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COMPREHENSIVE ENVIRONMENTAL POLLUTION ABATEMENT ACTION PLAN FOR CRITICALLY POLLUTED INDUSTRIAL CLUSTER – JODHPUR (REVISED POST CPCB IN-HOUSE COMMITTEE REVIEW)

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ABBREVIATIONS

APCS	Air Pollution Control System
BIS	Bureau of Indian Standards
BMW	Bio medical Waste
BOD	Biological Oxygen Demand
CBOs	Community Based Organisations
CBWTDF	Common Biomedical Waste Treatment and Disposal Facility
CEPI	Comprehensive Environmental Pollution Index
CETP	Common Effluent Treatment Plant
CGWB	Central Ground Water Board
CHWTSDF	Common Hazardous Waste Treatment, Storage and Disposal Facility
Cl_2	Chlorine
CNG	Compressed Natural Gas
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CPCB	Central Pollution Control Board
CPCB	Central Pollution Control Board
DBOOT	Design Built Own Operate Transfer
DG	Diesel Generator
DO	Dissolved Oxygen
Ecosmart	IL&FS Ecosmart Ltd
EP Act	Environment (Protection) Act, 1986.
ETP	Effluent Treatment Plant
FC	Faecal Coliform
GHGs	Green House Gases
GoI	Government of India
Ha	Hectare
HCs	Hydro carbons
HDPE	High density Polyethylene
IIT	Indian Institute of Technology
IMD	Indian Meteorological Department
IS	Indian standard
JDA	Jodhpur Development Authority
JMC	Jodhpur Municipal Corporation
kg	kilogram
km	kilometer
Leq	Linear equivalent
lpcd	Litres per capita per day
LPG	Liquified Petroleum Gas
LSI	Large Scale Industries
m.	Meter
M.S.	Mild Steel
MLD	Million Liters per Day

MNES	Ministry of Non conventional Energy Resources
MoEF	Ministry of Environment & Forests
MSW	Municipal Solid waste
MTA	Metric Tonnes per Annum
NAAQS	National Ambient Air Quality Standards
NAMP	National Air Quality Monitoring Programme
NGOs	Non Governmental Organisations
NH_3	Ammonia
NIO	National Institute of Oceanography
NO	Nitrogen Oxide
NO_2	Nitrogen Dioxide
NOC	No Objection Certificate
NOx	Nitrogen Oxide
NWMP	National Water Quality Monitoring Programme
PDCOR	Project Development Company of Rajasthan Ltd
PHED	Public Health and Engineering Department
PMC	Project Management Consultant
PM_{10}	Particulate Matter with a diameter of less than 10 microns
$PM_{2.5}$	Particulate Matter with a diameter of less than 2.5 microns
ppm	Parts per million
ppt	Parts per trillion
PWD	Public Works Department
RH	Relative Humidity
RIICO	Rajasthan State Industrial Development & Investment Corporation Ltd
RO	Reverse Osmosis
RSPCB	Rajasthan State Pollution Control Board
RSPM	Respirable Suspended Particulate Matter
SEZ	Special Economic Zone
SO_2	Sulphur di Oxide
SPM	Suspended Particulate Matter
SPV	Special Purpose Vehicle
sq.km	Square Kilometer
SSI	Small Scale Industries
SWM	Solid Waste Management
TC	Total Coliforms
TDS	Total Dissolved Solids
ToR	Terms of Reference
TPA	Tonnes per Annum
TPD	Tonnes per Day
TSDF	Treatment Storage and Disposal Facility
TSS	Total Suspended Solids

EXECUTIVE SUMMARY

Background

The Central Pollution Control Board (CPCB) in association with Indian Institute of Technology (IIT) New Delhi carried out an environmental assessment of industrial clusters across the country. Based on this, Comprehensive Environmental Pollution Index (CEPI) was calculated to identify polluted industrial clusters in the country.

The main objective of the study to establish CEPI is to identify polluted industrial clusters or areas in order to take concerted action towards pollution abatement and to centrally monitor them at the National level. A total of 88 industrial areas or clusters have been identified by the CPCB in consultation with the Ministry of Environment & Forests (MoEF), Government of India (GoI) for the study to be conducted across the country.

Preparation of Comprehensive Environmental Pollution Abatement Plan

This report is for the Jodhpur Industrial Cluster selected under the CEPI study of Critical Industrial Clusters in the State of Rajasthan. The cluster needs a long term comprehensive environmental pollution abatement plan to improve its environmental performance. Presented below is the CEPI score assigned to the Jodhpur Industrial Cluster by CPCB.

Parameter-wise CEPI Scores for Jodhpur Industrial cluster

S.No	Parameter	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Sub Index	Existing CEPI
1	**Air**	3	5	15	6	3	3	12	5	3	5	20	5	52	
2	**Water**	6	5	28	7	3	3	13	5	3	0	15	10	65.5	
3	**Land**	3	5	15	3	3	3	9	5	3	5	20	10	54	75.19

Industrial Development in Jodhpur Region

Jodhpur is the third most industrialized district in Rajasthan. The industries in Jodhpur City are mainly located in Industrial Areas developed mainly by RIICO. Mandore Industrial Area, developed by RIICO on the Jodhpur- Nagaur road at about 16kms from the City is an established industrial area to the North of the town. To the West side of the City at about 20kms on Barmer Road is the Bornada Industrial Area developed by RIICO. To the South of the City within the Municipal Limits there exist the industrial areas such as Light

Industrial Area, Industrial Estate, Behind New Power House (B.N.P.H), Heavy Industrial Area, and Basni (Phase I & II) to the South of the City, beyond Municipal Limits, are the Industrial Areas of Tanawada, Sangaria (Phase I & II), Boranada and Salawas.

The Textile industries of Jodhpur are mostly engaged in screen-printing process. The finished products in 60% of industries are printed fabric where as 40% are dyed and bleached fabrics.

The industrial activities in the Basani industrial area is dominated by small scale Textile Processing units (157 units), small scale S S rerolling industries (91 units), handicraft units (31 units), Guargum processing units (21 units), small scale engineering units (8 units) and other units (105 units). This industrial area does not have large/medium Red category units and the number of highly polluting units enlisted under seventeen categories of highly polluting industries is just 5, which are small scale dye/dye intermediate units. Besides, all the water polluting textile processing units and S S rerolling units are connected with CETP for treatment of their effluent. All the Guargum units have established adequate measures for control of air pollution.

The industrial activities in the Heavy Industrial Area and Industrial Area behind New Power House is dominated by small scale textile processing units (76 units), small scale SS rerolling industries (19 units), handicraft units (8 units), small scale engineering units (3 units) and other units (9 units). This industrial area has limited number of Red category large/medium units (5 units) and the number of units enlisted under seventeen categories of highly polluting industries is just 2 which are small scale dye/dye intermediate manufacturing units.

Water Environment

There is no perennial river in Jodhpur District. Important rivers in the district are Luni and Mithari Rivers. Main sources of irrigation besides rainwater are dug-wells and tubewells. Major lakes in Jodhpur are Balsamand, Pratap Sagar, Ummed Sagar, Kayelana, Takht Sagar. Another main water body in Jodhpur is River Jojari, which is a seasonal river.

There are three main reservoirs of raw water in the city viz. Kailana, Takhat sagar, and Balsamand. All these reservoirs receive water continuously from Rajiv Gandhi canal and are also rain fed. Public Health Engineering Department treats this water in filter houses and supplies to the city for drinking purpose. The inhabitants mostly use tap water and also groundwater from open wells/hand pumps.

The combined industrial effluent is carried through drainage and is left in River Jojri, a seasonal river which normally carries water flow only in rainy season having its course south of City. Industrial effluent has caused groundwater pollution in downstream of the river in villages viz. Salawas, Nandwan, Bhandu Kallan etc. which is harmful for irrigation also.

The major effluent discharging units operating here are textile dyeing and printing, steel re-rolling, heavy machinery, chemical, etc. to treat this waste water, Common Effluent Treatment Plant (CETP) was established at MGC Sangaria, Jodhpur in the year 2004. The CETP is being managed by Jodhpur Pradhushan Niwaran Trust, Jodhpur (CETP Trust).

Major issues related to groundwater in Jodhpur are:

- Decline of water level
- Rising water level (water logging) in Jodhpur city
- Poor Quality
- Industrial pollution
- Less groundwater recharge due to scanty and uneven rainfall.

Air Environment

The main sources of air pollution are natural dust and vehicles which contribute minimally to the pollution load. The trucks carrying products from mining belts also adds to pollution.
Secondary data and field level observations reveals that air pollution in Jodhpur city is mainly limited to roads, industrial areas, major junctions and the walled city. Pollution in the old city and along arterial roads is due to increased traffic. Burning of wood and charcoal in low-income houses, slums and small-scale industries also contributes to higher air pollution levels. The SPM and RSPM levels in both industrial and non-industrial areas exceed the prescribed standards. It is required to find cleaner / alternate fuels for industrial and household use.

Land Environment

Sources of soil contamination in Jodhpur are solid waste including domestic waste (generation is around 350 TPD), waste from industries and commercial units and hospitals, sewage from unlined septic tanks, drains which carry effluents from few industries and sludge from effluent treatment plant. Biomedical waste is transported to a Common Biomedical Waste Treatment Facility by M/s Sales Promoters, treated and disposed.
Main contaminated sites for soil / ground water pollution assessment are the waste dump sites at Keru and seams of River Jojari. The hazardous wastes from CETP at Jodhpur are

being sent for disposal to the Common Hazardous Waste Treatment Storage and Disposal Facility (CHWTSDF) at Udaipur.

Proposed Action Plan for Pollution Abatement

The proposed Action Plan for abatement of pollution is based on the data collected from RSPCB and other concerned agencies. The action points mentioned have been categorized into Short Term and Long Term Measures based on the timeframe required for their implementation. The Short Term Action Points include measures that require one year or less for implementation i.e., December 2012, while the Long Term Action Points include measures that require time beyond one year for implementation. The effective implementation of the remedial action plan will help in abatement of pollution and to restore the environmental quality of these industrial clusters.

The Action Plan was presented on July 20, 2010 before the Steering Committee appointed by the CPCB. Consequent to their suggestions/observations, the Action Plan was modified and resubmitted to CPCB in August 2010. This revised Action Plan was further reviewed by the In-house Committee of CPCB and certain observations/suggestions were made on the Plan and clarifications/additional information, pertaining to those observations were sought vide CPCB's letter number B-29012/ESS(CPA)/2010/4619 dated October 7, 2010. This Action Plan addresses all those issues.

A tabulated summary of the Final Action Plan **(Revised Post CPCB In-House Committee Review)** for Jodhpur Industrial Cluster is presented in the following page.

Impact on CEPI Score

Pollution load in the industrial cluster is long term and has a cumulative effect. Hence, change in the CEPI score post implementation of the Action Plan will take some time depending on the individual parameters. However, for the purpose of this study, the CEPI score post implementation of the pollution abatement measures is calculated and presented below. It is expected that, post implementation of the pollution abatement measures, the CEPI Score for Jodhpur Industrial Cluster will be lowered by nearly 17 points to **58.47.**

CEPI Score for Jodhpur Industrial Cluster Post Implementation of Action Plan

S. No	Parameter	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Sub Index	Post Action Plan CEPI
1	Air	3	5	15	4.5	0	3	7.5	5	3	5	20	5	47.5	
2	Water	3	5	15	3	3	3	9	5	3	0	15	0	39	
3	Land	3	5	15	3	3	3	9	5	3	0	15	5	44	**58.47**

Final Action Plan for Jodhpur Industrial Cluster: Short Term and Long Term Action Points - (REVISED POST CPCB IN-HOUSE COMMITTEE REVIEW)

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
Short Term Action Plan- Air					
1.	Performance monitoring of major air polluting industries for assessment of compliance of the notified air emission standards.	RSPCB, RIICO Industrial Association, CETP Trust	June 2012	Approx. Rs. 25-40 lakhs	The work of stack emission monitoring of the identified major air polluting industries in the industrial cluster would be taken up by the State Board in association with recognized laboratory of the State Board/ CPCB/MoEF for assessing compliance of the emission standards notified under EP Rules '86.
2.	Up- gradation of the air pollution control measures e.g. dust collector, multi cyclone etc. with the non compliance industries.	RSPCB, RIICO Industrial Association, CETP Trust	October 2012	Not Available	The State Board will issue directions under the provision of Air Act' 81 to the non complying industry for up gradation for the air pollution control measures before end of Oct- 2012.
3.	Installation of Real Time Continuous Air Quality Monitoring System	RSPCB	March 2012	Approx. Rs. 1.25 crores	The work of installation of Real Time Continuous Air Quality Monitoring stations is going on and will be functional by March 2012. The system will provide real time Ambient Air Quality for PM10, SO2, NOx, CO, O3 and BTX. The real time

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					data shall be available with Board's Head office and Regional Office, Jodhpur. The station will also provide necessary metrological data including wind speed, wind direction, temperature, pressure and humidity. Efforts are also made for the up-gradation of the system for monitoring of PM 2.5.
4.	Installation of ambient air quality monitoring station	RSPCB, RIICO, Industries Department	March 2012	Approx. Rs. 44-50 lakhs	Three additional ambient air quality monitoring stations (existing 6 stations) to monitor the ambient air quality as per the NAAQMS are under consideration in Jodhpur with analytical facilities (lab facilities) in Jodhpur industrial clusters.
Long Term Action Plan-Air					
1.	Implementation of Traffic Master Plan	Traffic Police, RTO, RSPCB, District Supply Officer, PWD	Continuous Process	-	a. Introduction of one way traffic in selected areas to reduce the traffic density b. Banning entry of heavy commercial vehicle inside the City to reduce vehicular pollution c. Issuing licenses to LPG based autos as per notification dated

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					22/12/2010 d. Continuous monitoring of vehicles by flying squads of transport department to check PUC e. Regular monitoring of the quality of the fuel being used by the vehicles. f. Periodic education and awareness campaigns for the public, drivers, transporters and other stake holders g. Phasing out of 15 year old commercial vehicles is already in progress. 3,323 autos have been phased till now h. Removal of encroachment on the road side i. Development of parking arrangements by traffic management near the commercial areas by JDA j. Widening of main roads for reducing the traffic congestion and periodic maintenance of roads

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					k. Development of roadside arboriculture l. Construction of multi-storeyed/underground parking areas
2.	Adoption of Clean fuel by the Industry	RSPCB, Industry and Industrial Association, RIICO	--	Not Available	The State Board shall advise the major air polluting industries to adopt clean fuel, depending upon the availability of clean fuel. The state board may take a view to advise the major air polluting industries for promotion of cleaner fuel and replacement of boiler/thermo pack which are 10 year old.
Short Term Action Plan- Water					
1.	Assessment of the compliance of the effluent quality standards of the water polluting industries with the prescribed standards of effluent quality for inlet to CETP as specified under EP Rules	RSPCB, RIICO Industrial Association, CETP Trust	June 2012	Approx. Rs. 25-40 lakhs	The work of effluent quality assessment of the identified major water polluting industries in the industrial cluster would be taken up by the State Board in association with recognized laboratory of the State Board/ CPCB/MoEF for assessing compliance of the inlet to CETP standards notified under EP Rules'86.
2.	Up- gradation of the primary treatment facilities	RSPCB, RIICO Industrial Association,	October-2012	Not Available	The State Board will issue directions under the provision of Water Act' 74 to

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
	e.g. physicochemical treatment etc. with the non compliance industries.	CETP Trust			the non complying industry for up gradation for the primary treatment facilities before end of Oct- 2012.
3.	Installation of Flow meter / Water mater with each member unit of CETP trust for monitoring of compliance of the permitted discharge quantity by CETP Trust.	RSPCB, RIICO Industrial Association, CETP Trust	March 2012	Not Available	RIICO will ensure that each industry sets up water meter/flow meter within the given timeframe. (The work of confirmation for installation of water meter / flow meter by each member unit of CETP Trust shall be out sourced to recognized Agency /laboratory)
4.	Commissioning of additional Sewage Treatment Plant (STP) at Salawas.	RSPCB, RUIDP and Municipal Corporation	September 2011	Approx Rs. 34 crores	Under UIDSSMT scheme, construction of 50 MLD STP project had been sanctioned. The construction work of STP is completed and started working on trial basis. The commissioning of STP is preventing discharge of untreated sewage to river which will result in prevention of contamination of groundwater.
5.	Up-gradation of the sewerage system	RSPCB, RUIDP, Municipal Corporation, JDA	March 2012	Approx. Rs. 27 crores	Up-gradation of sewerage system will help in regularizing and ensuring proper collection and transportation of city sewage. Sewerage system is being developed in the Jodhpur city. Total length of the sewage line is 125 km out of which 90% of the work of laying of

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					the pipeline has been completed. The collected sewage will ultimately be taken to Salawas STP for the treatment.
6.	Up-gradation of existing CETP at Sagariya	CETP Trust, RIICO, Industrial Associations and RSPCB	December 2012	Not Available	Preliminary study shall be carried out and the report regarding location, capacity and estimated cost shall be submitted. The estimated cost of preparation of the report is Rs. 20-30 lakhs.
7.	Cleaning, Desilting & repairs of the open drains for transportation of untreated industrial effluent to CETP in the industrial area	RIICO CETP Trust , RSPCB	March 2012	Approx. Rs. 20-30 Lakhs	The cleaning of the drains will prevent overflow and spread of effluent on land. This will also help in smooth conveyance of effluent to CETP.
8.	Construction of closed conduit conveyance system for carrying effluent of textile units to CETP	RIICO, CETP Trust and Industrial Association	March 2012	Approx. Rs. 9.63 Crores	The Phase-I of the Project for connecting all the 109 small scale S.S. Re-rolling member units with the CETP has already been completed. Phase-II includes laying the 23 km pipeline which will carry alkaline wastewater from the RIICO industrial area. The work is already undertaken by Jodhpur Pradushan Nivaran Trust on the own expense.

