empty barrels/containers/liners contaminated with hazardous chemicals/wastes	I	33.1	4020.00 NOS./ANNUM	Reuse/ Sales to Registered Recycler
2	Chemical sludge from waste water treatment	I	35.3	0.50 MT/ANNUM	Reuse/ Sales to Registered Recycler
3	Used or spent oil	I	5.1	20.00 KL/ANNUM	Reuse/ Sales to Registered Recycler

4 The authorization shall be in force for period from **25/09/2018** to **31/08/2023**

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File No: **F(HSW)/Chittorgarh(Kapasan)/2246(1)/2017-2018/4298-4300** **Date:-** 25/09/2018

Unit Id : 90319

The authorization is subject to the following general and specific conditions :

A. General conditions of Authorization

1. The authorised person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.

2. The authorisation or its renewal shall be produced for inspection at the request of an officer authorised by the State Pollution Control Board.

3. The person authorised shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorisation.

4. Any unauthorised change in personnel, equipment or working conditions as mentioned in the application by the person authorised shall constitute a breach of his authorisation.

5. The person authorised shall implement Emergency Response Procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;

6. The person authorised shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty"

7. It is the duty of the authorised person to take prior permission of the State Pollution Control Board to close down the facility.

8. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.

9. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.

10. The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilisation of imported hazardous or other wastes shall be treated and disposed

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Registered

File No: **F(HSW)/Chittorgarh(Kapasan)/2246(1)/2017-2018/4298-4300** **Date:-** 25/09/2018

Unit Id : 90319

of as per specific conditions of authorisation.

11. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
12. An application for the renewal of an authorisation shall be made as laid down under these Rules.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.

14. Annual return shall be filed by June 30th for the period ensuring 31st March of the year.

B. Specific Conditions

5 **That this authorization shall ceased to be valid & shall be liable to be revoked without any furthor notice in case of refusal/expiry of consent to operate under the provisions of Water(Prevention and Control of Pollution) Act,1974 and Air(Prevention and Control of Pollution)Act,1981 by the State Board.**

6 **That no recycling/re-processing of the hazardous waste covered under schedule IV shall be carried without prior valid registration with Competent Authority as recycler/ re-processor of hazardous waste under the rule 6 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.**

7 **That no hazardous waste shall be utilized for co-processing as a supplementary resource or for energy recovery, or after processing without prior & valid approval of Central Pollution Control Board under the rule 9 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.**

8 **That in case of any expansion or change in process or product or change in mode / practice of disposal of hazardous waste or its quantity, industry shall obtain fresh authorization.**

9 **That the arrangements for transportation of the hazardous waste for disposal shall be done by the authorized/dedicated vehicles only.**

10 **That you shall strictly comply with the CPCB guideline (For pre-processing and co-processing in the cement plants) dated: 07/07/2017 and H & OW (M &TM) Rules, 2016.**

11 **That you should strictly supply produced AFR (Alternative fuel and raw material) to the cement plant for the co-processing only ,if you found non-compliant of the same the said authorisation shall be treated as revoked/in-fructuous without any further notice intimation in this matter.**

GREEN ENVIRO PROTECTION & INFRASTRUCTURE PVT. LTD. Singhpur Chittorgarh

Signature Not Verified

RAJASTHAN STATE POLLUTION CONTROL BOARD
4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159600,5159695Fax: 0141-5159697

Registered

File No: F(HSW)/Chittorgarh(Kapasan)/2246(1)/2017-2018/4298-4300 **Date:-** 25/09/2018

Unit Id : 90319

12 **That all records of the quantity procured raw material (Hazardous and other waste) and produced AFR (Alternative fuel and raw material) and supply of the same to the cement plants should be maintained and submitted to the Board regularly under the provisions of the H & OW (M &TM) Rules, 2016.**

13 **That you should procured hazardous and other waste from the Rajasthan State and accord highest priority for utilization of the hazardous and other waste available in the Rajasthan State, only those waste which are not available in the Rajasthan State in adequate quantity than you shall procured the same from other State, but volume of the procured hazardous and other waste from the other state than Rajasthan shall not exceed 50 % of the total waste.**

14 **That hazardous waste shall be transported through only authorised vehicle from SPCB and regular Annual return (Form-4) AND Manifest (Form-10) shall submitted to the Board as per the provisions of the H & OW (M &TM) Rules, 2016.**

15 **That quantity of the procured hazardous/other waste & non-hazardous waste in the form of solid ,semi solid and liquid shall not exceed 2,00,000 TPA in any case or the quantity specified in the authorization/pass book issued by the Competent Authority as recycler/re-processor of hazardous waste under the Hazardous and Other Wastes(Management and Transboundary Movement) Rules, 2016.**

16 **That this authorisation is being issued for the production of the Alternative fuel & resources up to 1,80,000 MTA only.**

17 **That procured hazardous/other waste & non-hazardous waste from the other State than Rajasthan shall not exceed 50 % of the total procured waste in a year.**

18 **That you should procure hazardous and other waste only through the pass-book and maintained its record.**

19 The authorization is subject to the conditions stated at Annexure "A" enclosed with the authorization letter and the such conditions as may be specified in the Rules for the time being forced under the Environmental (Protection) Act, 1986.