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
9.	Performance monitoring of CETPs and STPs	RSPCB, CETP Trust and Municipal Corporation	Ongoing activity	Approx. Rs. 2 lakhs	RSPCB is monitoring the performance of CETP on a monthly basis which includes the quality of treated effluent and disposal of ETP sludge. The performance monitoring of additional STP (50 MLD) shall be taken up after its regular commissioning.
10.	Monitoring of groundwater quality	RSPCB, CETP Trust, RIICO	March 2012	Approx. Rs.1- 2 lakhs	The State Board has increased ground water quality monitoring points from earlier two points to six points around Jodhpur under NWMP having frequency of one sample in six month. The frequency of the sampling of all the six points shall be increased to once in three months for upgrading the monitoring of groundwater quality.
11.	Installation of rain water harvesting system in the buildings and institutions	RIICO, Municipal Corporation , RSPCB	Ongoing activity	Not Available	The RIICO is making allocation of new plots with the condition for installation of proper rain water harvesting structures for the proposed industrial unit. This will improve the level of groundwater in the industrial cluster as well quality of groundwater.
Long Term Action Plan- Water					
1.	Construction of the additional CETP for	CETP Trust, RIICO, Industrial Associations	December 2013	Not Available	Preliminary study shall be carried out and the report regarding location,

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
	Industries apart from textile & steel industries near Salawas	and RSPCB			capacity and estimated cost shall be submitted. The estimated cost of preparation of the report is Rs. 20-30 lakhs.
2.	Construction of the additional CETP for Industries near Boranada	CETP Trust, RIICO, Industrial Associations and RSPCB	December 2013	Not Available	Preliminary study shall be carried out and the report regarding location, capacity and estimated cost shall be submitted. The estimated cost of preparation of the report is Rs. 20-30 lakhs.
3.	Reuse and Recycling of treated effluent	RSPCB, RIICO, Industrial Association and CETP trust	December 2013	Not Available	Preliminary study shall be carried out and the report regarding location, capacity and estimated cost shall be submitted. The estimated cost of preparation of the report is Rs. 20-30 lakhs.
4.	Construction of the additional STP of 50 MLD capacity at Salawas.	JDA &JMC	-	-	DPR has already been prepared and the work is likely to be allocated soon.
Short Term Action Plan- Land					
1.	Augmentation of Treatment and Disposal facility for Biomedical Waste	Medical and Health Department, RSPCB and Municipal Corporation	December 2012	Not Available	The Biomedical Waste of the health care facilities of Jodhpur is being collected, transported and disposed at the authorized Common Bio Medical Waste Treatment and Disposal Facility

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					located at Village Keru near Jodhpur on Jaisalmer Road. The RSPCB is monitoring the disposal of biomedical waste in accordance with the provision of Bio Medical Waste (Handling & Management) Rules 1998. The disposal facility requires augmentation for the compliance of CPCB guidelines for treatment and disposal facility of BMW.
2.	Disposal of Hazardous Waste	CETP Trust, Industries, RIICO, RSPCB, Rajasthan Waste Management System and UCCI	Ongoing activity	---	The CETP sludge from physico-chemical treatment comes under the definition of hazardous waste. This sludge is presently collected, dried and transported to common treatment storage and disposal facility developed by Rajasthan Waste Management System near village Gudli in accordance with the provisions of Hazardous Waste (Management, Handling & Trans-boundary Movement) Rules 2008. The RSPCB has advised the CETP Trust to go for co-incineration of the ETP sludge in Kiln of Cement Plant with prior approval under the Rules for co-incineration. This will result in reduction of disposal cost as well recovery of the energy.

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
Short Term Action Plan- Land					
1.	Development of Municipal Solid Waste disposal facility	Municipal Corporation, RIICO and RSPCB	Not Available	Not Available	Land of development of Sanitary landfill site has already been identified. Presently, 100 TPD compost plant is partially in operation.
Action Point-Others					
1	Development of green belt and tree plantation in industrial area	Forest Department, Industry, RIICO, RSPCB	Ongoing activity	Approx. Rs. 30-50 lakhs	The RIICO Limited and Industrial Association is to develop & encourage road side plantation in the industrial cluster as well as to develop green spot in cluster for maintenance of ambient air quality.
2	Capacity Building for prevention & control of Pollution	RIICO , CETP Trust & RSPCB	March 2013	Not Available	**1. Following actions shall be taken up by the RSPCB:** a. Strengthening of technical and scientific manpower of Regional Office, Jodhpur (RO, Jodhpur) b. Strengthening of regional laboratory of RO, Jodhpur for regular assessment of PCM with the industries, CETP, water quality and air quality of the area c. Education and training of

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					technical and scientific staff of familiarization with the latest technology for pollution control and analytical techniques d. Strengthening of online connectivity of RO, Jodhpur with HO-Jaipur and CPCB Delhi for upgrading the data transfer mechanism e. Seminar and workshop for education and awareness of the project proponents for adoption of cleaner fuel and advanced process techniques for reduction of air emission and effluent discharge **2 Following action shall be taken up by RIICO & CETP Trust**: i. Development of Regional Research Centre for development of new technology for reduction of dyes & chemicals in textile processing as well as reduction of water requirement. ii. To encourage use of cleaner fuel by providing soft loan for replacement / conversion of

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					the existing boiler / thermo pack to cleaner fuel. iii. To develop non polluting industries like weaving units / ready mate garment manufacturing units for diversion of industrial activities. iv. To encourage & provide soft loan to industrial unit which intends to install RO plant at their own for recycling of their effluent.

Note: While recommending the interventions to reduce CEPI, various studies, reports, Master Plans, RSPCB and RIICO data was referred to and wherever the information was available, the costs of interventions have already been included in the Final Action Plan. These interventions will be implemented by different agencies, including RIICO as identified in the Report.

1 INTRODUCTION

The Action Plan was presented on July 20, 2010 before the Steering Committee appointed by the CPCB. Consequent to their suggestions/observations, the Action Plan was modified and resubmitted to CPCB in August 2010. This revised Action Plan was further reviewed by the In-house Committee of CPCB and certain observations/suggestions were made on the Plan and clarifications/additional information, pertaining to those observations were sought vide CPCB's letter number B-29012/ESS(CPA)/2010/4619 dated October 7, 2010. This Action Plan addresses all those issues.

This report[1] is the Final Action Plan for Jodhpur Industrial Cluster based on the data collected from RSPCB and other Agencies/responsible key stakeholders. The Plan has been prepared with due field verifications and consequent implementation of various actions included therein.

[1] This report has been structured based on the document titled "Framework of Model Action Plan for Critically Polluted Industrial Areas/Clusters" which was circulated by the CPCB on July 20, 2010 after going through all the presentations made by various State Pollution Control Boards.

2 ACTION PLAN FOR JODHPUR INDUSTRIAL CLUSTER

2.1 *Introduction*

2.1.1 *Area and Demography*

Jodhpur district extends between 25°51' 08" & 27 ° 37' 09" North latitude and 71 ° 48' 09" & 73 ° 52' 06" East longitude covering a geographical area of 22,850 sq km. The headquarters of Jodhpur district is the city of Jodhpur, the second largest city in Rajasthan, which has registered 21% decadal population growth.

Jodhpur district is bound by Nagaur in East, Jaisalmer in west and Bikaner in North while in the South side, Barmer and Pali lines on the boundary. Population of the district is 28.81 lakhs as per 2001 census while Jodhpur Nagar Nigam and out growths have a total area of 8.6 lakhs. Rural and Urban population of the district are 19.09 lakhs and 9.77 lakhs respectively. Decennial population growth rate of the district is 34.03% since 1991. The district falls under western arid zone of the Rajasthan State and covers 11.60% of total area of arid zone of the state. The district is divided into 5 sub-divisions namely Jodhpur, Shergarh, Pipar City, Osian & Phalodi and comprises of 07 tehsils and 09 blocks. Total number of villages in the district is 1157 as per 2001 census. The district is known for its Guar gum industries and mineral wealth. Refer ***Figure 1*** for Jodhpur Industrial Cluster Location Map.

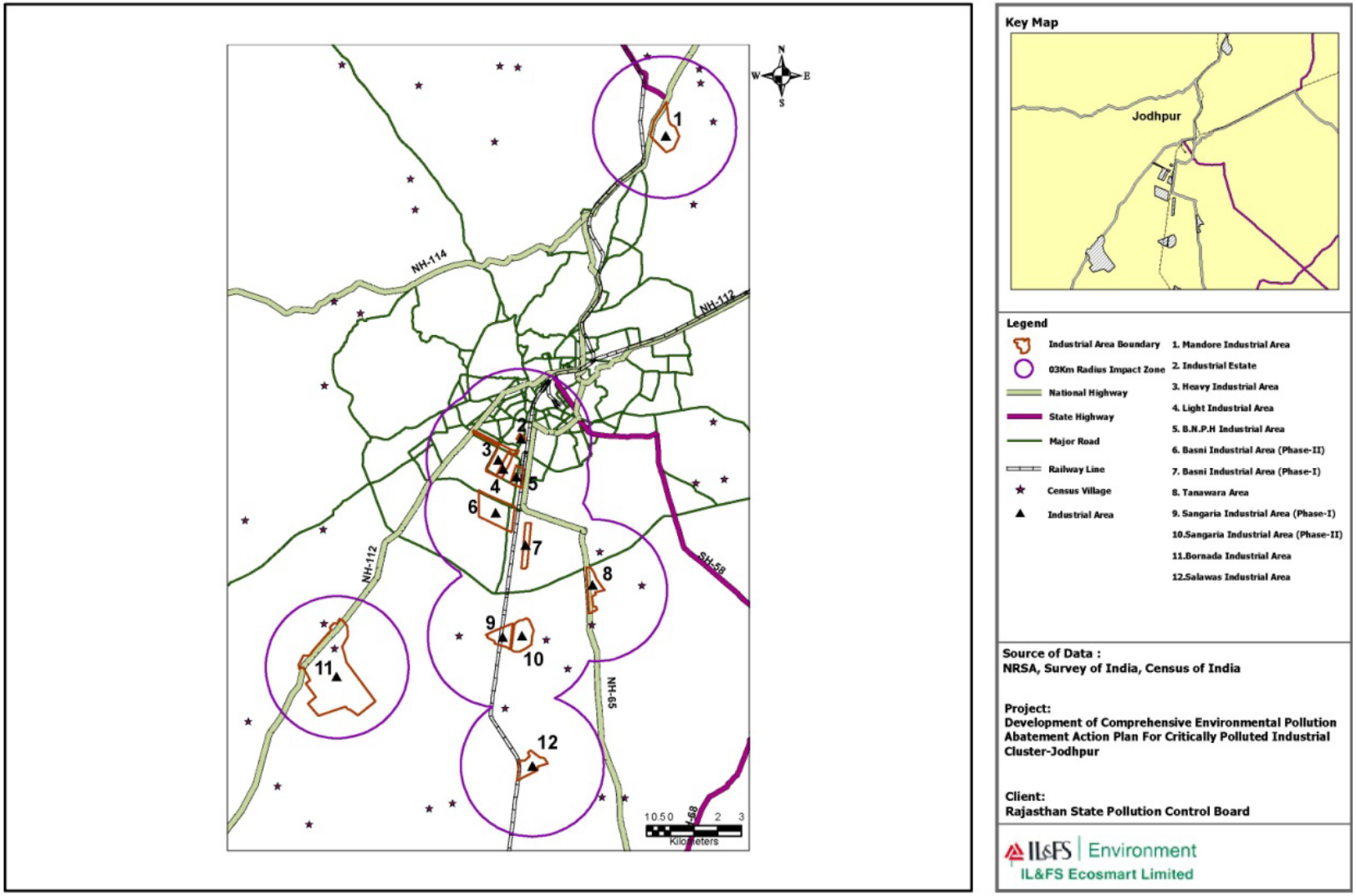

Figure 1 Jodhpur Industrial Cluster Location Map

2.1.2 *Topography*

Major physiographic units of Jodhpur are Sand Dunes, Alluvial plains, Ridges and Hillocks which lies scattered in the area, while major drainage is offered by Luni River and Mithari River. Jodhpur district forms part of Great Thar Desert of Rajasthan. This district is situated at the height between 250-300 meters above sea level.

The Eastern part of the district area exhibits gentle undulating topography interrupted by small ridges of hard rocks. The area between Bilara and Jodhpur in the eastern part of the district is covered by alluvium deposited due to fluvial action of Luni river system. The general elevation of plains varies from 300 m above mean sea level in north to 150m above mean sea level in South. Regional slope is from North-East towards South-West direction. Orientation of alluvial plain area follows the Luni River and its tributaries. Sand dunes occupy a major part of the district north of Vindhyan escarpment in northern and northwestern part of the district.

2.1.3 *Climate*

Jodhpur exhibits similar climatic conditions as in the dessert namely; arid to semi arid type of climate with extreme of heat in summer and cold in winter. The temperature varies from 49 degree in summer to 1 degree in winter. Both day and night temperature increases gradually and reaches their maximum values in May and June respectively.

The average rainfall in this region is about 300mm. Atmosphere is generally dry except during the monsoon period. The humidity is highest in August with mean daily relative humidity of 81%. The annual maximum potential evapo-transpiration in the district is quite high. It is highest (264.7 mm) in the month of May and lowest (76.5 mm) in the month of December.

2.1.4 *Geology and Soils*

The geological set-up of the district is represented by various igneous, metamorphic and sedimentary rocks. Predominant geologic formations are Quaternary Aeolian sand, Alluvium, Bap Boulder Bed, Nagaur Sandstone, Bilara Limestone and Jodhpur Sandstone of Marwar Super Group, Malani Igneous Suite, Eranpura granite & rocks of Delhi Super Group. Delhi Super Group litho units are very limited and in the form of isolated pockets. Erinpura granites and Malani igneous rocks cover large area in the southern part of the district. Marwar Super Group of rocks occupies maximum geographical area of the district lying in

the central, western, and eastern parts of the district. The rock units of various formations belonging to Cenozoic epoch/era represented in very small area, lies in the north-western parts of the district. In the entire district, the hard rocks are overlain by thin blanket of alluvium and windblown sand.

Major water bearing formations here are Quaternary alluvium, Nagaur Sandstone, Bilara Limestone and Jodhpur Sand -stone, Rhyolite, Granite, Schist and Phyllite. Please refer ***Figure 2*** for the details.

The major and important minerals of the district are sand stones and lime stones. Fawn and Red colored sandstone of the district is very popular and found in abundance. Besides this, building stones, stone slabs and flagstones are mined in the district on regular basis. Minerals like quartz and clays of various colours and dolomite are also available in the district.

Soil of the district is classified mainly as sandy and loamy. Following types of soils are found:

Red desertic soils: This type of soil is most predominant in central, eastern and southern parts of the district. These are pale brown to reddish brown soils, loose and well drained. Texture varies from sandy loam to sandy clay loam.

Desert soils: Desert soils occupy a considerable area of the district forming its northern and western part of the district. These are mainly windblown sand and soils of interdunal depressions.

Sand dunes: Sand dunes occupy a small part in northern and north-western margin of the district. These are sandy to loamy sand, loose, structure less and well drained.

Lithosol and regosols of hills: These types of soils are found in hills and hill slopes of central and western part of the district. These are shallow, light textured, fairly drained, reddish brown to grayish brown in colour.

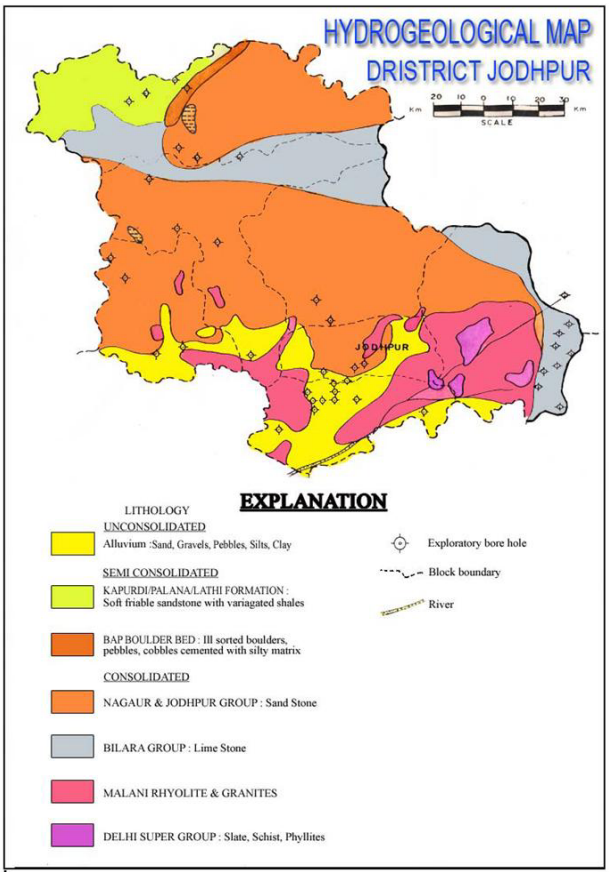

Figure 2: Hydrogeological Map of Jodhpur District[2]

2.1.5 *Vegetation*

Bajra (pearl millet) is the major crop during Kharif season in Jodhpur. In Rabi season wheat, pulses and a variety of masala like jeera, dhania and red chilly are also grown. It is one of the major production centres for guar.

On account of arid climate, only negligible percentage of the total reporting area for the landuse in the district is covered under forests. Despite its arid climate, Jodhpur is blessed with a variety of flora and fauna. Due to sandy soil only scrub and thorny bushes of vegetation are found in the forest areas of the district. The main species of trees are Kumat, Kair, Khejri, Babul, Bir, Jal khara, Pilu, etc. Fruit bearing trees are pomegranates and guavas. The fauna of the district include Jackal, Jungle Cat, Indian Fox, Black Buck, Chinkara, common Hare, etc. The birds commonly found are Baya, Koyal, Parrot, Vulture, Jungle Crow, bulbul, House Sparrow, Kite, Sand Grouse, Common Quail, grey Partridge, little Egrit, etc. A survey conducted by district administration with the help of forest officials shows 162 flora and 144 fauna at Machia Safari situated only 10 kms from Jodhpur.

[2] District Ground Water Brochure for Jodhpur (2007)

2.1.6 *Industrial Development*

Jodhpur is the third most industrialized district in Rajasthan. Jodhpur district accounts for 6% of the net domestic product from the Mining and Manufacturing Sector of the state. In the recent years, Jodhpur has increasingly become the important industrial centre. About 1968 acres land is under industrial development, which is 12.06% of total developed area and is likely to be 5135 acre in 2023 under Master Plan-II (2001- 2023). Main industries of Jodhpur are textiles, handicrafts, steel re-rolling and pata patti, guar gum, chemicals and minerals, stone cutting and processing and food processing units.

Jodhpur industrialization started with the announcement by then Jodhpur government to set up two industrial areas here namely a light industrial area and a heavy industrial area. After this, the Industries Department of the State Government setup 529 acre Industrial estate at Bhagat ki Kothi, behind New Power House. Additionally New Jodhpur & Electronics Complex was established by RIICO with 107 plots which are completely developed. Further, many general and special industrial areas are being planned and developed by RIICO.

Jodhpur is located in the western part of the Rajasthan and has suffered scarcity of water prior to supply of water from Rajiv Gandhi Nahar Project (RGNP) and therefore there is hardly any industry which may be classified as water incentive industry i.e., consumption more than 1,000 KLD.

2.1.7 *Location of Industrial Areas*

Most of the industrial areas in the cluster are located to the South and South West of Jodhpur city; while Mandore is located to the north of the city. Light and Heavy Industrial Area, Industrial Estate, BNPH, Basni (Phase I & II), Tanawada, Salawas, Sangaria and Bornada are proximal to each other, mostly sandwiched between NH-112 and NH-65. Mandore Industrial Area is approached by NH-65 and SH–61.

2.1.8 *CEPI Score (Air, Water, Land, Total)*

Jodhpur City and industrial areas have been classified as critically polluted area as per the CEPI score in the report prepared by CPCB.

Table 1: Details of Critically Polluted Areas – Jodhpur

Critically Polluted Industrial Area (CPA) and CEPI	Industrial Cluster / Potential Impact Zone
Jodhpur CEPI – 75.19 (As_Wc_Ls)	a) Industrial areas including Basni Areas (Phase I & II), Industrial estates, light and heavy industrial areas, Industrial areas behind new power house Mandore, Bornada, Sangaria and village Tanawada and Salawas b) Jodhpur City

The existing CEPI Score of the Jodhpur Industrial Cluster is 75.19; Jodhpur is ranked 23rd in the list of critically polluted industrial clusters in India. Following table gives the parameter-wise CEPI scores for Jodhpur.

Table 2: Parameter-wise CEPI Scores of Shortlisted areas - Jodhpur

Rank	Industrial Area / clusters	Air	Water	Land	CEPI	Comment
23	Jodhpur	52.00	65.50	54.00	75.19	As Wc Ls

Note: A/W/L: Air/ Water /Land; c/s: Critical/Severe

2.1.9 *Digitized Map with Demarcation of Geographical Boundaries and Impact Zones*

The map showing impact zones and geographical boundaries of the polluted clusters in Jodhpur has been presented in ***Figure 1.***

2.1.10 *Total Population and Sensitive Receptors*

The industrial areas in Jodhpur, included in the CEPI study are mostly located in and near the Jodhpur City. Based on the suggestion in the *Framework of Model Action Plan for Critically Polluted Industrial Areas / Cluster* by CPCB, the geographical area of the industrial cluster and its impact zone has been considered here. A **radius of 3 kms** has been considered to fully cover the Industrial Clusters as well as the sensitive receptors in the area. Refer ***Figure 3*** **and** ***Figure 4*** for impact zones with locations of sensitive receptors for Bindayaka I.A and Sitapura I.A respectively.

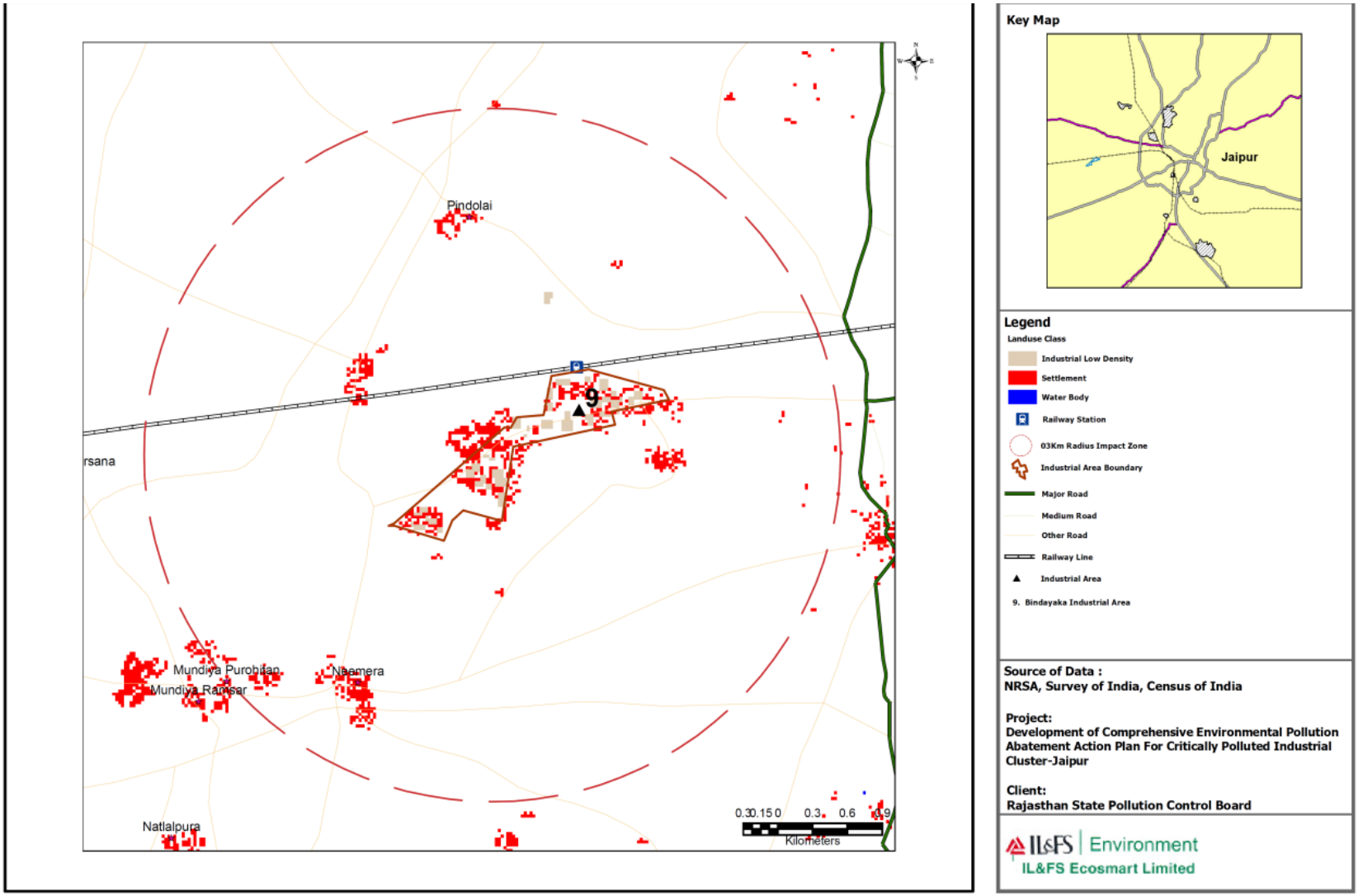

Figure 3 Sensitive Receptors Location Map of Bindayaka I.A

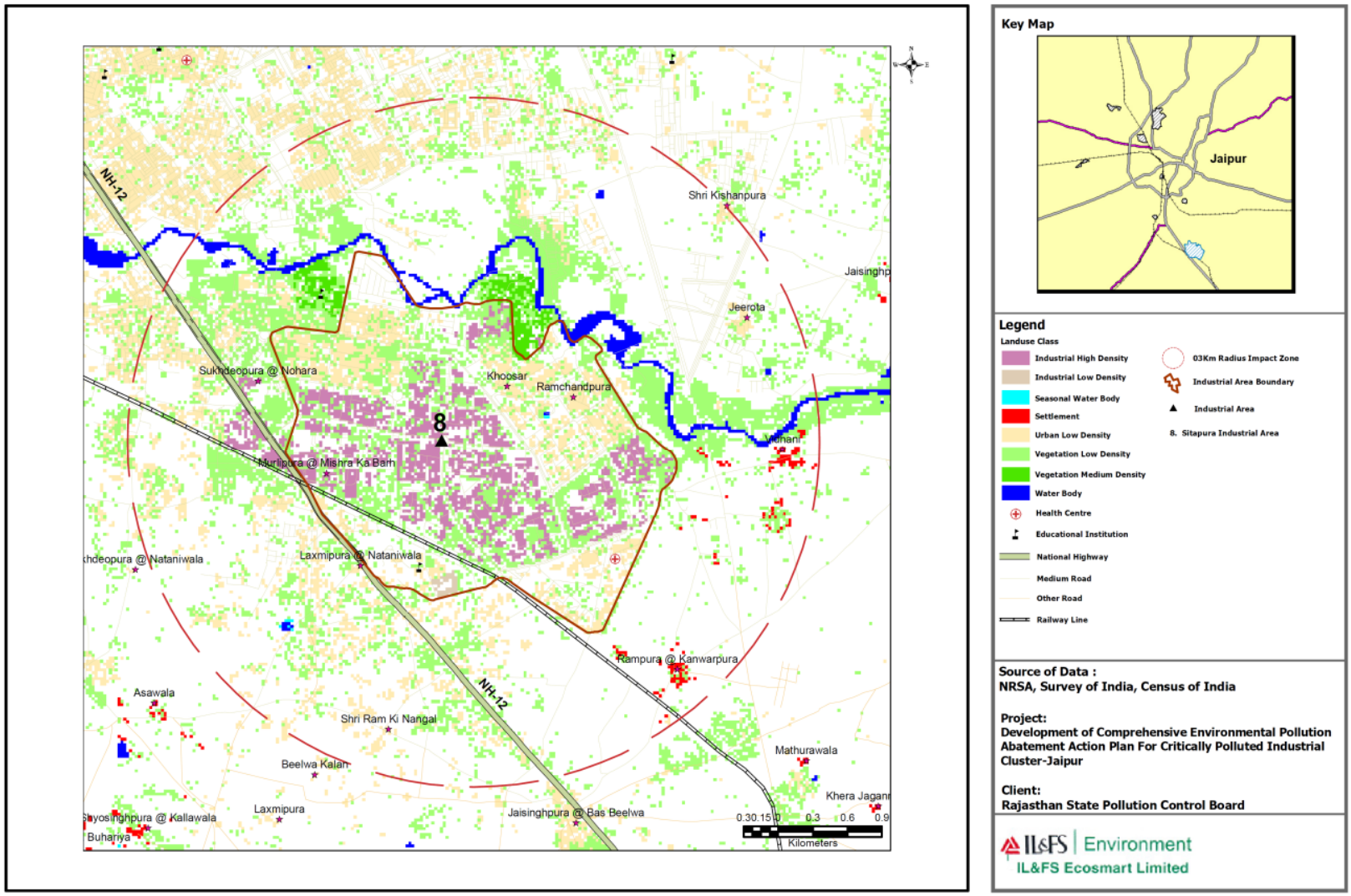

Figure 4 Sensitive Receptors Location Map of Sitapura I.A

There are many sensitive receptors in the area. Noted ecological feature is a River Jojari flowing through the impact area. Many settlements and scattered vegetation are seen in the impact zone. Main settlement is the census village of Daijar to the North of the industrial area. Minor settlements around are Anganwa, Surpura, Desooriya Vishnoiyan and Desooriya Kharolan.