20 The unit has to display and maintain the data online outside the factory main gate in Hindi & English both on a 6'X 4' display board in the manner & format prescribed at Annexure "B" and the report of the Compliance along with photograph shall be submitted to this office & Regional Office, time to time.

21 That the annual reports/returns in the form prescribed under the Rules shall be submitted to the Board by 30th June of every year and records of hazardous waste Generation, handling & management shall be maintained according to the provisions of the Hazardous Waste (Management and Transboundary Movement) Rules, 2016 and shown & submitted to the Board as and when asked for.

Signature Not Verified

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RAJASTHAN STATE POLLUTION CONTROL BOARD
4, Institutional Area, Jhalana Doongari, Jaipur-302 004
Phone: 0141-5159600,5159695Fax: 0141-5159697

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File No: **F(HSW)/Chittorgarh(Kapasan)/2246(1)/2017-2018/4298-4300** **Date:-** 25/09/2018

Unit Id : 90319

22 The hazardous waste should not be stored for a period beyond 90 days, failing which the authorization shall deemed to be revoked.

23 It shall be ensured that the Hazardous waste is handled, managed & disposed of strictly in accordance with the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016. Non compliance of the Rules or any of the conditions contained in the authorization shall be tantamount to automatic cancellation/revocation of the authorization.

24 The operator of the facility shall liable to comply any other conditions as per the guidelines isssued by the MoEF or CPCB or State Board related to collection, disposal, reception, storage & treatment of hazardous waste.

25 **That Authorization is issued under the provisions of Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016 from the environmental angle only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility, to comply with conditions laid down in all other for the time-being in force,rests with the industry/unit/project proponent.**

26 That this Authorization shall not, in any way, adversely affect or jeopardize the legal proceeding, if any, instituted in the past or that could be instituted againt you by the State Board for violation of the provisions of the Act or the Rules made thereunder.

This bears the approval of the competent authority.

Yours Sincerely

Group Incharge

Copy To:-

1 Regional Officer, Regional Office, Rajasthan State Pollution Control Board, Chittorgarh you are advise to ensure the compliance of authorization conditions under the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016

2 Master File

Signature Not Verified

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Rajasthan

RAJASTHAN STATE POLLUTION CONTROL BOARD
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File No: **F(HSW)/Chittorgarh(Kapasan)/2246(1)/2017-2018/4298-4300** **Date:-** 25/09/2018