- Basni industrial area is surrounded by urban and industrial uses and low density vegetation. Airport is the main land use here. Presence of a water body is observed. Sensitive receptors are the Railway Station, 2 worship places and 2 educational institutions.
- Bornada and its impact zones is characterised mainly by industrial areas, and low density vegetation. Small water bodies are observed.
- Impact zones of the Industrial Estate, Heavy Industrial Area, Light Industrial Area and B.N.P.H is characterized by industrial areas, low density vegetation and urban areas. Airport and water bodies are also prominent features here. In addition, pumping station, old city (with heritage monuments), hospital, major university (Jodhpur University) and schools are also found here. Three Railway Stations, 23 educational institutions, 7 health care centers and 5 worship places are the sensitive receptors.
- Mandore area has urban low density developments and water bodies as prominent landuses in addition to industrial landuses. Railway station and a *Matadi* ka temple are also the sensitive receptors here.
- Salawas area shows the presence of urban, industrial, low density vegetation landuses apart from the presence of a water body. Railway station is also a sensitive receptor here.
- Sangria area is mostly occupied by low density vegetation. Presence of urban and industrial low density development and water body are notable.
- Tanawara is near the Airport. There is a water body in the impact area, in addition to low density industrial developments. An educational institution and a place of worship are among the sensitive receptors here.

Major land uses in the impact zones of Jodhpur Industrial Cluster are presented here.

Table 3: Land Use Area for Jodhpur Industrial Cluster[3]

Industrial Areas	Landuse Class	Area in Sqkm
Basni Industrial Area (Phase-I&II)	Vegetation Low Density	1.90
	Water Body	0.02
	Urban Low Density	3.66
	Industrial Low Density	0.10
	Industrial High Density	3.00
	Airport	0.13
Bornada Industrial Area	Vegetation Low Density	0.21
	Water Body	0.00
	Settlement Village	0.02
	Urban Low Density	0.04
	Industrial High Density	1.34
Industrial Estate, Heavy Industrial Area, Light Industrial Area, B.N.P.H Industrial Area	Water Body	0.03
	Vegetation Low Density	3.95
	Urban Low Density	2.84
	Urban Medium Density	4.27
	Urban High Density	1.32
	Industrial Low Density	0.02
	Industrial High Density	1.06
Mandore Industrial Area	Water Body	0.02
	Vegetation Low Density	0.71
	Settlement Village	0.57
	Urban Low Density	0.22
	Industrial Low Density	0.46
Salawas Industrial Area	Water Body	0.12
	Vegetation Low Density	0.08
	Settlement Village	0.23
	Industrial Low Density	0.15
Sangaria Industrial Area (Phase-I&II)	Urban Low Density	1.51
	Water Body	0.13
	Vegetation Low Density	0.47
	Settlement Village	0.14
	Industrial High Density	0.05
	Industrial Low Density	0.03
Tanawara Area	Water Body	0.23
	Vegetation Low Density	1.35
	Settlement Village	0.26
	Urban Low Density	2.17
	Industrial Low Density	0.18
	Industrial High Density	0.12

[3] Analysis using GIS data by Ecosmart

2.1.11 *Eco-geological features Impact Zones*

2.1.11.1 *Major water bodies (Rivers, lakes, ponds etc)*

Water bodies near Mandore are Jaswand sagar band and springs. Khetnadi nadi flows through the impact area of Bornada. Jojari River flows through BNPH, Basni, Salawas and Sangaria industrial areas and is reported as polluted. Within 5kms impact zone of Heavy / Light Industrial Area and BNPH is the Takt Sagar Lake, which is a major water body in Jodhpur.

2.1.11.2 *Ecological Parks, Sanctuaries, Flora, Fauna or any eco sensitive zones*

A Forest Nursery is seen in the impact zone of Mandore Industrial area. Zoological garden in the old city area falls in the impact zone of Heavy / light industrial areas.

2.1.11.3 *Historical Monuments*

Heavy and Light industrial areas almost abut the old city. Hence many monuments and historically important places and buildings of heritage importance fall within the impact zone of this area.

2.1.12 *Industry Classification and distribution*

The industries in Jodhpur city are mainly located in Industrial Areas developed mainly by RIICO. Mandore Industrial Area, developed by RIICO on the Jodhpur- Nagaur road at about 16kms from the city is an established industrial area to the north of the town. A stone park is also developed by the RIICO in which units related to the cutting of stone slabs (Sand Stone) would be established. To the west side of the city at about 20kms on Barmer Road, there exists Boranada Industrial Area developed by RIICO.

To the south of the city within the Municipal Limits there exist the following industrial areas:

- Light Industrial Area
- Industrial Estate
- Behind New Power House.
- Heavy Industrial Area
- Marudhar Industrial Area Phase- I
- Marudhar Industrial Area Phase-II
- Sangaria Industrial Area.
- Stone

The textile industries of Jodhpur are mostly engaged in screen-printing process. The finished products in 60% of industries are printed fabric where as 40% are dyed and bleached fabrics.

The industrial activities in the Basani industrial area is dominated by small scale Textile Processing units (157 units), small scale S S rerolling industries (91 units), handicraft units (31 units), Guargum processing units (21 units), small scale engineering units (8 units) and other units (105 units). This industrial area does not have large/medium Red category units and the number of highly polluting units enlisted under seventeen categories of highly polluting industries is just 5, which are small scale dye/dye intermediate units. Besides, all the water polluting textile processing units and S S rerolling units are connected with CETP for treatment of their effluent. All the Guargum units have established adequate measures for control of air pollution.

The industrial activities in the Heavy Industrial Area and Industrial Area behind New Power House is dominated by small scale textile processing units (76 units), small scale SS rerolling industries (19 units), handicraft units (8 units), small scale engineering units (3 units) and other units (9 units). This industrial area has limited number of Red category large/medium units (5 units) and the number of units enlisted under seventeen categories of highly polluting industries is just 2 which are small scale dye/dye intermediate manufacturing units.

2.2 *Water Environment*

2.2.1 *Present Status of Water Environment*

2.2.1.1 *Surface Water Resources*

There is no perennial river in Jodhpur District. Important rivers in the district are Luni and Mithari rivers. Main sources of irrigation besides rainwater are dug-wells and tubewells. Major lakes in Jodhpur are Balsamand, Pratap Sagar, Ummed Sagar, Kailana, Takht Sagar. Another main water body in Jodhpur is River Jojari, which is a seasonal river.

There are three main reservoirs of raw water in the city viz. Kailana, Takhat sagar, and Balsamand. All these reservoirs receive water continuously from Rajiv Gandhi canal and are also rain fed. Public Health Engineering Department treats this water in filter houses and supplies to the city for drinking purpose. The inhabitants mostly use tap water and also groundwater from open wells/hand pumps. The main filter house for drinking water supply to the city is setup near Kailana lake, Chopasani Road. The other filter house is near

Balsamand lake, which supplies water to a very small population of the city in its north side. Under the Rajasthan Urban Infrastructure Development Project (RUIDP), Commissioning of WTP at Kailana has increased water supply to Jodhpur city by 600 lakh liters and has also resulted in saving of power charges due to the gravity mains.

2.2.1.2 *Surface Water Quality*

The surface water quality of Lake Kaylana (drinking water supply source of Jodhpur city) is monitored by the RSPCB. The monitoring is carried out four times a year for Lake water. The water quality results are published in the Annual Report of the Board.
The following table presents the data on water quality for various parameters in the Lake.

Table 4: Water Quality Monitoring Data of Lake Kailana[4]

Date	pH	Conductivity mmho/cm	DO mg/l	BOD 3 at 20oC
Apr-07	7.58	270	7.50	4.08
Sep-07	8.14	230	6.50	0.29
Oct-07	8.08	260	7.20	1.85
Jan-08	8.23	250	7.40	0.81
Apr-08	7.5	350	5	1.06
Jul-08	7.86	370	5.9	0.54
Oct-08	8.15	300	8.1	2.85
Apr-09	7.6	320	7.4	0.34
Jul-09	7.62	290	6.2	0.47
Oct-09	8.31	330	6.2	0.42
Jan-10	8.16	330	4.7	1.24

It is seen than the pH levels have been within the prescribed limits for all the samples analysed from April 2007 to January 2010. Conductivity levels show that it is well within the prescribed limits for industrial use. Minimum DO level observed is 4.7, maximum being 8.1 and average being 6.55 for the three year period. Around 70 percent of the samples showed compliance with the prescribed standards for drinking water source without conventional treatment, but after disinfection. BOD levels have been generally within the prescribed limits since September 2007, indicating that the water quality of the Lake is good.

[4] Source: Central Laboratory, RSPCB

2.2.2 *Sources of Surface Water Pollution*

2.2.2.1 *Industrial Activities*

The combined industrial effluent is carried through drainage and is left in River Jojari, a seasonal river which normally carries water flow only in rainy season having its course south of city. Industrial effluent has caused ground water pollution in downstream of the river in villages, viz. Salawas, Nandwan, Bhandu Kallan etc. which are harmful for irrigation also.

2.2.2.2 *Domestic*

To prevent discharge of raw sewage of the City into River Jojari from different channels, the RUIDP has already established a STP having capacity of 20 MLD at Banard Road in the Year 2006 at the cost of **Rs. 4.21 Crores**. This STP takes care of the sewage of eastern parts of Jodhpur City covering Mahamandir, Rai Ka Baug and nearby areas.

A Second STP with the capacity of 50 MLD is under construction since January, 2009 with estimated cost of approx Rs. 34. The construction work of STP is completed and started working on trial basis. DPR has already been prepared and the work is likely to be allocated soon.

The JDA has awarded the work for preparation of DPR for up-gradation of the existing sewerage system and its treatment to M/s N.K. Buildcon at the cost of Rs 100 - 125 crores. The work for preparation of DPR has already been completed. The DPR contains construction of additional STPs, laying of 900 mm diameter trunk sewer from Ratanada to Basni-Benda. Proposed STP site is to be selected for intercepting raw sewage reaching River Jojari through Bamba-Ratanda- Air Port – Binayakia – near major storm water drain. Also, cover repair, rehabilitation and upgrading of Jhalamand sewerage zone to prevent pollution of River Jojari and water bodies through major water storm drains. The treated sewage of Banard STP is presently utilize for irrigation/horticulture.

The RIICO has requested Jodhpur Development Authority (JDA) / Jodhpur Municipal Corporation (JMC) to connect the domestic sewage of Industrial Area with the sewer line to be laid by JDA along Basani Sangria – Salawas Road so that the entire sewage of Industrial areas could also be treated at the proposed Sewage Treatment Plant (STP).

The District Collector has also directed JPNT to segregate Industrial effluents from sewage and lay a separate conduit pipeline from the Industrial area to carry the sewage to Salawas STP.

2.2.3 *Effluent Disposal Methods*

RIICO has developed several industrial areas in and around Jodhpur, i.e. Basni Ph-I, II, MGC Sangaria Ph-I, II, BNPH, Heavy and Light industrial areas etc. The major effluent discharging units operating in these industrial areas are textile dyeing and printing, steel re-rolling, heavy machinery, chemical etc. To treat this wastewater, CETP was established at MGC Sangaria, Jodhpur in the year 2004. The CETP is being managed by Jodhpur Pradhushan Niwaran Trust, Jodhpur (CETP Trust). The District Collector, Jodhpur is Ex-officio Chairman of the Trust whereas the Executive Trustee is elected/ nominated person from the entrepreneurs by the industrial associations. The installed capacity of the CETP is 20 MLD. The project cost of **Rs. 18.21 crore** was met through Rs. 10 crore grants from GoI and the balance Rs. 8.21 crore from entrepreneur's contribution.

Jodhpur Pradhushan Niwaran Trust (JPNT) has already taken-up the project to connect all its member units through closed effluent conveyance system by HDPE pipe / RCC pipe with the CETP so as to prevent their discharge of untreated effluent into open channel leading to River Jojari.

- The first phase of the Project for connecting all the 109 small scale S.S. Re-rolling member units with the CETP through laying of 21 Km HDPE pipe line has been completed in the Year 2004 by NOCIL, Mumbai, with investment of **Rs. 3.13 crores**
- Under the second phase, permission has been obtained by the JPNT from RIICO Ltd. to lay an effluent conveyance system to carry alkaline effluent generated by the 212 small scale Textile processing member units with estimated cost of **Rs. 9.63 crores**. The work has been awarded by JPNT to M/s Tapi Prestressed Products Ltd, Bhusawal, Maharashtra , for laying this alkaline wastewater conveyance system

The work on laying the pipeline will be completed by March 2012 and it covers approx 23 km length of the pipeline in the RIICO Industrial areas. Subsequent to completion of this project, no alkaline effluent of textile units will be discharged into open channel leading to River Jojari.

2.2.4 *Present Status of Ground Water Environment*

2.2.4.1 *Groundwater Resources*

Groundwater occurs under unconfined to semi-confined conditions in rocks of Delhi Super Group, Jodhpur sandstone, Bilara limestone, Nagaur sandstone, Lathi sandstone and unconsolidated valley fills and alluvium. These form the chief source of groundwater in the district. Confined conditions are also met sometimes at deeper levels in the northwestern parts of the district. The highest-irrigated area in district is in Bilara Tehsil followed by Bhopalgarh and Osian tehsil.

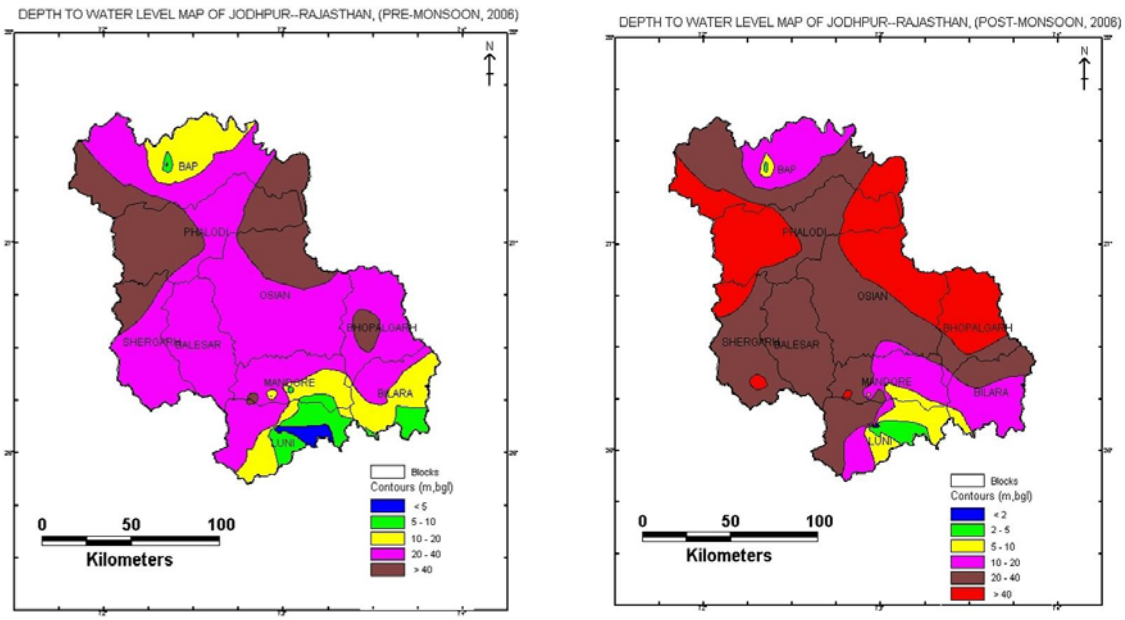

Figure 5: Depth to Water level Map of Jodhpur (Pre and Post Monsoon 2006)[5]

According to the Report "Ground Water Behaviour in the State" (December 2005), prepared by GWD, during the period 1995 to 2005, in Jodhpur, average decline in ground water level has been 5.31m.

Categorization of blocks based on groundwater utilization in Jodhpur is presented in the following map. The present stage of groundwater development in the district is 197.38%, which indicate that the scope of ground water development is already exhausted. Out of 9 blocks, 5 falls under "Over-exploited" category, 2 blocks under "Critical" category, 1 block under semi-critical category and 1 block under safe category. General depth of dug wells and bore wells ranges from 20 to 80 m and up to 200 m respectively.

[5] Ground Water Department (2005), Ground Water Behaviour in the State, Government of Rajasthan

Figure 6: Categorization of Blocks in Jodhpur based on Ground Water Utilization levels[6]

Analysis of the data on water leavel points out that there has been slight decline in the depth to water level over the past 5 years. Water level in dugwells is deeper in the Mandore area. Though detailed studies have not been conducted on the cause of decrease in depth to water level, cause may be the increased availability of water from surface water sources, under utilisation of ground water or geomorphological reasons. Depth to water level data for Jodhpur for the past 5 years is presented in the ***Table 5.***

Table 5: Depth to Water Level in Jodhpur Industrial Cluster[7]

Sl. No	Location	Type of Well	Year	Month			
				Jan	May	Aug	Nov
1	Jodhpur	Dugwell	2005	9.44	10.19	11.39	10.29
			2006	8.99	9.19	8.71	8.79
			2007	8.21	7.89	8.07	8.19
			2008	7.94	8.19	7.34	6.77
			2009	8.09	6.29	6.21	9.31
2	Mandore	Dugwell	2005	16.96	17.64	14.14	12.34
			2006	10.94	23.54	14.24	12.84
			2007	13.11	14.74	23.66	16.44
			2008	17.54		18.54	13.57
			2009	13.61	15.64	14.04	13.14

[6] Central Ground Water Board (2007), District Ground Water Brochure of Jodhpur, Ministry of water Resources, Government of India

[7] Ground Water Board

3	**CAZRI, Jodhpur**	**Tubewell**	2005	36.46	39.99		
			2006	NA	39.95	36.59	35.38
			2007	37.39	36.29	34.89	34.79
			2008	34.54	34.29	33.17	32.34
			2009	32.89	34.89	35.02	32.21
4	**Salawas, Jodhpur**	**Dugwell**	2005	5.62	5.53	2.29	6.35
			2006	NA	6.43	3.40	3.5
			2007	5.60	1.00	5.30	1.05
			2008	5.00	4.80		4.8
			2009		0.60	5.10	

2.2.4.2 *Quality of Ground Water*

Major issues related to ground water in Jodhpur are[8]:

- Decline of water level
- Rising water level (water logging) in Jodhpur city
- Poor Quality
- Industrial pollution
- Less groundwater recharge due to scanty and uneven rainfall.

2.2.5 *Present levels of pollutants in water bodies / effluent receiving drains / ground water*

The RSPCB is monitoring groundwater quality at five (05) locations near Jodhpur since May 2002. These locations include wells located near Civil Airport and Village Vinayaka. ***Table 6*** presents compliance of the samples from the monitored wells with the prescribed standards during the period 2007 to 2010.

[8] Ground Water Board

Table 6: Analysis of Ground Water Quality Data for Jodhpur (2007 – 2009)[9]

Year	No of Samples	Average pH	Percentage Samples showing compliance with Standards	Average DO (mg/l)	Percentage Samples showing compliance with Standards	BOD 3 at 20°C	Percentage Samples showing compliance with Standards
2007	10	7.52	100%	3.6	0%	2.23	80%
2008	10	7.42	100%	3.7	0%	1.45	90%
2009	10	7.62	100%	3.24	0%	1.43	90%

Analysis of the available data on the groundwater quality monitoring conducted by RSPCB indicates that pH levels were well within the prescribed limits for drinking water quality namely; IS 10500:1991.

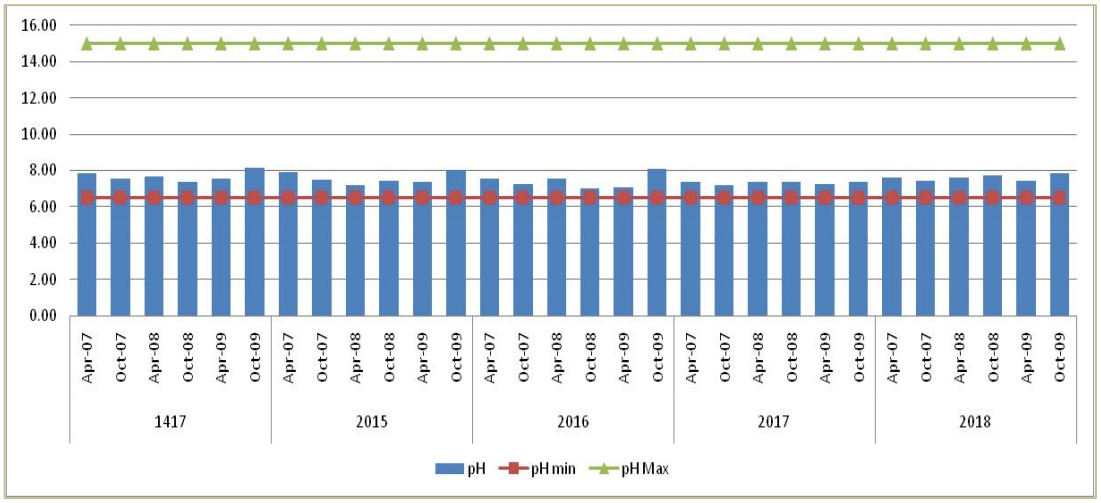

Figure 7: Water Quality Analysis: pH levels in Ground Water (2007 – 2009)

Source: Central Laboratory, RSPCB

[9] RSPCB

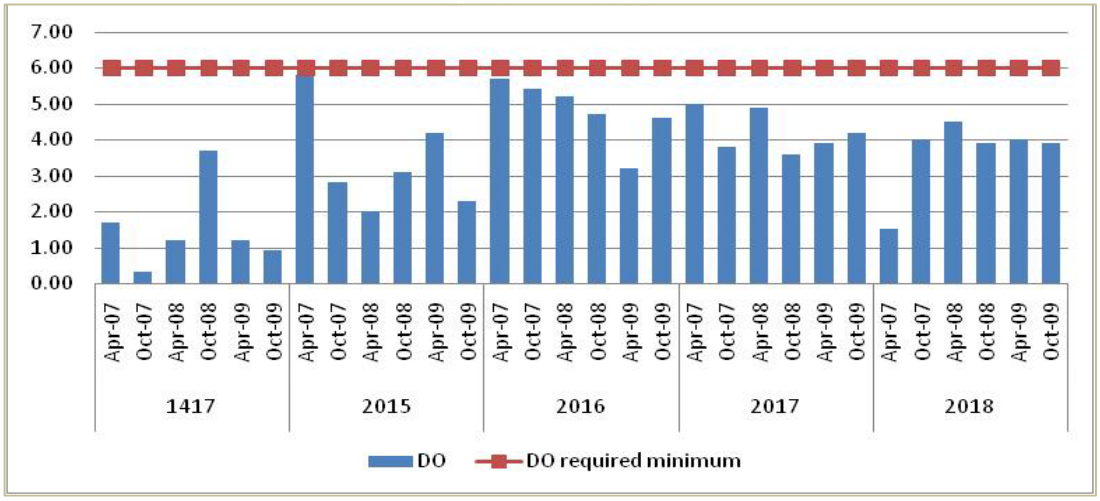

Figure 8: Water Quality Analysis: DO levels in Ground Water (2007 – 2009)

Source: Central Laboratory, RSPCB

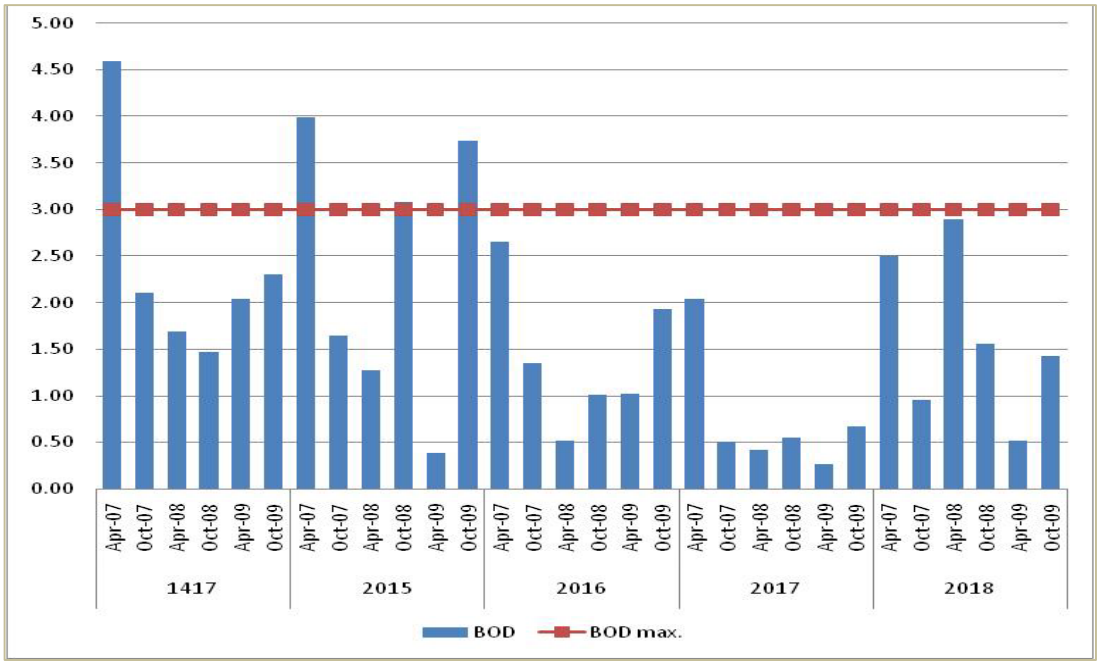

Figure 9: Water Quality Analysis: BOD levels in Ground Water (2007 – 2009)

Source: Central Laboratory, RSPCB

The water quality monitoring data for various wells in Jodhpur by RSPCB is presented as Annexure. Data on groundwater quality monitoring by the Groundwater Board is presented in the ***Table 7.***

Table 7: Water Quality Monitoring Data by CGWB

S. No	Parameters	Standards		Units	Monitoring Locations & Years						
		IS:10500 Desirable	IS:10500 Permissible		2006-07	2007-08				2008-09	
					Jodhpur	CAZRI	Jodhpur	Mandore	Salawas	Mandore	Jodhpur
1	pH	6.5-8.5	6.5-8.5	-	8.25	7.81	7.89	7.77	7.55	7.76	7.77
2	EC, at 25° c	NA	NA	µmhos/cm	3220	1670	2620	1320	11700	1440	3710
3	CO_3	NA	NA	mg/l	0	0	0	0	0	0	0
4	$HC0_3$	NA	NA	mg/l	122	232	390	415	512	317	451
5	CI	250	1000	mg/l	604	245	351	174	2520	197	640
6	SO_4	200	400	mg/l	250	182	320	93	2240	150	103
7	NO_3	45	No Relaxation	mg/l	710	204	331	43	33	101	671
8	PO_4	NA	NA	mg/l	0.02	0.07	0.05	0.05	0.05	0.08	0.04
9	TH	300	600	mg/l	750	460	680	375	2655	350	868
10	Ca	75	200	mg/l	100	100	138	96	728	77	142
11	Mg	30	100	mg/l	122	51	81	33	209	38	125
12	Na	NA	NA	mg/l	478	198	337	137	1665	162	480
13	K	NA	NA	mg/l	7.8	3.9	6.5	38	55	60	8
14	F	1	1.5	mg/l	0.82	0.7	1.42	0.67	2.06	0.41	1.18
15	Fe	0.3	1	mg/l	0.04	0.06	0.07	0.03	0.05	2.52	0.06
16	SiO_2	NA	NA	mg/l	30	17	22	18	38	17	34
17	TDS	500	2000	mg/l	2093	1086	1703	858	7605	936	2412

In addition to existing wells, 9 more wells have been identified for groundwater quality monitoring. These wells are located at Sangaria, Tanwara, Salavas and Nandvan. The monitoring at these locations has already started from **April, 2011**. The estimated cost of monitoring at these locations is Rs**. 1 Lakh per year.** RSPCB has also suggested installation of four (4) piezometers wells near the Keru MSW disposal site for monitoring of groundwater quality.

2.2.6 *Action Plan for Control of Pollution*

2.2.6.1 *Pollution control measures installed by industries*

Most of the polluting industries are connected to the CETP. Lined drains have been provided for carrying effluents to the CETP.

2.2.6.2 *Infrastructure renewal*

1) Upgradation to existing CETP

The status of the action taken/been taken for up-gradation of CETP, Jodhpur is as under:

1. Up-gradation of primary treatment of CETP (**Rs 3.70 crores**): The work of up-gradation of the facility of CETP, Jodhpur has already been completed in the Year 2010 at the cost of Rs 3.70 Cr. This work included mainly up-gradation of the primary treatment arrangement of the CETP
2. Conduit pipeline system for transportation of alkaline waste water from textile industries to CETP: The work has already been awarded by JPNT to M/s Tapi Prestressed Products Ltd, Bhusawal for laying this alkaline wastewater conveyance system with estimated cost of **Rs. 9.63 crores**. The work on laying the pipeline has already commenced in November 2010 and covers approx 23 km length of the pipeline in the RIICO Industrial area. The expected date of completion of the Project shall be by the end of **March 2012**.
3. Construction of treated water storage tank: The CETP Trust is planning to utilise the treated effluent for plantation/aforestation purpose and for which request is made to JDA for providing / allocation of large land area to them. The CETP Trust also proposes to construct the storage tank of the treated effluent at the land site so allotted to it for plantation/aforestation, for efficient utilization of the treated effluent.

4. Setting up of RO system: At present, no proposal for establishment of RO plant at CETP but proposal of utilizing treated wastewater for plantation and reuse for agriculture under consideration
5. Other infrastructure facilities and green belt development: The JPNT has proposed to take up following activities for the improvement of the infrastructure facilities of CETP and to develop green belt with the help of treated water of CETP.
    a. Installation of proper water meters at appropriate locations.
    b. Qualified and experienced persons to be appointed to look after the technical and administrative problems associated with the functioning of CETP
    c. Laboratory facility to be suitably upgraded and
    d. Additional DG sets to be installed to take care of power failure

A meeting was convened under the Chairmanship of District Collector on March 22, 2011. The meeting was attended by the key officials of the concerning departments including Irrigation Department, Public Health Engineering Department, Ground Water/Water Resource Department, Industries Department, JPNT and RSPCB. During the meeting it was submitted that all the water polluting industries are being connected with CETP through closed conduit conveyance system which will prevent flow of polluted effluents into the open drain leading to River Jojari. This will result into improvement in groundwater quality in the downstream of River Jojari.

2.2.6.3 *Rainwater Harvesting*

Recharging of groundwater through rainwater harvesting (RWH) techniques will be made mandatory for medium and large industries. Entrepreneurs are being motivated by RIICO to adopt the rain water harvesting and a condition in this regard is imposed in the land allotment orders issued by RIICO.

The RIICO Limited is making allocation of new plots with the condition for installation of proper rain water harvesting structures for the proposed industrial unit. This will improve the level of ground water in the industrial cluster as well quality of groundwater. RIICO shall intensely pursue with the industries to install RWH system.

2.2.6.4 *Water Meters and Establishment of RO Systems*

Jodhpur Industrial Areas have hardly any water-intensive industries. Nearly all the water polluting industries which are mainly small scale textile processing industries and small scale SS rerolling industries are having average water consumption in between 50 to 200 KLD, and

therefore these industries cannot be termed as water intensive industries. These industries are also advised by the JPNT to install water meter/flow measuring device at their outlets to monitor the flow of their effluents to CETP, this will also help to monitor their water consumption.

The RIICO, Jodhpur is being directed to make it mandatory for establishment of water meter with water incentive industries located in industrial areas. The RSPCB shall ensure to persuade all the large water consuming industries to provide adequate arrangements including establishment of RO system for recycling of treated effluent into the process so as to reduce the requirement of raw water. The State Environmental Appraisal Committee (SEAC) is also ensuring the provision of tertiary treatment RO system while issuing Environmental Clearance to new CETP under the provisions of EIA notification 2006 for encouraging recycling of treated effluent.

2.2.6.5 *Desilting of water tanks, drains, rivulets etc*

Jodhpur city experiences higher levels of water logging. Lack of proper drainage resulting from clogging of existing drains due to indiscriminate dumping of wastes and siltation. Hence, it is proposed to mandatorily desilt the drains annually as pre-monsoon preventive maintenance.

2.2.6.6 *Treatment and management of contaminated surface water bodies*

- Stoppage of effluent disposal to River Jojari. It should be noted that JPNT is already in the process of execution of project for laying closed pipeline effluent conveyance system to CETP to prevent the discharge of polluted effluent into any open drain leading to River Jojari..