Unit Id : 90319

Group Incharge

GREEN GENIE ENVIRO PROTECTION & INFRASTRUCTURE PVT LTD. Singhpur Chittorgarh

Signature Not Verified

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Annexure 6.4

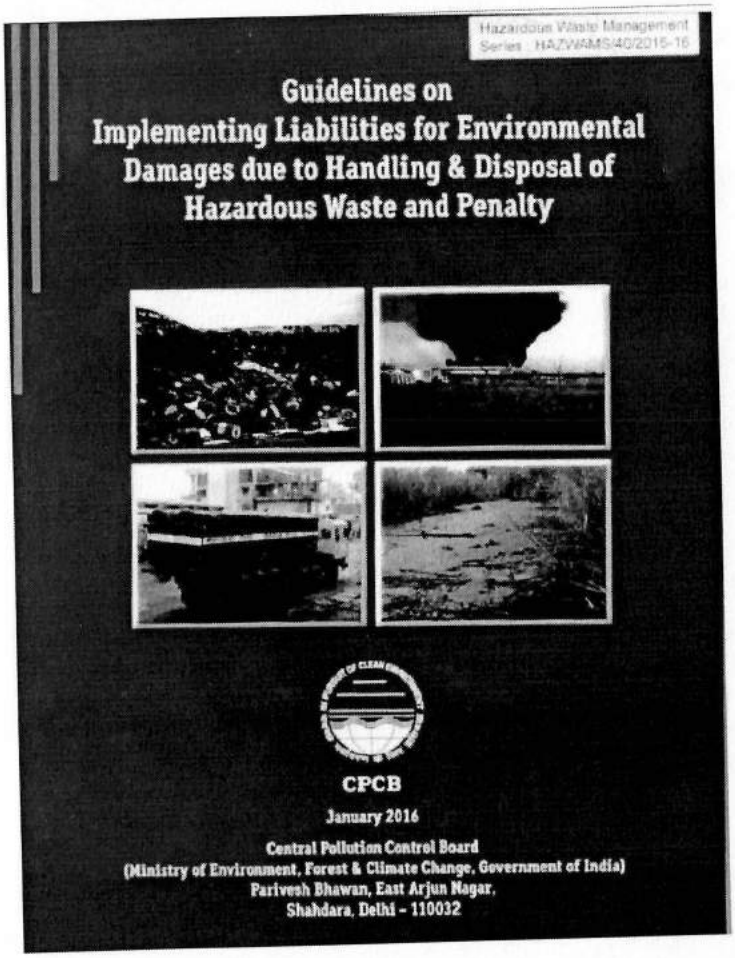

Table 2: Indicative cost for Site Assessment and Remediation

Scenario (onsite and offsite)	Site Assessment/ Risk Assessment		Remediation	
	Cost of liability (INR)	Notes	Cost of liability (INR)	Notes
Landfill breach and release of hazardous waste into environment	20,00,000 to 15,000,000	Costs can vary depending on volume of breach, whether the breach is above ground surface or below ground surface, whether the groundwater resources have been contaminated etc. Costs can vary in relation to the quantity of waste released, type of wastes, etc.	1,0000,000 to 250,000,000 and higher	Low range is applicable for basic excavation of above ground wastes and high range is applicable for situations where breach has occurred below ground contaminating groundwater resources. These complex situations of below ground breach can further be complicated and costly depending on the type of contaminant washing into the groundwater, the sensitive receptors using that groundwater resource etc.

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Scenario (onsite and offsite)	Site Assessment/ Risk Assessment		Remediation	
	Cost of liability (INR)	Notes	Cost of liability (INR)	Notes
Spillage of liquid hazardous waste due to transportation incident, including pipeline failures, spillage from drums, tanks etc also included	20,00,000 to 22,500,000	Costs can vary depending on what type of environmental receptors are located in the immediate spill vicinity (lake, river, stream, shallow potable groundwater aquifer, flora/ fauna, human receptors, etc.)	10000,000 to 200,000,000 and higher	Low costs may be applicable to sites where the groundwater table is very deep and the overlying strata is confining (example thick clay layer, competent rock with no weathering or fractures etc.). High costs may be applicable where the liquid hazardous waste immediately finds it to sensitive receptors including groundwater resources, surface water bodies used by humans, flora and fauna, etc.
Dumping of hazardous waste on open grounds without secondary containment	20,00,000 to 35,000,000	Costs will vary from a small dump (not exceeding 400 kg) to a large dump covering more than 100 m2 spatial extent (not considering the vertical depth). Costs will be higher for sites where groundwater table is shallow, where contaminants are carcinogenic, etc.	10000,000 to 250,000,000 and above.	
Costs less than 10,000,000 may be applicable to small volumes of less than 1 ton and immediate lifting and transportation to TSDF and not residual waste further contaminating the subsurface	Low costs may be applicable to sites where the groundwater table is very deep and the overlying strata is confining (example thick clay layer, competent rock with no weathering or fractures, etc.). High costs may be applicable where the liquid hazardous waste immediately finds it to sensitive receptors including groundwater resources, surface water bodies used by humans, flora and fauna, etc.			

Scenario (onsite and offsite)	Site Assessment/ Risk Assessment		Remediation	
	Cost of liability (INR)	Notes	Cost of liability (INR)	Notes
Improper handling and storage of hazardous waste	10,00,000 to 10,000,000	Low costs are applicable for small spatial impacts (less than 10,000 m2), whereas higher costs are for larger spatial impacts (greater than 10,000 m2). Costs will also vary depending upon the local site settings, geology, hydrogeology, etc.	5,000,000 to 75,000,000 and higher	Low costs may be applicable to sites where the groundwater table is very deep and the overlying strata is confining (example thick clay layer, competent rock with no weathering or fractures, etc). High costs may be applicable where the liquid hazardous waste immediately finds it to sensitive receptors including groundwater resources, surface water bodies used by humans, flora and fauna, etc. Costs are also dependent on the type of contaminant etc.
Fire incident leading to spillage of hazardous waste/ contaminated runoff water	20,00,000 to 10,000,000		10000,000 to 75,200,000 and higher	Low costs may be applicable to sites where the water runoff is low and contact with hazardous wastes has been minimal. Higher costs would be applicable to situations where large volume of contaminated runoff has migrated offsite, spills of hazardous wastes have occurred due to the fire, etc. The costs will also get magnified based on the local site settings, depth to groundwater etc.

Note: The factors that should be accounted for in estimating remediation liabilities based on the remediation technologies are given at Annexure-V. This Annexure may be referred by SPCBs/PCCs to estimate remediation liability.