2.2.6.7 *Proposed water pollution abatement measures*

- Explore the possibility of development of the groundwater quality contours with groundwater board. The systematic study regarding variation of groundwater quality within the radius of 10 km from the industrial area can be considered after consultation with groundwater department.
- A Study by CAZRI/AFRI on identification of suitable plant species which can be successfully grown using treated waste water.

- Explore the possibilities to identify land parcels and their allotment for plantation based on recommendation of CAZRI/AFRI study report on raising a plantation of suitable plant species using the treated waste water.
- Study for development of lined channel system in the river course of Jojari River for disposal of treated effluent at suitable disposal point in order to prevent groundwater pollution in nearby area in consultation with district administration/water resource department.

2.2.7 *Managerial and Financial Aspects*

The details of actions to be undertaken and associated budgetary provision and expected timelines of completion has been tabulated in the Short and Long-term Action Plans incorporated in the Report.

2.2.7.1 *Identified private / public sector, potential investors and their contribution/obligation*

RIICO is the agency which would be responsible for development of industrial areas and provision of environmental infrastructure to abate pollution from industrial units. RIICO should be backed by relevant industrial associations and industries in respective areas to bring in perceptible improvement in environmental quality.

Local body; namely Municipal Corporation of Jodhpur is the agency to provide city level facilities. Both these agencies would have to work in tandem in aspects like shifting of industries, stoppage of effluent and waste related disturbances / negative externalities on canals, lakes and other sensitive receptors. Support of the Ground Water Board and Water Resources Department shall be sought in rejuvenation of traditional water harvesting structures and rain water harvesting.

For large infrastructure projects, National competitive bidding procedure should be adopted to bring in required technical expertise and investment. Funds from various Central and State government schemes in addition to attracting investment and operating support from specialised private agencies shall be suitably selected for various projects.

2.2.7.2 *Governmental / Budgetary support requirement*

For city level infrastructure projects, suitable funding can be availed from existing Central and State Government schemes like UDISMT.

2.2.8 *Monitoring System*

A self monitoring system should be arranged within the industry premises for regular monitoring at the ETP. This would help in checking the effluent quality reaching the CETP thus reducing the effective load on the treatment facility.

2.2.9 *Impact on CEPI Score*

Pollution load in the identified clusters is long term and cumulative. Marked change in the CEPI index would be resulted only after longer durations. Change in CEPI Score post implementation of the pollution abatement measures is shown in ***Table 8.*** The CEPI score is expected to reduce to **39**.

Table 8: CEPI Score for Water Environment Post Implementation of Action Plan

S.No	Industrial Cluster	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Sub Index, Water
1	**Existing CEPI**	6	5	28	7	3	3	13	5	3	0	15	10	65.5
2	**Post Action Plan CEPI**	3	5	15	3	3	3	9	5	3	0	15	0	39

2.3 *Air Environment*

2.3.1 *Present Status*

Jodhpur has more than 3 lakh registered vehicles and many industrial units, which are likely to contribute to air pollution. In addition, the quarrying of sandstones in Sursagar and Mandore area are the other major sources, contributing to the region's air pollution.

2.3.1.1 *Critical locations for air quality monitoring*

Rajasthan State Pollution Control Board is monitoring the ambient air quality at three monitoring stations under National Air Quality Monitoring Programme (NAMP). These stations are located at Sojati gate, RIICO Office and Maha Mandir Police Thana. In addition, three monitoring stations (DIC Office, Shastri Nagar Police Station, and Office of Housing Board Chopasni Road) are being operated under State Air Quality Monitoring Programme (SAMP). The status and trends in ambient air quality are detailed in following sections.

The State Board is also planning to expand the existing number of monitoring stations from six to nine on the recommendation of Regional Office, Jodhpur apart from the proposed CRTAQMS. The proposed stations shall be located in the residential area or close to major traffic intersection points or industrial areas.

2.3.1.2 *Present levels of pollutants in air*

The main sources of air pollution are natural dust and vehicles which contribute minimally to the pollution load. The trucks carrying products from mining belts also adds to pollution.

Table 9 consolidates the air pollution monitoring data for various locations in Jodhpur. Analysis of the air pollution monitoring data from these locations shows that main contributors to pollution are RSPM and SPM levels. Nearly 100 percent of the samples from all locations for all months from March 2005 to March 2010 showed compliance with respect to standards for SO_2 and NOx. For all samples from all monitored locations, SPM and RSPM levels are well ahead of allowable standards. This is mainly attributed to the wind characteristics and desert like climatic and soil structure of Jodhpur.

Table 9: Analysis of Air Quality Data for Jodhpur Industrial Cluster (2005 – 2010)

Period	Location: Mahamandir			
	RSPM	**SPM**	**SO_2**	**NO_x**
Standards	**60**	**100**	**80**	**80**
average 2005 - 06	110.6	316.6	7.9	20.0
average 2006 - 07	132.5	354.3	6.1	20.2
average 2007-08	160.3	385.2	5.3	19.3
average 2008 -09	167.7	429.8	5.5	22.2
average 2009 - 10	171.4	414.7	5.2	20.7

Period	Location: Sojatigate			
	RSPM	**SPM**	**SO_2**	**NO_x**
Standards	**60**	**100**	**80**	**80**
average 2005 - 06	119.5	331.7	8.2	19.9
average 2006 - 07	139.3	369.1	7.0	22.1
average 2007-08	150.8	376.8	7.4	25.4
average 2008 -09	177.0	429.1	7.0	25.4
average 2009 - 10	186.5	431.1	6.4	24.4

Period	Location: R.O.Office			
	RSPM	**SPM**	**SO_2**	**NO_x**
Standards	**60**	**100**	**80**	**80**
average 2005 - 06	115.7	319.6	7.9	19.6
average 2006 - 07	118.9	353.5	6.5	21.5
average 2007-08	155.6	381.8	6.8	24.3
average 2008 -09	160.1	419.2	6.3	23.7
average 2009 - 10	167.7	404.3	5.9	23.3

Period	Location: DIC Office			
	RSPM	**SPM**	**SO_2**	**NO_x**
Standards	**60**	**100**	**80**	**80**
average 2005 - 06	106.5	358.4	8.2	19.7
average 2006 - 07	116.8	361.4	7.0	22.1
average 2007-08	116.8	367.0	7.1	24.7
average 2008 -09	110.1	337.1	6.3	23.9
average 2009 - 10	127.5	359.0	5.8	22.8

Period	Location: Shastri Nagar Police Station			
	RSPM	**SPM**	**SO_2**	**NO_x**
Standards	**60**	**100**	**80**	**80**
average 2005 - 06	132.7	407.9	8.2	19.7
average 2006 - 07	156.6	463.0	7.0	22.4
average 2007-08	131.8	407.3	7.5	25.6
average 2008 -09	131.4	400.0	6.7	24.6
average 2009 - 10	140.6	379.7	6.0	23.3

Period	Location: Office of Housing Board Chopasni Road			
	RSPM	**SPM**	**SO_2**	**NO_x**
Standards	**60**	**100**	**80**	**80**
average 2005 - 06	109.6	378.4	7.9	19.4
average 2006 - 07	119.2	395.0	5.7	19.7
average 2007-08	118.3	369.1	5.2	20.4
average 2008 -09	108.6	321.7	5.3	21.6
average 2009 - 10	114.4	334.1	5.1	20.4

SO_2 and NOx values are low and within prescribed limits. RSPM and SPM levels shows an increase during February - March, May - June (mostly in June) and October - November during each year for most of the locations monitored. RSPM levels have increased over the past 5 years, with higher values shown during the recent years (2009, 2010). Except for samples from Shastri Nagar and the Office of the Housing Board, there had been considerable increase in the SPM levels over the past 5 years. Maximum increase in SPM and RSPM levels are observable for Sojati Gate monitoring station over the past 5 years. Mahamandir and RO Office monitoring stations also recorded similar upward trend in SPM and RSPM values over the past 5 years.

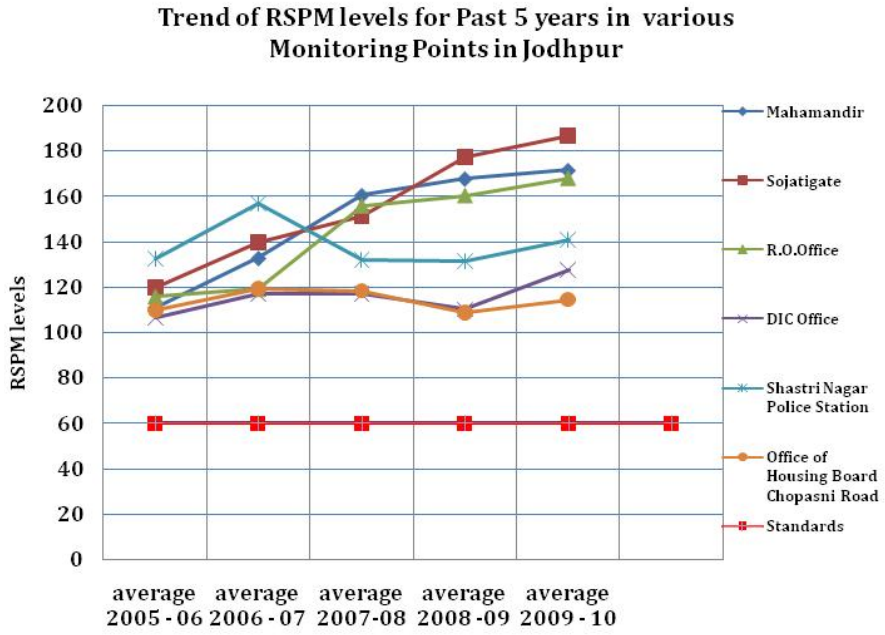

Figure 10: Air Quality Analysis: Trend of RSPM levels at Various Monitoring Locations in Jodhpur (2005 – 2010)
(source: Central Laboratory, RSPCB)

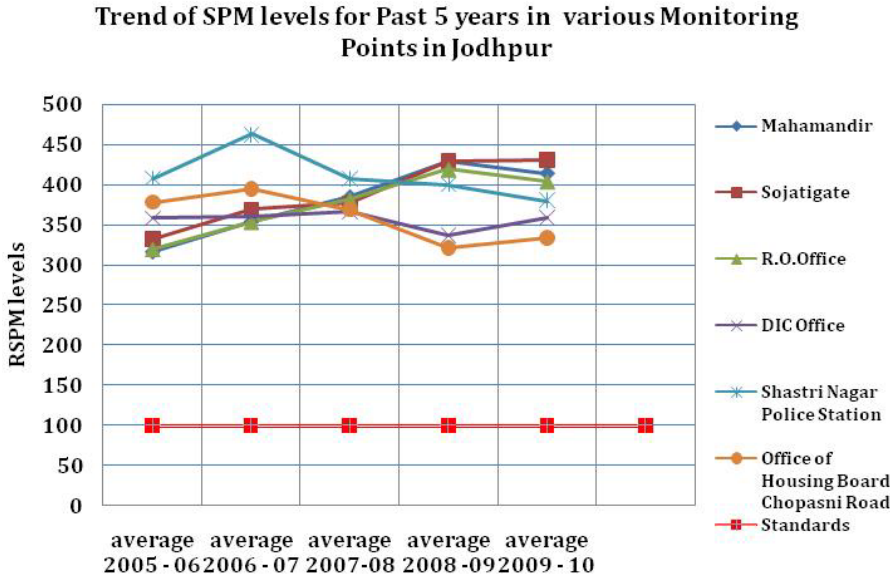

Figure 11: Air Quality Analysis: Trend of SPM levels at Various Monitoring Locations in Jodhpur (2005 – 2010)
(Source: Central Laboratory, RSPCB)

The salient features of action plan proposed to control vehicular pollution are as follows:

- Implementation of the already prepared traffic master plan.
- Effective checking of vehicular emissions.

- Incorporation of environmental policy parameters in urban planning.
- Phasing out all grossly polluting vehicles.
- Development of green belt around the city.
- Master plan to shift various commercial activities located in densely populated areas to outside area to the outskirts of the city.
- Detailed assessment of air pollution problems in the city.
- Formulation and implementation of the parking policy for the city area

2.3.2 *Sources of Air Pollution*

2.3.2.1 *Air polluting industries in the area / cluster*

Air polluting industries are less in number. Main units which contribute to air pollution are cement industries, stone cutting / polishing industries and household industries which use biomass as fuel.

2.3.2.2 *Air pollution due to Road Traffic / Vehicular Emissions*

The vehicular load in the city of Jodhpur has increased from 2,38,880 to 3,66,399 in last six years. For the purpose of vehicular air pollution assessment, the city can be divided into two categories i.e. old walled city area and the outer new city areas. Old city area has congested sites (markets, residential areas) with heavy vehicular load, while new city area has less congested sites with moderate to heavy vehicular load where the roads are wide but less congested. Vehicular load here also includes heavy motor vehicles. State and national high ways pass through this area. Big commercial complexes are developed along the wide roads. Steady increase of RSPM and SPM levels above the standards were observed in Sojati gate area in the walled city, traffic intersections in the city and areas like Mahamandir and Chopsni road which may be due to higher vehicular density in the City[10].

There are four flying squads which are operated by Transport Department in Jodhpur City to check the vehicular emissions for their conformity for Pollution Under Control (PUC). These squads have checked 18,250 vehicles till December, 22 2010 and have taken action against 1,827 vehicles which were not complying with the vehicular emission standards. The Government of Rajasthan vide notification dated 22-12-2010 has made it mandatory that registration of new Auto Rickshaw shall be permitted only with the clean fuel like

[10] Sharma RC, Et.al (2006), Environmental Health Study in Jodhpur, Desert medicine Research Centre.

CNG/LPG. The number of Auto Rickshaws in the Jodhpur City has increased from 6,000 to 6,400. The 400 new Rickshaws shall operate only on cleaner fuels like LPG and CNG. Till March 22, 2011, there were 5,890 Auto Rickshaw in Jodhpur running on diesel. Transport Department, Jodhpur has issued licenses to 157 Rickshaws which shall use LPG/ CNG as fuel.

For prevention of fugitive air emissions from vehicles due to transportation of product/mineral following measures are in practice.

- JMC has directed the transporters of Municipal Solid Waste to cover the trucks while transporting the waste from City area to disposal site.
- The RSPCB, while issuing consent of mining units under the provisions of Air (Prevention and Control of Pollution) Act, 1981 generally directs the mines owner to cover the trucks with tarpaulin while carrying or transporting the minerals from the Mines. The compliance will be check by the RSPCB.
- The RSPCB has issued Guidelines for Abatement of Pollution in Stone Crusher Industry for effective prevention and control of fugitive emissions in the manufacturing and handling of Stone quarries.
- The JMC has also restricted the entries of the trucks carrying products /minerals during the day time for control of fugitive emissions in city areas.
- The JMC, JDA and RIICO Ltd. have taken up plantation in the residential, commercial and industrial areas for control of fugitive emissions.
- Laying of cement concrete interlocking blocks is encouraged in the City/Industrial area to prevent fugitive emissions of fine road side dust/sand.

2.3.2.3 *Air pollution due to emissions from Treatment facilities*

Table 10: Monitoring of flue gas emission from incinerators installed at CBMWTFs[11]

CBMWTF	**Incinerator capacity (kg/hr.)**	**A.P.C.D. installed**	**PM (mg/ Nm3)**	**HCl (mg/ Nm3)**	**NOx (mg /Nm 3)**	**SO_2 (mg /Nm 3)**	**Combustion efficiency(CE) (%)**
M/s. Sales Promoters, Jodhpur, Rajasthan	100	Wet Venturi Scrubber followed by ID fan & stack	415	144	186	491	72.92

[11] Parivesh (2008) Central Pollution Control Board

2.3.3 *Action Plan for compliance and control of pollution*

2.3.3.1 *Existing infrastructure facilities – Ambient Air quality monitoring network*

Expanding the Air Quality Monitoring network of Jodhpur by introducing monitoring stations in major traffic intersections and industrial estates is essential.

Presently, the State Board is already carrying Ambient Air Quality monitoring under CPCB sponsored National Air Monitoring Program (NAMP) at 6 locations. The two locations for ambient air quality monitoring in the industrial areas are located at DIC office and other at RSPCB Regional Office. Beside, ambient air quality monitoring is also carried in residential/commercial areas at four locations; viz. Sojati Gate, Mahamandir, Housing Board office (Choupasani) and Police Station, Shastri Nagar. The ambient air sampling is carried on 24-hr basis for two days in a week at each location. The existing operating cost is Rs.2.7 lakhs per station.

In addition, as per the new National Standards of Ambient Air Quality, for monitoring of PM 2.5, additional capital investment on equipment will be **Rs. 6 Lakhs per station**. Additional recurring costs will be **Rs. 1 Lakh per station**. The monitoring of PM 2.5 shall be commenced after receiving the guidelines from the CPCB.

The site of the CETP may be considered as one of the location as a one of the additional air quality monitoring station.

The State Board has proposed to install Real Time Continuous Air Quality Monitoring System under the guidelines of the CPCB. The State Board has already given order for the procurement, installation and operation of the system to M/s Environment S.A. (India) Ltd. through NTCP at the cost of **1.25 crore**. The installation work is likely to commence by **March 2012**. The system will provide real time Ambient Air Quality for PM10, SO2, NOx, CO, O3 and BTX. The real time data shall be available with Board's Head office and Regional Office, Jodhpur. The station will also provide necessary metrological data including wind speed, wind direction, temperature, pressure and humidity.

The progress regarding the establishment of Real Time Ambient Air Quality Monitoring Station has been documented above. This station shall be established in the campus of District Collector Office, Jodhpur and therefore the Ambient Air Quality data collected from the station will be used for scientific assessment of air pollution in the City area.

Three additional ambient air quality monitoring stations (existing 6 stations) to monitor the ambient air quality as per the NAAQMS are under consideration in Jodhpur with analytical facilities (lab facilities in Jodhpur industrial clusters.

The State Board shall carry out ambient air quality monitoring in any of the polluted areas, identified by JMC / JDA.

2.3.3.2 *Technological intervention*

Introduction and switch over to cleaner fuel

- Possibility of switch over to Gas as the fuel for high fuel consumption industries (subject to availability) needs to be explored.

2.3.3.3 *Actions Taken for Reduction of Pollution Due to Vehicles*

The Transport Department has implemented following actions to reduce the vehicular pollution:

- Introduction of one way traffic on Ranchod Das Ji Ka Mandir to Puri during the day period (between 9 AM to 9 PM) so as to reduce the traffic density on the referred roads during the pick hours.
- Ban entry of heavy commercial vehicle inside the City areas during the day hours (7 AM to 10 PM) to prevent vehicular pollution.
- Ban on new permits to diesel based Auto Rickshaws in the City as per the Notification dated 22.12.2010, issued by the Government of Rajasthan. The maximum Auto Rickshaws to be permitted in the Jodhpur City is increased from 6,000 to 6,400. The 400 new Rickshaws shall operate only on cleaner fuels like LPG and CNG. Till March 22, 2011, there are 5,890 autos in Jodhpur running on diesel. Transport Department, Jodhpur has issued licenses to 157 Rickshaws which are to use LPG/ CNG as fuel.
- Regular monitoring of the vehicles regarding conformity of the emission levels within the prescribed norms. There are four flying squads in place and operated by Transport Department in Jodhpur city to check the Pollution Under Control (PUC). These squads have checked 18,250 vehicles till March, 22 2010 and have taken action against 1,827 vehicles which were not complying with the vehicular emission standards.
- Regular monitoring of the quality of the fuel being used by the vehicles.

- Periodic education and awareness camps for the public, drivers, transporters and other stake holders.
- The phasing out of 15 years old vehicles is being implemented as per the Hon'ble Supreme Court's Orders. As per information, the work of identification of 15 year old vehicles on road is in progress.

2.3.4 *Managerial and Financial Aspects*

2.3.4.1 *Cost and time estimates*

Cost and time estimates are provided in the consolidated tables on Action Points.

2.3.4.2 *Identified private / public sector, potential investors and their contribution/obligation*

RIICO is the agency which would be responsible for development of industrial areas and provision of environmental infrastructure to abate pollution from industrial units. RIICO should be backed by relevant industrial associations and industries in respective areas to bring in perceptible improvement in environmental quality. Local body; namely Municipal Corporation of Jodhpur is the agency to provide city level management measures, greening the city; development of parks, open spaces and those related to traffic management. Both these agencies would have to work in tandem in aspects like shifting of industries. For projects involving the creation of buffers, and green belts, support of the Forest Department shall be sought in identifying areas for development of buffers/green belts, selection of local and resistant species, and to finalise the maintenance mechanism.

For large infrastructure projects, National Competitive Bidding procedure should be adopted to bring in required technical expertise and investment. Funds from various Central and State government schemes in addition to attracting investment and operating support from specialised private agencies shall be suitably selected for various projects.

2.3.4.3 *Governmental / Budgetary support requirement*

For city level infrastructure projects (like traffic management measures) suitable funding can be availed from existing Central and State Government schemes like UDISMT.

2.3.5 *Monitoring System*

A self monitoring system should be arranged within the industry premises, all incinerators and CWBTF for regular monitoring.

2.3.6 *Impact on CEPI Score*

Impact on the CEPI score after installation and commissioning of air pollution control systems has been calculated in ***Table 11.*** The CEPI score is expected to reduce to 47.5.

Table 11: CEPI Score for Air Environment Post Implementation of Action Plan

S. No	CEPI Score	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Sub Index, Air
1	**Existing**	3	5	15	6	3	3	12	5	3	5	20	5	52
2	**Post Action Plan CEPI**	3	5	15	4.5	0	3	7.5	5	3	5	20	5	47.5

2.4 *Land Environment*

2.4.1 *Waste Generation and Management*

2.4.1.1 *Municipal Solid Waste classification and quantification*

JMC, Jodhpur has already carried the quantification and characterization study of Municipal Solid Waste through Consultant. As per the report, the estimated total generation of municipal solid waste of Jodhpur is approx. 350 TPD. JMC has also prepared an Action Plan for development of landfill site at Keru. A Compost Plant (100 TPD) has been installed in the **Year 2007**.

The draft of bye-laws have been prepared by JMC for the source segregation and disposal of MSW including C&D waste and submitted for approval before the competent authority. The byelaws have not come into force yet, as they are pending approval from competent Authority.

RSPCB vide their Notification dated **July 21, 2010** has completely banned the manufacture, storage, use and disposal of the plastic bags in the entire State from **01 August 2010**. The implementation of notification is rigorously implemented by the Regional Office of RSPCB at Jodhpur along with the District Administration.

The status of development of a Municipal Solid Waste (MSW) processing, treatment and disposal site for Jodhpur city is presented in ***Table 12.***

Table 12 Status of MSW Site for Jodhpur City

S. No.	Particular of the work	Present status
1.	Identification and status of the land	The land for the development of MSW facility has already been identified near village KERU. The area of the land is around 297 acres and it has been allotted to JMC for development of the site.
2.	Preparation of DPR for MSW facility	JMC is to appoint consultant for preparation of DPR. The matter is under process.
3.	Execution of the project	The Director, Local Bodies, LSG Department has issued EOI for development of the facility on PPP/BOOT basis. 23 Bidders have submitted their response to the EoI and have participated in the presentation organized at Jaipur on March 7, 2011. The process of selection of the bidder for implementation of the project is in progress
4.	Existing facility	The JMC has installed Compost Plant (100 TPD) in the year **2007** at the cost of **Rs 19 Cr**. The plant is under operation.

2.4.1.2 *Hazardous waste*

No hazardous waste dump site is identified in Jodhpur by the State Board or the related agencies like RIICO, JPNT. This has already reported with the Action Taken Report 2010 submitted by RSPCB to the MoEF in compliance of the directions given by the Hon'ble Supreme Court. The details of Hazardous Waste Generation in Jodhpur are presented in ***Table 13.***

Table 13: Details of Hazardous Waste Generated in Jodhpur district

Industrial Area	**Hazardous Waste Generated**			**Hazardous Waste Disposal**			
	Schedule - I (MTA)	Schedule – II (MTA)	Total (MTA)	Land Disposable	Incinerable	Reprocessable	Discarded Containers
Jodhpur	8004.76	0	8004.76	294.12	5290.1	2420.54	0

The State Board has already directed all the identified units including CETP, generating hazardous waste to store their hazardous waste, not exceeding 90 days, under the cover shed and on lined cemented floor to prevent any contamination of soil/ground water due to leachates. The Board has also directed these industries (including CETP) to dispose their hazardous waste with the authorized Treatment, Storage and Disposal Facility developed by Rajasthan Waste Management Project near village Gurli, Dist. Udaipur (TSDF, Udaipur).

Apart from a Hazardous Waste Management facility at Udaipur, another facility has been approved and established at Balotara for disposal of Hazardous Waste from Jodhpur. The Consent to Operate (CTO) has been granted. The site has already started functioning. The RSPCB is reviewing the compliance of these directions while granting authorization to such units/CETP under the provisions of Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008. In case of any violation the Board takes stringent actions against the defaulting unit which may also include issue of direction of closure under section 5 of Environment (Protection) Act, 1986.

Existing Common Treatment, Storage & Disposal Facilities (CHWTSDF), Udaipur

A State level facility for disposal hazardous waste one Common Hazardous Waste Treatment; Storage & Disposal Facility has been developed at Village Gudli, Tehsil Mavli Distt. Udaipur in an area of 8 Hectare by Udaipur Chamber of Commerce & Industries, Udaipur (UCCI) under the name of Rajasthan Waste Management Project through M/s Ramky Enviro Engineers Ltd., Hyderabad with a estimated capital investment of Rs. 18.0 Crore. The establishment work of the first phase of this Facility had been completed with investment of app. Rs.8.0 Crore and was commissioned in October'2006.

Co-processing of hazardous waste in cement kilns

The State Board is also encouraging the hazardous waste generating units including CETP for co-processing of their hazardous waste in the Cement Kiln of nearby large Cement industries for utilization of calorific value of their waste as well as to reduce their cost for disposal with prior approval from CPCB under Rule 11 of Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008. Shri Cement Ltd has been granted permission for co-processing of CETP sludge of Jodhpur CETP vide letter dated 22/03/11.

Development of laboratory: The State Board has developed a fully fledged analytical facility with well qualified scientific officials for analysis & characterization of hazardous waste at its Central Laboratory at Jodhpur.

The Regional Office of RSPCB at Jodhpur has also been entrusted the work for monitoring of the provisions of HW (M,H & TM) Rules, 2008 by the identified hazardous waste generating units as well as disposal facilities of their jurisdiction.

2.4.1.3 *Biomedical Waste*

The Bio-medical waste of Health Care Facilities (HCFs) is collected, transported and disposed with the existing bio-medical waste treatment and disposal facility at Jodhpur operated by M/s Sales Promoter having incineration capacity of 100kg/hr. The details are presented in ***Table 14.***

Table 14: Details of Biomedical Waste Treatment Facility in Jodhpur

Aspects	**Details**
Location	Jaisalmer Road, Jodhpur
CBWTF developed & operated by	M/s Sales Promoters
Year of Establishment	September 2006
Area	90mX60m = 5400sqm
Investment	Rs 40 Lakhs
Details of the facility	Waste Treatment Capacity: 800 kgs per shift Incinerator - 100 kg/hr. mfg. by Multifab Gujrat. Pvt. Ltd. Vadodara. Air Pollution device High pressure wet ventury scrubber made of SS. PLC - Siemens make. Autoclave 40 kg./hr. cycle mfg. by Multifab Gujarat. Pvt. Ltd. Vadodara. Shredder 35 kg/hr. mfg. By Multifab Gujarat. Pvt. Ltd. Vadodara.
Authorisation & Consent Details	Authorisation Applied, pending with RSPCB
Cost charged from the health care facility	Rs. 1.80/per bed/per day from bedded units Rs. 100/per month from non-bedded units ie Dental clinics, blood bank, labs etc.
Total quantity of BMW treated on monthly average basis	Yellow (Cat. 1,2,3,6) 6610kg. Black (Cat. 5, 9) 2990kg. Blue (Cat. 4, 7) 77kg. Waste Water (Cat. 8) 39000ltr
Coverage area	Around 150kms radius from plant site. **-District Jodhpur:-** Jodhpur, Shergarh, Balesar, Phalodi, Osiyan, Mathaniyan, Piparcity, Borunda, Bilara, Bhopalgarh, Salawas & Dhundhara. **2-District Pali:-** Pali, Rohat, Sojat, Kharchi, Raipur, Nimaj & Jaitaran
	Jodhpur **Units** **Beds** Above 500 Beds 3 1817 200 to 500 Beds - - 50 to 200 Beds 6 492 Below 50 Beds 63 1093

Aspects	Details		
	Without Beds	57	-
	Pali	**Units**	**Beds**
	Above 500 beds	-	
	200 to 500 Beds	1	300
	50 to 200 Beds	-	-
	Below 50 Beds	7	77
	Without Beds	3	-
Daily Operation Schedule	Collection vehicle leaves the plant at 9:00 am. & reaches back at around 5:00pm. Treatment & disposal timing is 9:30am to 5:30pm		

Source: Solid Waste Management Cell, RSPCB

Total amount of bio medical waste handled by the facility annually (2009-10 data) is 76525 kgs. Average biomedical waste collected by the facility per month is 9500 Kgs. Average waste received per day is around 320 kgs. Percentage composition of categories of BMW treated at the CBWTF at Jodhpur is presented in the figure below.

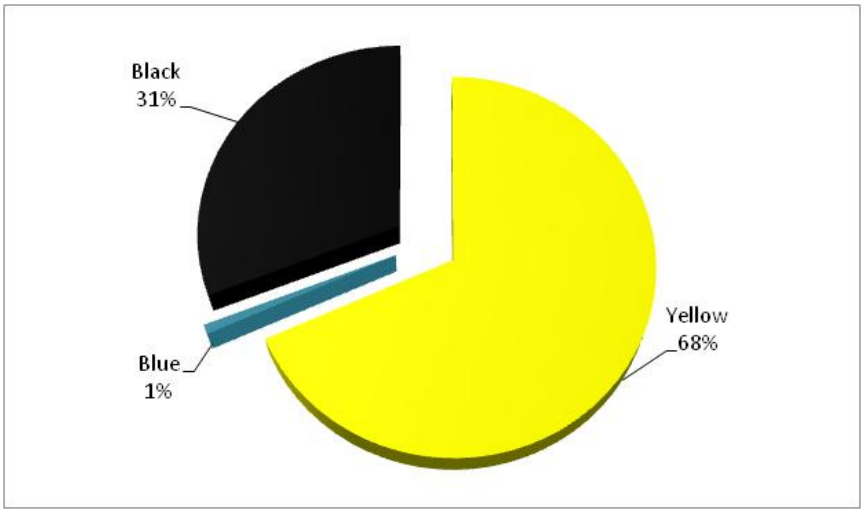

Figure 12: Percentage of Bio-medical Waste Categories Treated at CBWTF, Jodhpur

2.4.2 *Reduction / Reuse / Recovery / Recovery options in the co-processing of wastes*

The State Board is perusing the proper management, handling, disposal and reviews of the waste being generated by the stone processing industries. With the persuasion of the State Board, the marble/sand stone processing units are transporting and disposing their slurry waste at the identified disposals sites by the RIICO / District Administration. The State Board is also perusing the marble processing industries and cement manufacturing industries for utilization of the slurry in manufacturing of cement as the slurry contents high percent of

Calcium Carbonate. The State Board has already sponsored a study to Central Building Material Research Institute for utilization of marble slurry with the cement industries. The study report has already been circulated to the cement industries for their information and to initiate appropriate action for utilization of marble slurry. The cement industries have approached to BIS for guidance.

2.4.3 *Impact on CEPI Score*

Pollution load in the identified clusters is long term and cumulative. Marked change in the CEPI index would be resulted only after longer durations. Change in CEPI Score post implementation of the pollution abatement measure is shown in ***Table 15.*** The CEPI score is expected to reduce to 44.

Table 15: CEPI Score for Land Environment Post Implementation of Action Plan

S.No	CEPI Score	A1	A2	A	B1	B2	B3	B	C1	C2	C3	C	D	Sub Index, Land
1	**Existing CEPI**	3	5	15	3	3	3	9	5	3	5	20	10	54
2	**Post Action Plan CEPI**	3	5	15	3	3	3	9	5	3	0	15	5	44

2.5 *Other Infrastructural renewal measures*

2.5.1 *Green belts*

RIICO Ltd. is planning that all the Industrial Areas are to be provided with open space pockets for development of plantation /greenbelt area. In some of the Industrial Areas, dense plantation has already been developed by RIICO which is being maintained by Industries Associations. RIICO also motivates the Industries Association and individual industries prior to every monsoon to carry out the plantation in their Industrial areas/plots.
In Industrial Area of Boranada, massive plantation work has been carried out by RIICO on the central verge and the right side of way of the roads.

As per approved layout plans of Industrial Area, specific areas/plots have been marked as open areas for green belt development and RIICO has done plantation in those areas. The identified areas and their sizes are as under:

- Basni 10,807 Sqm; Sangria 11,546 Sqm; Mandore 45,326 Sqm and Stone park Mandore 6,151 Sqm.
- JPNT has under taken plantation in the industrial areas since 2006 onwards and have planted 1,050 trees. They have also awarded the work on road side beautification

near Jodhpur University on Pali road and Jodhpur Airport Road to Arid Forest Research Institute, Jodhpur (AFRI). JPNT has paid **Rs. 2,27,835** for the plantation and **Rs 78,538** for the maintenance of the plants for five years to the AFRI.

- About 3,500 Trees had planted in Slum areas in Jodhpur during June to Sept 2010. Aerial seeding of local species over hilly outcrops in the City area was also carried out.

2.5.2 *Public awareness and Capacity Building*

The RSPCB has recently undergone complete restructuring for better management of the State Board activities. Under this restructuring process following new cells/departments were established at the RSPCB Head Office in Jodhpur:

- Planning & Internal Capacity Building Cell
- Technical Cell - 3 Nos, based on various types of industries
- Vigilance Task Force
- Mining Cell
- Solid Waste Management Cell- HW/BMW/MSW/Plastics/e-Waste
- Climate Change Cell
- Miscellaneous Urban Infrastructure Development Cell
- Public Awareness and Assistance Centre
- IT Support and E-governance Cell
- Legal Cell
- Central Laboratory
- Accounts
- Administration and Cess

In addition to monitoring and enforcement, the RSPCB is taking initiatives in the issues and activities related to Public Environmental Education, Awareness and Assistance. Following activities are included in the agenda for public awareness:

- Distribution of promotional literature
- Well established library facility
- Dissemination of information on issues related to brick kilns and lime kilns
- Awareness creation on issues related to Noise Pollution and Noise Pollution (Regulation & Control) Rules, 2000.
- Environmental awareness programs on FM Radio.

The regional office at Jodhpur has 4 technical officers (EE:1, AEE:1, JEE:2) and 4 scientific officers (SO:1, JSO:1 and SSA:2). There is an urgent need to double the strength of technical and scientific staff at regional office Jodhpur with a provision of separate transport facilities to them in order to enhance the regulatory and monitoring functions carried out by this staff in order to enforce the regulatory regime by the regional office Jodhpur.

Training and capacity building of the RSPCB staff is underway. Regular training programs in various technical as well as administrative spheres are being conducted for strengthening of central and regional laboratories. e-Governance is being introduced for faster and better Consent Management and efficient monitoring of environmental infrastructure facilities such as air and water monitoring stations, CETPs, STPs, etc.

2.6 *Summary of Proposed Action Points*

2.6.1 *Proposed Action Plan*

The proposed Action Plan for abatement of pollution is based on the secondary data collected from RSPCB and other concerned agencies. The action points mentioned have been categorized into Short Term and Long Term Measures (refer ***Table 16***) based on the timeframe required for their implementation. Short Term Action Points include measures that require one year or less for implementation, while the Long Term Action Points include measures that require up to one year for implementation.

Table 16: Final Action Plan for Jodhpur Industrial Cluster: Short Term and Long Term Action Points - (REVISED POST CPCB IN-HOUSE COMMITTEE REVIEW)

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
Short Term Action Plan- Air					
1.	Performance monitoring of major air polluting industries for assessment of compliance of the notified air emission standards.	RSPCB, RIICO Industrial Association, CETP Trust	June 2012	Approx. Rs. 25-40 lakhs	The work of stack emission monitoring of the identified major air polluting industries in the industrial cluster would be taken up by the State Board in association with recognized laboratory of the State Board/ CPCB/MoEF for assessing compliance of the emission standards notified under EP Rules '86.
2.	Up- gradation of the air pollution control measures e.g. dust collector, multi cyclone etc. with the non compliance industries.	RSPCB, RIICO Industrial Association, CETP Trust	October 2012	Not Available	The State Board will issue directions under the provision of Air Act' 81 to the non complying industry for up gradation for the air pollution control measures before end of Oct- 2012.
3.	Installation of Real Time Continuous Air Quality Monitoring System	RSPCB	March 2012	Approx. Rs. 1.25 crores	The work of installation of Real Time Continuous Air Quality Monitoring stations is going on and will be functional by March 2012. The system will provide real time Ambient Air Quality for PM10, SO2,

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					NOx, CO, O3 and BTX. The real time data shall be available with Board's Head office and Regional Office, Jodhpur. The station will also provide necessary metrological data including wind speed, wind direction, temperature, pressure and humidity. Efforts are also made for the up-gradation of the system for monitoring of PM 2.5.
4.	Installation of ambient air quality monitoring station	RSPCB, RIICO, Industries Department	March 2012	Approx. Rs. 44-50 lakhs	Three additional ambient air quality monitoring stations (existing 6 stations) to monitor the ambient air quality as per the NAAQMS are under consideration in Jodhpur with analytical facilities (lab facilities) in Jodhpur industrial clusters.
Long Term Action Plan-Air					
1.	Implementation of Traffic Master Plan	Traffic Police, RTO, RSPCB, District Supply Officer, PWD	Continuous Process	-	a. Introduction of one way traffic in selected areas to reduce the traffic density b. Banning entry of heavy commercial vehicle inside the City to reduce vehicular pollution

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					c. Issuing licenses to LPG based autos as per notification dated 22/12/2010 d. Continuous monitoring of vehicles by flying squads of transport department to check PUC e. Regular monitoring of the quality of the fuel being used by the vehicles. f. Periodic education and awareness campaigns for the public, drivers, transporters and other stake holders g. Phasing out of 15 year old commercial vehicles is already in progress. 3,323 autos have been phased till now h. Removal of encroachment on the road side i. Development of parking arrangements by traffic management near the commercial areas by JDA j. Widening of main roads for

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					reducing the traffic congestion and periodic maintenance of roads k. Development of roadside arboriculture l. Construction of multi-storeyed/underground parking areas
2.	Adoption of Clean fuel by the Industry	RSPCB, Industry and Industrial Association, RIICO	--	Not Available	The State Board shall advise the major air polluting industries to adopt clean fuel, depending upon the availability of clean fuel. The State Board may take a view to advise the major air polluting industries for promotion of cleaner fuel and replacement of boiler/thermo pack which are 10 year old.
Short Term Action Plan- Water					
1.	Assessment of the compliance of the effluent quality standards of the water polluting industries with the prescribed standards of effluent quality for inlet to CETP	RSPCB, RIICO Industrial Association, CETP Trust	June 2012	Approx. Rs. 25-40 lakhs	The work of effluent quality assessment of the identified major water polluting industries in the industrial cluster would be taken up by the State Board in association with recognized laboratory of the State Board/ CPCB/MoEF for assessing

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
	as specified under EP Rules				compliance of the inlet to CETP standards notified under EP Rules'86.
2.	Up- gradation of the primary treatment facilities e.g. physicochemical treatment etc. with the non compliance industries.	RSPCB, RIICO Industrial Association, CETP Trust	October-2012	Not Available	The State Board will issue directions under the provision of Water Act' 74 to the non complying industry for up gradation for the primary treatment facilities before end of Oct- 2012.
3.	Installation of Flow meter / Water mater with each member unit of CETP trust for monitoring of compliance of the permitted discharge quantity by CETP Trust.	RSPCB, RIICO Industrial Association, CETP Trust	March 2012	Not Available	RIICO will ensure that each industry sets up water meter/flow meter within the given timeframe. (The work of confirmation for installation of water meter / flow meter by each member unit of CETP Trust shall be out sourced to recognized Agency /laboratory)
4.	Commissioning of additional Sewage Treatment Plant (STP) at Salawas.	RSPCB, RUIDP and Municipal Corporation	September 2011	Approx Rs. 34 crores	Under UIDSSMT scheme, construction of 50 MLD STP project has been sanctioned. The construction work of STP is completed and started working on trial basis. The commissioning of STP is preventing discharge of untreated sewage to river which will result in prevention of contamination of groundwater.

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
5.	Up-gradation of the sewerage system	RSPCB, RUIDP, Municipal Corporation, JDA	March 2012	Approx. Rs. 27 crores	Up-gradation of sewerage system will help in regularizing and to ensuring proper collection and transportation of city sewage. Sewerage system is being developed in the Jodhpur city. Total length of the sewage line is 125 km out of which 90% of the work of laying of the pipeline has been completed. The collected sewage will ultimately be disposed off in Salawas STP for treatment.
6.	Up-gradation of existing CETP at Sagariya	CETP Trust, RIICO, Industrial Associations and RSPCB	December 2012	Not Available	Preliminary study shall be carried out and the report regarding location, capacity and estimated cost shall be submitted. The estimated cost of preparation of the report is Rs. 20-30 lakhs.
7.	Cleaning, Desilting & repairs of the open drains for transportation of untreated industrial effluent to CETP in the industrial area	RIICO CETP Trust , RSPCB	March 2012	Approx. Rs. 20-30 Lakhs	The cleaning of the drains will prevent overflow and spread of effluent on land. This will also help in smooth conveyance of effluent to CETP.
8.	Construction of closed conduit conveyance system for carrying effluent of textile units to	RIICO, CETP Trust and Industrial Association	March 2012	Approx. Rs. 9.63 Crores	Phase-I of the Project for connecting all the 109 small scale S.S. Re-rolling member units with the CETP has already been completed.

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
	CETP				Phase-II includes laying the 23 km pipeline which will carry alkaline wastewater from the RIICO industrial area. The work is already undertaken by Jodhpur Pradushan Nivaran Trust on the own expense.
9.	Performance monitoring of CETPs and STPs	RSPCB, CETP Trust and Municipal Corporation	Ongoing activity	Approx. Rs. 2 lakhs	RSPCB is monitoring the performance of CETP on monthly basis which includes the quality of treated effluent and disposal of ETP sludge. The performance monitoring of additional STP (50 MLD) shall be taken up after its regular commissioning.
10.	Monitoring of groundwater quality	RSPCB, CETP Trust, RIICO	March 2012	Approx. Rs.1- 2 lakhs	The State Board has increased groundwater quality monitoring points from earlier two points to six points around Jodhpur under NWMP having frequency of one sample in six month. The frequency of the sampling of all the six points shall be increased to once in three months for upgrading the monitoring of groundwater quality.
11.	Installation of rain water harvesting system in the buildings and institutions	RIICO, Municipal Corporation , RSPCB	Ongoing activity	Not Available	The RIICO is making allocation of new plots with the condition for installation of proper rain water

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					harvesting structures for the proposed industrial unit. This will improve the level of ground water in the industrial cluster as well quality of groundwater.
Long Term Action Plan- Water					
1.	Construction of the additional CETP for Industries apart from textile & steel industries near Salawas	CETP Trust, RIICO, Industrial Associations and RSPCB	December 2013	Not Available	Preliminary study shall be carried out and the report regarding location, capacity and estimated cost shall be submitted. The estimated cost of preparation of the report is Rs. 20-30 lakhs.
2.	Construction of the additional CETP for Industries near Boranada	CETP Trust, RIICO, Industrial Associations and RSPCB	December 2013	Not Available	Preliminary study shall be carried out and the report regarding location, capacity and estimated cost shall be submitted. The estimated cost of preparation of the report is Rs. 20-30 lakhs.
3.	Reuse and Recycling of treated effluent	RSPCB, RIICO, Industrial Association and CETP trust	December 2013	Not Available	Preliminary study shall be carried out and the report regarding location, capacity and estimated cost shall be submitted. The estimated cost of preparation of the report is Rs. 20-30 lakhs.

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
4.	Construction of the additional STP of 50 MLD capacity at Salawas.	JDA &JMC	-	-	DPR has already been prepared and the work is likely to be allocated soon.
Short term Action Plan- Land					
1.	Augmentation of Treatment and Disposal facility for Biomedical Waste	Medical and Health Department, RSPCB and Municipal Corporation	December 2012	Not Available	The biomedical waste of the health care facilities of Jodhpur is being collected, transported and disposed with the authorized Common Bio Medical Waste Treatment and Disposal Facility located at village Keru near Jodhpur on Jaisalmer Road. The RSPCB is monitoring the disposal of biomedical waste in accordance with the provision of Bio Medical Waste (Handling & Management) Rules 1998. The disposal facility requires augmentation for the compliance of CPCB guidelines for treatment and disposal facility of BMW.
2.	Disposal of Hazardous Waste	CETP Trust, Industries, RIICO , RSPCB, Rajasthan Waste Management System and UCCI	Ongoing activity	---	The CETP sludge from physico-chemical treatment comes under the definition of hazardous waste. This sludge is presently collected, dried and transported to, common treatment storage and disposal facility develop by Rajasthan Waste Management System

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					near village Gudli in accordance with the provisions of Hazardous Waste (Management, Handling & Trans-boundary Movement) Rules' 2008. The RSPCB has advised the CETP Trust to go for co incineration of the ETP sludge in Kiln of Cement Plant with prior approval under the Rules for co-incineration. This will result in reduction of disposal cost as well recovery of the energy.
Short term Action Plan- Land					
1.	Development of Municipal Solid Waste disposal facility	Municipal Corporation, RIICO and RSPCB	Not Available	Not Available	Land of development of Sanitary landfill site has already been identified. Presently, 100 TPD compost plant is partially in operation.
Action Point-Others					
1.	Development of green belt and tree plantation in industrial area	Forest Department, Industry, RIICO, RSPCB	Ongoing activity	Approx. Rs. 30-50 lakhs	The RIICO and Industrial Association is to develop & encourage road side plantation in the industrial cluster as well as to develop green spot in cluster for maintenance of ambient air quality.
2.	Capacity Building for prevention & control of Pollution	RIICO , CETP Trust & RSPCB	March 2013	Not Available	**2. Following actions shall be taken up by the RSPCB:** a. Strengthening of technical and scientific manpower of

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					Regional Office, Jodhpur (RO , Jodhpur) b. Strengthening of regional laboratory of RO, Jodhpur for regular assessment of PCM with the industries, CETP, water quality and air quality of the area c. Education and training of technical and scientific staff of familiarization with the latest technology for pollution control and analytical techniques d. Strengthening of online connectivity of RO, Jodhpur with HO-Jaipur and CPCB Delhi for upgrading the data transfer mechanism e. Seminar and workshop for education and awareness of the project proponents for adoption of cleaner fuel and advanced process techniques for reduction of air emission and effluent discharge **3 Following action shall be taken up by RIICO & CETP**

Sr. no	Action points (Including source and mitigation measures)	Responsible stakeholders/Agency involved	Time limit	Cost	Remarks
					Trust: i. Development of Regional Research Centre for development of new technology for reduction of dyes & chemicals in textile processing as well as reduction of water requirement. ii. To encourage use of cleaner fuel by providing soft loan for replacement / conversion of the existing boiler / thermo pack to cleaner fuel. iii. To develop non polluting industries like weaving units / ready mate garment manufacturing units for diversion of industrial activities. iv. To encourage & provide soft loan to industrial unit which intends to install RO plant at their own for recycling of their effluent.

Note: While recommending the interventions to reduce CEPI, various studies, reports, Master Plans, RSPCB and RIICO data was referred to and wherever the information was available, the costs of interventions have already been included in the Final Action Plan. These interventions will be implemented by different agencies, including RIICO as identified in the Report.

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